

**Integrated Rapid Transport: Is the City of Cape Town utilising its full potential?**

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*He gives power to the weak and strength to the powerless. Even youths will become weak and tired, and young men will fall in exhaustion. But those who trust in the LORD will find new strength. They will soar high on wings like eagles. They will run and not grow weary. They will walk and not faint.*

**Isaiah 40:29-31**

It's all for You Father.

I have truly been blessed with the world's greatest family and no words can even nearly express how much I love you all. I want to thank my Daddy, you have always wanted only the best for me and have always been behind me pushing me to succeed. Without your love, faith and support none of this would have been possible. I could not have asked for a better dad! My Mami, the person on the other side of 99.9% of all my conversations. You are my best friend. You have taught me countless priceless life lessons and I am honoured to call you my mom. Uncle, your faith, love and support has never gone unnoticed, thank you. My big sister Annemi, you are an inspiration to me in so many ways; I look up to you and are so proud to call you my sister.

Angelique, in my mind your name is synonym for hot chips, coffee breaks, peppermint crisp and dogs. You are the most amazing friend anyone could ever ask for. Johan you are my rock, no words can do you justice, thank you.

Prof Schoeman, thank you for your guidance and for believing in me. After all these years I consider you part of my family.

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## **ABSTRACT**

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The spatial structure of Cape Town is characterised by segregated low density development patterns and urban sprawling. With a high population growth rate and urbanisation, these patterns are becoming more prominent. Due to the spatial nature of Cape Town, a large proportion of economic activities and employment opportunities are concentrated in patches across the city. In order to combat low-density sprawl and integrate spatially separated areas the key concept “city densification” and the various elements thereof emerged. The segregated low density city structure, the concentrated nature of economic and employment opportunities along with an ever increasing population and inadequate public transport system resulted in issues such as long average travel lengths, low accessibility by poorer communities, greater use of private vehicles, and a sharp rise in traffic congestion. With the implementation of the Integrated Rapid Transport System (IRT), an initiative to transform the public transport sector to integrate all modal options, the opportunity is rendered to address these environmental, social and economical issues.

The purpose of this study was to determine whether the City of Cape Town (CoCT) is utilising the full potential of the new Integrated Transport System currently being developed and implemented in Cape Town, namely the MyCiTi BRT System. It was determined that in terms of potential environmental benefits the CoCT, is utilising its full potential. Furthermore, although the potential social benefits were being utilised, the urgency of addressing social inequality is not reflected in the phased timeframe set out for the system. In terms of economic benefits, the options of using land-value add and environmental finance currently not sufficiently utilised and should be used to encourage a more sustainable public transport system.

## **KEY WORDS**

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Integrated rapid transit

Bust rapid transit

City densification

Corridor densification

Compact city

Social inequality

Sustainability

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## OPSOMMING

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Kaapstad se ruimtelike struktuur word gekenmerk deur gefragmenteerde lae digtheidsontwikkelingspatrone en stedelike randsproei. Die hoë bevolkingsgroeikoers en verstedeliking veroorsaak dat hierdie ontwikkelingspatrone meer prominent word. As gevolg van Kaapstad se ruimtelike struktuur word die meerderheid ekonomiese- en werksgeleenthede saam gegroepeer. Konsepte soos stedelike verdigting en die verskillende elemente daarvan het begin ontwikkel as moontlike maatstawwe om stedelike randsproei teen te werk en om ruimtelike gefragmenteerde areas te integreer. Die gefragmenteerde stadstruktuur, die konsentrasie van ekonomiese- en werksgeleenthede, tesame met die alewig toenemende bevolkingsgroei en onvoldoende publieke vervoer het aanleiding gegee tot lang gemiddelde rit afstande, lae toeganklikheid vir armer gemeenskappe, hoër gebruik van privaat voertuie asook 'n skerp toename in verkeerskongestie. Met die implementering van die “Integrated Rapid Transport” stelsel word verskeie geleenthede daargestel om hierdie omgewings-, sosiale-, en ekonomiese probleem aan te spreek.

Die doel van die studie was om vas te stel of die stad Kaapstad die volle potensiaal van die “Integrated Rapid Transport” stelsel, naamlik die MyCiTi stelsel, wat huidiglik ontwikkel en geïmplementeer word in Kaapstad, benut. Die studie het bevind dat die stelsel, in terme van omgewingsvoordele, die volle potensiaal benut. Alhoewel die stelsel die potensiële sosiale voordele benut, word die noodsaaklikheid om sosiale ongelykheid te verminder nie in die verskillende fases se implementering tydsraamwerke gereflekteer nie. In terme van ekonomiese voordele, word die opsies om grond-waardetoevoeging en omgewingsfinansiering te gebruik vir die ontwikkeling en implementering van volhoubare publieke vervoer te bevorder nie ten volle benut nie.

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## ABBREVIATIONS

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BPSPCs	Broad Provincial Spatial Planning Categories
BRT	Bus Rapid Transit
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CER	Certified emission reduction
CIF	Climate Investment Fund
CoCT	City of Cape Town
CTF	Climate Technology Fund
DFA	Development Facilitation Act
EFF	External Financing Fund
EIA	Environmental Impact Assessment
GEF	Global Environmental Facility
GHG	Greenhouse gas
IDP	Integrated Development Plan
IMEP	Integrated Metropolitan Environmental Policy
IRT	Integrated Rapid Transit
ITP	Integrated Transport Plan
ITS	Intelligent Transportation Systems
MDB	Multilateral Development Bank
MP	Montreal Protocol
MSA	Moving South Africa
MTSF	Medium Term Strategic Framework
NAYMAP	National Transport Master Plan
NLTA	National Land Transport Act
NSDP	National Spatial Development Perspective
NSI	National Geo-Spatial Information
PCAS	Policy Co-ordination and Advisory Services
PGDS	Provincial Growth and Development Strategies
PGWC	Provincial Government of the Western Cape
POPs	Stockholm Convention on Persistent Organic Pollutants
PSDF	Provincial Spatial Development Framework

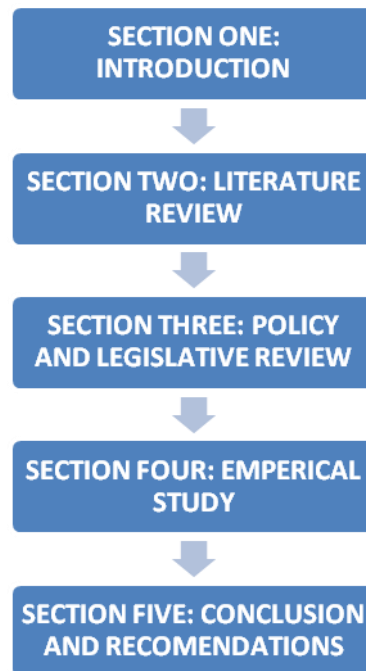
PTISG	Public Transport Infrastructure and Systems Grant
PTOG	Public Transport Operations Grant
RSA	Republic of South Africa
SDF	Spatial Development Framework
SMMEs	Small, Medium and Macro Enterprise
SOV	Single occupancy vehicle
TOD	Transit-Oriented Development
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change

## SECTION ONE: INTRODUCTION

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The objective of the study is to determine whether the City of Cape Town is exploiting the full potential created by the implementation of the new Integrated Rapid Transport System (IRT) system. Possible untapped potential will then be identified and recommendation will be made to fully exploit these. Figure 1 below is a graphical representation of the structure of this report:

FIGURE 1 – STRUCTURE OF THE REPORT



*Source: Own construction, 2010*

The present spatial structure of Cape Town is a good example of a low-density city dominated by sprawling and low density development patterns. Due to the spatial nature of Cape Town, a large proportion of economic activities and employment opportunities are concentrated, leaving much of Cape Town's population imposed by long average trip lengths. Cape Town has a relatively widespread, but poorly integrated and inadequate public transport system. Inadequate public transport results in greater use of private vehicles and a sharp rise in traffic congestion which in return results in various social, environmental and economic issues.

With a shift in Cape Town's focus towards combating low-density sprawl and integrating spatially separated areas, "city densification" and the various elements thereof emerged. City densification, or the "compact city approach", is not a new term and can be found in countless literature studies.

The evolution of the compact city and the various versions thereof and the facets pertaining these concepts are discussed in the literature study (section two).

This section three provides an overview of relevant National, Provincial and Local policies and their implications relating to city densification, corridor development, public transport, integrated rapid transport and sustainability.

Cape Town is in the process of implementing an IRT which is an initiative to transform the public transport sector to integrate all modal options into a coherent package for the customer. This IRT system, known as the MyCiTi Bus Rapid Transit (BRT) system will consist of four phases, which is aimed to be completed within the next 15 to 20 years. The development and implementation of a BRT system has environmental, social and economic impacts on the surrounding areas. These impacts and their applicability to Cape Town will be discussed in the empirical study (section four).

The conclusion and recommendations (section five) will follow the empirical study. This section entail a assessment of the environmental, social and economic impacts of the BRT system Phase 1A which is already completed as well as the planned future phases (Phases 2 to 4) and whether the City of Cape Town is utilising the full potential thereof.

## SECTION TWO: LITERATURE REVIEW

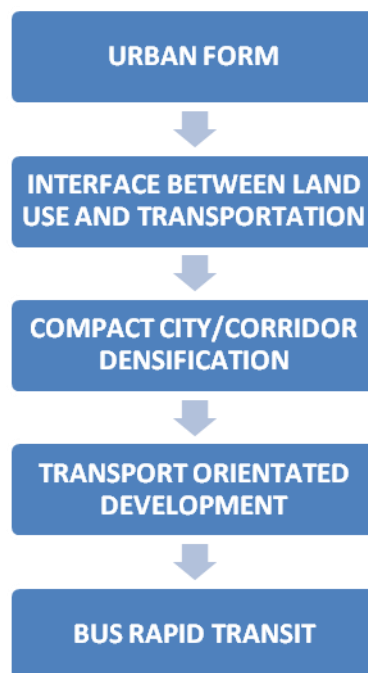
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### 2.1. INTRODUCTION

With ever increasing urban populations, urban patterns began to expand outward beyond the city periphery taking up a dispersed low-density settlement structure, known as urban sprawl. When the focus shifted towards combating low-density sprawl and integrating spatially separated areas, the compact city approach, as well as various versions thereof, emerged.

This section is a literature overview of urban form, the interaction between land use and transportation, the compact city and corridor densification concept, transport orientated development and finally bus rapid transit (refer to Figure 2 below).

FIGURE 2 – OUTLINE OF THE LITERATURE REVIEW



*Source: Own construction, 2010*

### 2.2. URBAN FORM

With urbanisation<sup>1</sup> constantly increasing, urban patterns began to expand outward beyond the city periphery taking up a dispersed low-density settlement structure, known as urban sprawl. The growth of low density urban spatial patterns, large outward expansion, spatially segregated land uses, leapfrog urban development, and prevalent commercial strip development, is generally considered not conducive to a good quality of life in urban areas (Burchell et al., 2000). Hess (2001) lists the negative effects attributed to sprawl, which include economic and racial segregation, crime, poverty, loss of community, increased infrastructure costs, deteriorating air and water quality, loss of greenfield land and open space, increased traffic congestion, and a general degradation in the quality of human life. Ewing *et al.* (2002) adds that the most prominent unintentional causes of urban sprawl are (i) disinvestment in urban core areas and central city decline; (ii) reliance on the use of private cars and therefore to growing travel distance, road congestion and decline of air quality; and (iii) the loss of open space and scenic areas in and close to metropolitan regions.

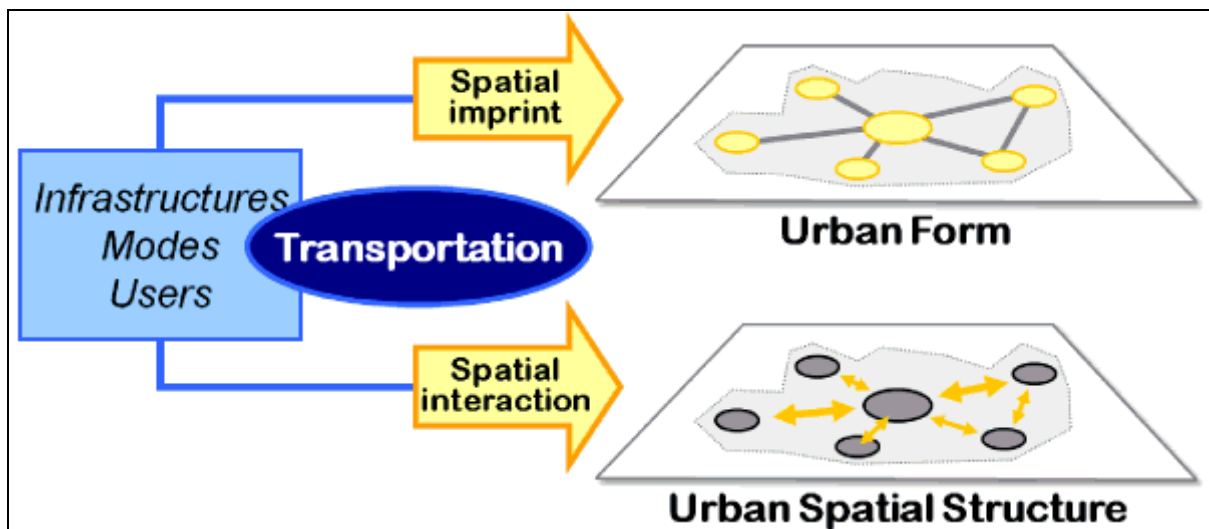
A dispersed settlement structure, on the other hand, relies on access to car travel as a prerequisite for taking advantage of employment and service opportunities, and thus contributed to social segregation. (Dieleman and Wagener, 2003) Rodrigue *et al.* (2009) states that the capacity and requirements of urban transport infrastructures, at the urban level, have been shaped by demographic and mobility growth. As a result, there is a wide variety of urban forms, spatial structures and associated urban transportation systems. These concepts are defined by Rodrigue *et al.* (2009) as (refer to Figure 3 below):

- **Urban form** refers to the spatial imprint of an urban transport system as well as the adjacent physical infrastructures. Jointly, they confer a level of spatial arrangement to cities.
- **Urban (spatial) structure** refers to the set of relationships arising out of the urban form and its underlying interactions of people, freight and information.

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<sup>1</sup> *The process of transition from a rural to a more urban society. Statistically, urbanization reflects an increasing proportion of the population living in settlements defined as urban, primarily through net rural to urban migration. The level of urbanization is the percentage of the total population living in towns and cities while the rate of urbanization is the rate at which it grows (UN-HABITAT, 2008).*

FIGURE 3 – URBAN FORM AND SPATIAL STRUCTURE



Source: Rodrigue *et al.* (2009)

A city's spatial structure is articulated by two structural elements even if the geographical setting of each city varies considerably. These structural elements include nodes and linkages (Rodrigue *et al.* 2009):

- **Nodes** are reflected in the centrality of urban activities, which can be related to the spatial accumulation of economic activities or to the accessibility to the transport system. Terminals, such as ports, rail yards, and airports, are important nodes around which activities agglomerate at the local or regional level. Nodes have a hierarchy related to their importance and contribution to urban functions, such as production, management, retailing and distribution. The presence of nodes requires linkages.
- **Linkages** are the infrastructures supporting flows from, to and between nodes. The lowest level of linkages includes streets, which are the defining elements of the urban spatial structure. There is a hierarchy of linkages moving up to regional roads and railways and international connections by air and maritime transport systems.

Two basic forms of interdependent nodes, accessibility nodes and economic nodes are at the core of the urban spatial structure (Rodrigue *et al.* 2009):

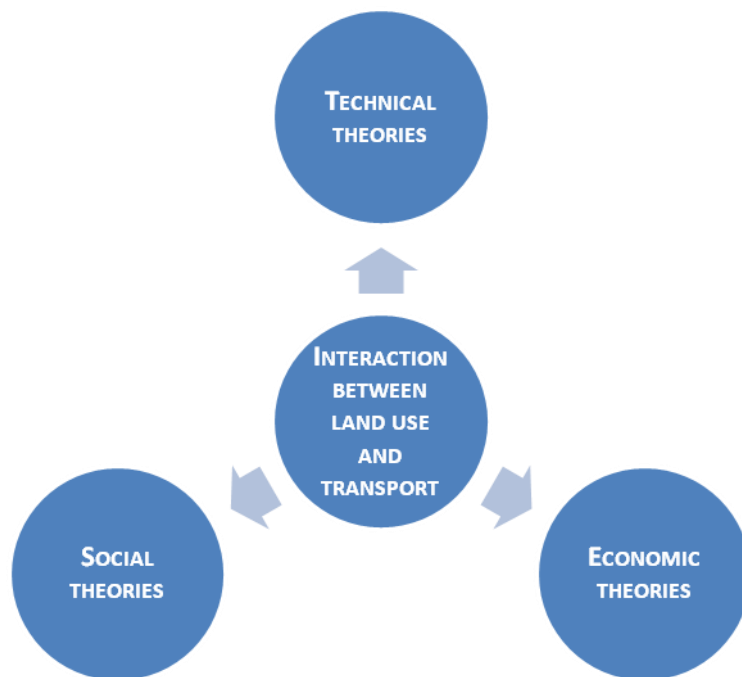
- **Accessibility nodes** which relate to locations that transfer passengers and freight, thus offering accessibility to resources and markets within and/or outside the urban area.
- **Economic nodes** refer to locations that perform a function of economic significance. These functions are extremely varied and can include transformation, administration, education, retailing and leisure. Economic nodes tend to agglomerate, or to cluster, and are often

dependent on access, if not close proximity, to an accessibility node or a linkage. Such clusters often take the form of central business districts, commercial strips industrial districts or logistics zones.

### 2.3. INTERFACE BETWEEN LAND USE AND TRANSPORTATION

According to Dieleman and Wagener (2003), the major theoretical approaches (refer to Figure 4 below) to explain the two-way interaction of land use and transport in metropolitan areas include technical theories (urban mobility systems), economic theories (cities as markets), and social theories (society and urban space).

FIGURE 4 – THEORETICAL APPROACHES TO EXPLAIN THE INTERFACE BETWEEN LAND USE AND TRANSPORT



*Source: Own construction as adapted from Dieleman and Wagener (2003)*

#### 2.3.1. TECHNICAL THEORIES - URBAN MOBILITY SYSTEMS

In the technical paradigm of urban development, technical circumstances determine the internal organisation of cities. Medieval cities required compactness due to their need for fortifications as well as the fact that most trips had to be made on foot. With the disappearance of these constraints, urban development, following this paradigm, largely became a function of transport technology.

The first analytical study on the interrelationship between transport and the spatial development of cities were made in the USA during the 1950's. Hansen (1959) demonstrated for Washington DC, that locations with good accessibility had a higher chance of being developed, and at a higher density, than remote locations, showing "how accessibility shapes land use". The acknowledgment that trip and location decisions co-determine each other (and that therefore transport and land use planning needed to be co-ordinated) quickly spread among American planners, and the 'land-use transport feedback cycle' became a commonplace in the American planning literature. Dieleman and Wagener (2003) summarized the relationships implied by this term in brief:

- The distribution of land uses, such as residential, industrial or commercial, over the urban area determines the locations of human activities such as living, working, shopping, education or leisure.
- The distribution of human activities in space requires spatial interactions or trips in the transport system to overcome the distance between the locations of activities.
- The distribution of infrastructure in the transport system creates opportunities for spatial interactions and can be measured as accessibility.
- The distribution of accessibility in space codetermines location decisions and so results in changes of the land use system.

According to Dieleman and Wagener (2003) the theories based on this paradigm started from observed regularities of parameters of human mobility, such as trip distance and travel time, and from here try to infer those trip origins and destinations that best reproduce the observed frequency distributions. Ravenstein (1885) and Zipf (1949) observed that the frequency of human interactions such as messages, trips or migrations between two locations (cities or regions) is proportional to their size, but inversely proportional to their distance. Dieleman and Wagener (2003) are of opinion that if it is possible to make inferences from the distribution of human activities to the spatial interactions between them, it is also possible to identify the location of activities giving rise to a certain trip pattern.

According to Dieleman and Wagener (2003) the spatial interaction paradigm has led to a better understanding of important dimensions of individual mobility and location behaviour and their interrelationships. It has made it clear that daily mobility depends on preceding more long-term location decisions and that these are in turn co-determined by the daily need for travel. The spatial

interaction model clearly predicts that if travel costs, in monetary costs or in time, decrease the result will be spatial dispersal of human activities and longer trip distances travelled.

### **2.3.2. ECONOMIC THEORIES - CITIES AS MARKETS**

Economic location theory goes further than technical theories in that location costs are taken into account. In this case firms look for the optimum constellation of size (economies of scale) and location (agglomeration economies) given their specific mix of products, production technology and pattern of suppliers and customers, whereas households try to match their space needs and location preferences with their budget restrictions. Both firms and households trade off accessibility for space or vice versa.

A fundamental assumption of all spatial economic theories is that locations with good accessibility are more attractive and have a higher market value than peripheral locations. This fundamental assumption goes back to Von Thünen (1850) and has since been varied and refined in many ways. In macro analytic approaches spatial development is the result of spatial production functions incorporating, amongst labour and capital, such spatial factors such as agglomeration advantages, transport costs and land prices; and it is still disputed under which conditions spatial equilibrium or spatial polarization will occur, or whether there is a cyclical sequence of agglomeration and deglomeration phases (Van den Berg et al., 1982).

Micro analytic approaches, on the other hand, start from the locational behaviour of individual players such as firms, landlords or households in the urban land or housing markets. According to Dieleman and Wagener (2003), Alonso's model of the urban land market (1964) is the most influential example of the latter kind. The basic assumption of the Alonso model is that firms and households choose the location at which their bid rent, i.e. the land price they are willing to pay, equals the asking rent of the landlord, so that the land market is in equilibrium. The bid rent of firms results from the cost structure of their production function, i.e. sales price minus production and transport costs plus profit divided by size of land. A firm with higher added value per unit of land is therefore able to pay a higher price than a firm with less intensive land utilization, everything else being equal. So it is not surprising that, say, jewellers are found in the centre, whereas trucking companies have their yards on the periphery (Dieleman and Wagener, 2003).

As households have no cost functions like firms, the trade-off is between land consumption and distance to the centre. Each household type has to divide its expenditure between land and transport costs. Households therefore maximise their combined utility of land and transport within their budget constraints. This explains why high-income households occupy large sites at the periphery, whereas low-income households frequently live in high-density housing areas near the centre (Dieleman and Wagener, 2003).

According to Dieleman and Wagener (2003) fundamental changes in the economic environment of the day lead to both spatial polarization and spatial dispersal within urban regions. Flexible production and distribution systems require extensive, low-density sites with good access to the regional and local road network, and this explains why new manufacturing firms prefer suburban locations. Retail facilities tend to follow their customers to the suburbs and similarly prefer large suburban sites with good road access. High-level services, however, continue to rely on face-to-face contacts and, despite e-mail, fax and electronic data interchange, remain in the city centre. Castells (1996) argues that in the present network economy processes of urban deconcentration and concentration operate parallel to each other. The result is the spatial dispersal of many economic activities except high-level services.

### **2.3.3. SOCIAL THEORIES - SOCIETY AND URBAN SPACE**

In social sciences theories of urban development the spatial development of cities is the result of individual or collective appropriation of space. A series of qualitative theories of urban development were put forward to explain the spatial expansion of American cities, such as the concentric (Burgess, 1925), sector (Hoyt, 1939), or polycentric (Harris and Ullman, 1945) theories of city growth.

According to Dieleman and Wagener (2003) the concepts from social ecology continue to be useful for understanding the mechanisms of social change in cities beyond the economic processes of the land market.

Social geography theories are related to social ecology concepts, but go beyond their macro perspective by referring to age-, gender- or social-group specific activity patterns which lead to characteristic spatiotemporal behaviour, and so to permanent location. Hägerstrand (1970) made these ideas operational by the introduction of 'time budgets', in which individuals, according to their social role, income, and level of technology (e.g. car ownership) command action spaces of different

size and duration. According to Dieleman and Wagener (2003) action spaces are limited by three types of constraints:

- (i) **Capacity constraints** which include personal, non-spatial restrictions on mobility, such as monetary budget, time budget, availability of transport modes and ability to use them.
- (ii) **Coupling constraints** referring to restrictions on the coupling of activities by location and time schedules of facilities and other individuals.
- (iii) **Institutional constraints** which include restrictions of access to facilities by public or private regulations such as property, opening hours, entrance fees or prices.

Only locations within these action spaces can be considered. It is an achievement of the 'time geography' of the Hagerstrand School that has drawn attention to the diverse kinds of limits of the land-use and transport system for the mobility of women with children, the elderly and the handicapped.

On the basis of Hägerstrand's action-space theory, Zahavi (1974; 1979) proposed the hypothesis that individuals in their daily mobility decisions do not, as the conventional theory of travel behaviour assumes, minimise travel time or travel cost needed to perform a given set of activities but instead maximise activities or opportunities that can be reached within their travel time and money budgets. He studied a large number of cities all over the world and found that the time and money budgets devoted to transport vary within urban regions as a function of age, income and residential location, but that they showed a significant stability over time when averaged across whole urban regions. The temporal stability of time and money budgets for transport explains why in the past gains in travel speed have not been used for time savings (as is usually assumed in transport cost benefit analysis) but for more and longer trips. Zahavi's theory explains why acceleration and cost reduction together permit more and more people to choose residential locations at the far periphery of urbanized areas, without increasing their time and money budgets for travel (Dieleman and Wagener, 2003).

## **2.4. THE LINEAR/CORRIDOR CITY CONCEPT**

Corridors can be broadly defined as infrastructure, or bundles of infrastructure, that link two or more urban areas. These can be highways, rail links, separate bus lanes (bus rapid transit), cycle paths, canals, short-sea connections and air connections. In general, however, corridor development concerns connections that use different transport modes, and carry both passenger and freight transport (Priemus & Zonneveld, 2003).

The linear city grows along a continuous transport line, ideally public transport, or a parallel series of lines. Intensive use of production, residence, commerce and services are located along and on either side of the line(s), and specifically form dense nodes at transport stops. Less intensive uses are located in parallel bands of space outside the compact strips of development. Overall the linear city is compact but has no central core. There would be relatively equal access to services, jobs and open land, though areas between transport stops are likely to be less well served than areas around a transport node. The public transport system would be efficient as the city form follows its linear nature. There would be a reasonably good mixture of uses in the band of intensive uses and around transport stops and a considerable variety of housing is possible ranging from high density low rise along the linear centre and around transport stops to single family homes at city's edge to the open land.

Jenks et al. (1996) argues that the concept of the linear city is based on the conviction that the quality of life in the city would be greatly enhanced if car dependency could be reduced. Commercial facilities, services, and workplaces as well as green open spaces could be within walking distance from housing areas, thus greatly reducing the need to travel. According to Schoffham and Vale (1996) the linear form results from the inevitable linear nature of public transport systems.

According to the University of Pretoria (2001), the first conceptualisation of the corridor concept had been put forward in 1882 by the Spanish urbanist, Soria y Mata (Hall, 2002). He was the first urban planner to design an urban model fully tailored to the development of transport technology. To combat the often-chaotic urban development of his day, he proposed that urban extensions be fully adjusted to the infrastructure necessary for efficient transport. Other well-known plans on this concept include Edgar Chambless's 'Roadtowns', Clarence Stein's proposals and the MARS group's proposals for London (Frey, 1999)

According to Oranje (1999) the linear/corridor city-idea resurfaced as an alternative to the mono-functional, cellular, inwardly-focussed, private motor-car driven, ecologically-unfriendly city during the 1980s and the 1990s. This focus on the concept can be attributed to three developments:

- Firstly the arrival of the ideal of sustainable developments that had come to play a vital role in special planning since the 1992 Earth Summit in Rio de Janeiro (Newman and Kentworthy, 1996). Within this environmentalist paradigm the logic of pursuing integrated and use and transport planning was that more efficient and more compact urban forms would result in

less sprawl, less private motor car travel, increased utilisation of public transport and less dangerous emissions (Anderson and Burnett, 1998).

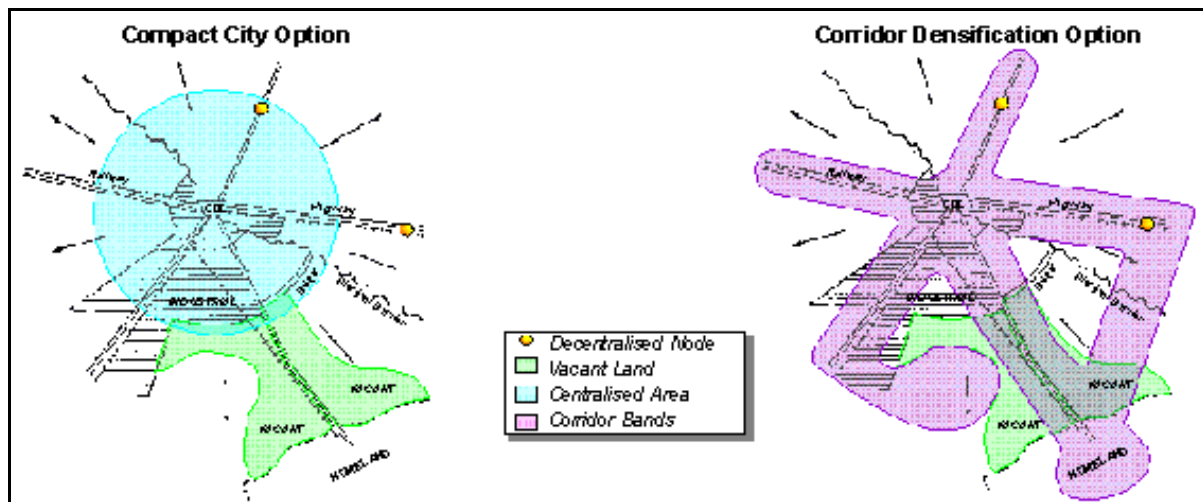
- Secondly, the arrival of “less government” and shrinking public budgets, resulting in a growing interest by public institutions in improving integration between land use and transport planning in an effort to reduce the vast fiscal losses at which public transport was being run (Republic of South Africa, 1999).
- Thirdly, the beginning of the post-modern condition, in which the boundaries between disciplines had become increasingly blurred and integrated, multi-sectoral planning processed the order of the day (University of Pretoria, 2001).

In South Africa the idea of land-use transport integration and the corridor concept had been proposed by a number of progressive urban designers, land-use planners and transport engineers in the 1980s (Oranje, 1999a). After the fall of the segregationist apartheid policies in the mid-1990s, the corridor concept’s popularity and respectability became representative. Policies and acts arose, such as Moving South Africa and the national Land Transport Transition Act, 2000. The idea would also make it into the field of practice with the launch of four corridor projects, the so-called “Four Cities Projects”, by the National Department of Transport at the end of 1995 in the cities of Cape Town, Durban, Johannesburg and Pretoria. In the following years, corridors made their appearance in a range of plans and frameworks at various scales. According to the University of Pretoria (2001) these corridors would at an urban scale, achieve a number of objectives, including:

- Restructure, reinvigorate and integrate the fragmented, segregated, dysfunctional and dualistic apartheid city;
- Unlock new economies in former “townships”;
- Reduce the transport subsidy bill of over R3 billion per annum by making public transport more viable and even opening up new public transport possibilities; and
- Ensure more dynamic, more choice-generating and more sustainable forms of human settlements.

Figure 5 below is a graphic representation of the compact city and corridor densification option from the Moving South Africa Transport Strategy for 2020 (RSA, 1999a):

FIGURE 5 - GRAPHIC REPRESENTATION OF THE COMPACT CITY AND CORRIDOR DENSIFICATION OPTION



Source: *Moving South Africa Transport Strategy for 2020 (RSA, 1999a)*

## 2.5. THE COMPACT CITY

With a shift in focus to combating low-density and integrating spatially separated areas, the compact city approach emerged. Various versions of the compact city approach include ‘smart growth’, ‘new urbanism’ and ‘transit-orientated development’ (Dieleman and Wagener, 2003).

According to Brehery (1992) the compact city consists of high density, mixed-use development where growth is encouraged within the boundaries of existing urban areas, but with no development beyond its periphery. This means that the settlement would be packed into one constant body with a very intensive peak of density and activity at its centre. Activities would be time and again distributed, all at high intensity. It could depend almost entirely on public transport, cycling and walking, rather than individual vehicles.

Harrison (2003) mentions key elements for the compact city approach, these include: increasing urban densities, containing sprawl, mixed use development and support for public transportation. Instruments used to achieve this include: urban growth boundaries, infill development, and the designation of urban corridors, road pricing and strategic infrastructural investments.

Rodenburg et al. (2003) argues that the concept of multifunctional land use is, directly related to themes of compact city and urban sprawl. He adds that a merging of land use functions at certain locations can lead to economies of synergy, which would save space, and be environmentally

friendly. Multifunctional land use can be most commonly observed in high-density urban environments, particularly at nodes of high accessibility such as railway stations and metro stops. Mainly the concept of mixed land use revolves around decreasing traffic congestion by bringing people closer to public transport and their work place, and so reducing private vehicle usage.

TABLE 1 – COMPARISON BETWEEN SMART GROWTH AND SPRAWL

	<b>Smart Growth</b>	<b>Sprawl</b>
<b>Density</b>	Compact development.	Lower-density, dispersed activities.
<b>Growth pattern</b>	Infill (brownfield) development.	Urban periphery (greenfield) development.
<b>Land use mix</b>	Mixed land use.	Homogeneous (single-use, segregated) land uses.
<b>Scale</b>	Human scale. Smaller buildings, blocks and roads. More detail, since people experience the landscape up close, as pedestrians.	Large scale. Larger buildings, blocks, wide roads. Less detail, since people experience the landscape at a distance, as motorists.
<b>Public services (shops, schools, parks)</b>	Local, distributed, smaller. Accommodates walking access.	Regional, consolidated, larger. Requires automobile access.
<b>Transport</b>	Multi-modal transportation and land use patterns that support walking, cycling and public transit.	Automobile-oriented transportation and land use patterns, poorly suited for walking, cycling and transit.
<b>Connectivity</b>	Highly connected roads, sidewalks and paths, allowing relatively direct travel by motorized and non-motorized modes.	Hierarchical road network with numerous loops and dead-end streets, and unconnected sidewalks and paths, with many barriers to non-motorized travel.
<b>Street design</b>	Streets designed to accommodate a variety of activities. Traffic calming.	Streets designed to maximize motor vehicle traffic volume and speed.

	<b>Smart Growth</b>	<b>Sprawl</b>
<b>Parking supply and management Planning process</b>	Limited supply and efficient management, Planned and coordinated between jurisdictions and stakeholders.	Generous supply, minimal management.  Unplanned, with little coordination between jurisdictions and stakeholders.
<b>Public space</b>	Emphasis on the public realm (streetscapes, pedestrian environment, public parks, public facilities).	Emphasis on the private realm (yards, shopping malls, gated communities, private clubs).

*Source: Adapted from Ewing (1996) and Galster, et al (2001)*

According to Todes (2003), arguments for compacting cities in South Africa developed differently than international countries, especially developed countries. In her article she argues that the South African case for compacting the city largely imitate concerns to do with history of urban apartheid, its impact on the city form, and the way it served to impoverish spatially marginalised Black people.

Todes (2003) states that the focus in South Africa, has been on restructuring and integrating the city, and so making it possible for low-income people to acquire housing in well-located areas, thus reclaiming access to urban opportunities that where lost under apartheid. She adds that the emphasis to the approach of urban restructuring falls on the infill and densification within the city. This densification is to be in central areas, around areas of economic activity, and along major transport routes. The development of nodes and ‘activity corridors’ throughout the city is intended to integrate the city, to create good routes for public transport and to provide accessible locations for the development of economic activity and services. This leads to a more continuous and much denser image of the city than in the past.

Arguments in favour of compacting the South African city were first developed by academics Dewar and Uytendogaardt (Dewar, 1984; Dewar *et al.* 1979), but were taken up in more detail by anti-apartheid planners in the inclusive development forums in the early 1990’s (Smit and Williamson, 1993; Turok, 1994) and after 1994, by the ANC government. Different opinions of the compact city

have emerged, both negative and positive. In South Africa, compact city ideas form part of the core principles of the 1995 *Development Facilitation Act (DFA)* which is intended to guide all physical planning and development, and are personified in the 1997 *White Paper on Urban Development* (Todes, 2003).

## **2.6. TRANSPORT ORIENTATED DEVELOPMENT**

As mentioned above, various versions of the compact city approach include smart growth, new urbanism and transit-orientated development (Dieleman and Wagener, 2003).

***Transit Oriented Development (TOD) refers to residential and commercial centres designed to maximise access by transit and non-motorised transportation, and with other features to encourage transit ridership. A typical TOD has a rail or bus station at its centre, surrounded by relatively high-density development, with progressively lower-density spreading outwards one-quarter to one-half mile, which represents pedestrian scale distances (Litman, 2005).***

Litman (2005) argues that transit-orientated development (TOD) not only shift a number of private vehicle trips to public transit, it also increases accessibility and transportation options through land use clustering and mix, and non-motorized transportation improvements. This reduces the distance required for car trips, allows a greater portion of trips to be made by walking and cycling, and allows some households to reduce their car ownership, which together can result in large reductions in vehicle travel.

Increasingly, urban transport is considered one of the major unresolved problems in large cities because of the pollution and congestion it generates. TOD is nothing but a partial administrative allocation of land through regulations which would allow an optimization of transit networks and as a consequence a significant decrease in both congestions and air pollution (Litman, 2005). To make land use more compatible with an efficient transit network, TOD proposes regulatory measures which would significantly alter the spatial fabric of existing cities. The main features of TOD are the creation of high density transport corridors, and the setting of urban growth boundaries. Urban growth boundaries would limit the supply of land available for development and therefore force higher densities and more contiguous development easier to service with transit. Litman (2005) lists the following benefits (Table 2) of transport orientated development (TOD):

TABLE 2 – BENEFITS OF TRANSPORT ORIENTATED DEVELOPMENT

Economic	Social	Environmental
<ul style="list-style-type: none"> <li>• Reduced development and public service costs</li> <li>• Consumer transportation cost savings</li> <li>• Economics of agglomeration</li> <li>• More efficient transportation</li> </ul>	<ul style="list-style-type: none"> <li>• Improved transportation choice, particularly for non-drivers</li> <li>• Improved housing choices</li> <li>• Community cohesion</li> </ul>	<ul style="list-style-type: none"> <li>• Green field and wildlife habitat preservation</li> <li>• Reduced air pollution</li> <li>• Reduced resource consumption</li> <li>• Reduced water pollution</li> </ul>

Source: Adapted from Litman (2005)

**TOD includes the following design features (Morris, 1996):**

- The neighbourhood is designed for cycling and walking, with adequate facilities and attractive street conditions.
- Streets have good connectivity and traffic calming features to control vehicle traffic speeds.
- Mixed-use development that includes shops, schools and other public services, and a variety of housing types and prices, within each neighbourhood.
- Parking management to reduce the amount of land devoted to parking compared with conventional development, and to take advantage of the parking cost savings associated with reduced automobile use (New Jersey Department of Transportation, 2007).
- Transit stops and stations that are convenient, comfortable and secure, with features such as comfortable waiting areas, vendors selling refreshments and periodicals, washrooms, way finding and multi-modal navigation tools.

**Wolf and Symington (2009) list the following tools for effective TOD:**

1. **Accommodate Pedestrians.** Reflect a pedestrian-orientation in built environments. Every transit trip begins and ends on foot, dictating a pedestrian emphasis.
2. **Improve Access from Transit to Jobs and Residences.** Locate new development in proximity to transit opportunities to leverage the public’s investment in transit capital and operating budgets.
3. **Move from Node to Place.** Create places for people, not cars. A place-making orientation should take precedence over creating a node for commuters and drivers.

4. **Resolve Fiscal Challenges and Barriers.** Continue diligent attention to resolution of public and private fiscal barriers. The public sector is handicapped by limited financing mechanisms for needed infrastructure.
5. **Depoliticize Transit Service.** There needs to be more fully funded transit operations and to focus new services in areas with the greatest demand for transit service.
6. **Integrate Views Among Actors.** Approach urban centres and TODs in an interdisciplinary fashion. To reach its potential, TOD should benefit from integrated goals, resources and policies.
7. **Enhance Leadership and Vision.** Continue leadership and articulation of a regional vision, consistent with goals and objectives for development of urban centres and TODs.
8. **Enhance Transportation Demand Management (TDM) and Related Tools.** Governments should continue to moderate vehicle usage through TDM. Litman (2010) lists the following TDM strategies that are effective at reducing traffic congestion:
  - Road Pricing or Road User Charging, which involve charging motorists directly for driving on a particular road or in a particular area using various forms such as (University of Nottingham, 2006):
    - **Area Licensing:** allows for provision of a license, which enables the user to enter a certain defined area. The licence can be paper, or electronic, by storage of a registration number.
    - **Cordon/zone charging:** involves setting up a linear cordon and charging at access points to the zone.
    - **Distance-based charging:** The fee levied is proportional to the distance travelled, and in simple terms, the amount that the driver would pay reflects more accurately the cost of the pollution caused.
    - **Time-based charging:** The driver is charged a fee related to how much time is spent on charging roads, or in an urban area, within a cordon.
    - **Congestion charging:** This can be considered as a sub-set of road-user charging, as the fee levied would be directly related to the amount of congestion caused by a car's journey.
  - Commute Trip Reduction Programs in order to encourage commuters to use alternative modes for work and school trips. These programmes are likely to be particularly effective if they incorporate fitting Financial Incentives, such as Transit Benefits or Parking Pricing.

- Flexitime means that employees are allowed some flexibility in their daily work schedules in order to shift travel from peak to off-peak period, thus directly reducing traffic congestion.
  - Transit Improvements and Rideshare Programs can be effective congestion reduction strategies, particularly if implemented with other incentives to shift mode, such as High Occupancy Vehicles Priority and Road Pricing.
9. **Implement Proactive Zoning and Land Use Regulations.** Seek graceful growth and quality living environments through proactive planning. Zoning and development regulations should reflect comprehensive planning objectives and integrate with transit agency planning and implementation.
  10. **Acknowledge Political Opposition to Growth and Density Imposition.** Offset resistance to density by corresponding investments in services and amenities.

## **2.7. TRANSPORT ORIENTATED DEVELOPMENT (TOD) AND BUS RAPID TRANSPORT (BRT)**

Transport orientated development is one of the versions of the compact city approach. The Transport Research Board (TRB) (2003) found that:

- Bus rapid transit (BRT) can be used to induce transit-oriented development;
- BRT should be complemented by appropriate “Transit First” policies such as transit-oriented land development; and
- that BRT stimulates transit-oriented land use patterns.

It can therefore be argued that the implementation of a BRT system, which can be used to induce transit-orientated development as well as transit orientated land use patterns, can be used as a “vehicle” to combat low-density spatially separated areas in order to promote a more compact city.

## **2.8. BUS RAPID TRANSPORT**

### **2.8.1. WHAT IS BUS RAPID TRANSIT**

The Institute for Transportation and Development Policy (ITDP) (2007) roughly defines the Bus Rapid Transit (BRT) is a high-quality bus based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service. BRT essentially emulates the

performance and amenity characteristics of a modern rail-based transit system but at a fraction of the cost. A BRT system will typically cost 4 to 20 times less than a tram or light rail transit (LRT) system and 10 to 100 times less than a metro system.

Bus Rapid Transit (BRT) has been found to be one of the most cost-effective mechanisms for cities to rapidly develop a public transport system that can achieve a full network as well as deliver a rapid and high-quality service. While still in its early years of application, the BRT concept offers the potential to revolutionise the manner of urban transport.

Through an analysis of the features offered by the system, BRT can be defined more accurately. The ITDP (2007) lists the following as features found on some of the most successful BRT systems implemented to date:

**A. Physical infrastructure**

- Segregated busways or bus-only roadways predominantly in the median of the roadway;
- Existence of an integrated “network” of routes and corridors;
- Enhanced stations that are convenient, comfortable, secure, and weather-protected;
- Stations provide level access between the platform and vehicle floor;
- Special stations and terminals to facilitate easy physical integration between trunk routes, feeder services, and other mass transit systems (if applicable);
- Improvements to nearby public space.

**B. Operations**

- Frequent and rapid service between major origins and destinations;
- Ample capacity for passenger demand along corridors;
- Rapid boarding and alighting
- Pre-board fare collection and fare verification;
- Fare-integration between routes, corridors, and feeder services.

**C. Business and institutional structure**

- Entry to system restricted to prescribed operators under a reformed business and administrative structure (*i.e.*, “closed system”);
- Competitively-bid and wholly-transparent processes for awarding all contracts and concessions;

- Efficient management resulting in the elimination or minimisation of public-sector subsidies towards system operations;
- Independently operated and managed fare collection system;
- Quality control oversight from an independent entity/agency.

#### **D. Technology**

- Low-emission vehicle technologies;
- Low-noise vehicle technologies;
- Automatic fare collection and fare verification technology;
- System management through centralised control centre, utilising applications of Intelligent
- Intelligent Transportation Systems (ITS) such as automatic vehicle location;
- Signal priority or grade separation at intersections.

#### **E. Marketing and customer service**

- Distinctive marketing identity for system;
- Excellence in customer service and provision of key customer amenities;
- Ease of access between system and other urban mobility options
- Special provisions to ease access for physically disadvantaged groups, such as children, the elderly, and the physically disabled;
- Clear route maps, signage, and/or real-time information displays that are visibly placed within stations and/or vehicles.

### **2.8.2. HISTORY OF BUS RAPID TRANSIT**

Although the development of BRT is credited to the opening of Curitiba's system in 1974, BRT's history resides in a wide range of previous efforts to improve the public transport. Prior to Curitiba, several efforts helped to establish the idea. Previous applications and concepts such as high-quality urban rail systems were highly beneficial to the BRT concept such as light rail and metro rail systems, which has a quality customer experience but at a lower cost than traditional rail systems.

Although Chicago outlined plans for three inner city rail lines to be converted to express bus corridors in 1937, actual implementation of bus priority measures did not occur until the 1960s with the introduction of the "bus lane" concept. In 1963, counter-flow express bus lanes were introduced

in the New York City area. A year later, in 1964, the first “with-flow” bus lane was implemented in Paris.

The first dedicated median busways appeared in St. Louis in the United States and in Liege in Belgium as a result of tram system’s conversion to bus use. The first high-speed busway was constructed in the United States in 1969 with the opening of the first 6.5 kilometre section of the Shirley Highway Busway in Northern Virginia. In 1971, the city of Runcorn in the United Kingdom opened a busway corridor which also acted as a catalyst for new town development.

In 1972 in Lima, Peru, the first developing-nation busway was developed with the introduction of a basic, dedicated busway known as “Via Expresa”. The first “bus-only” street also arrived in 1972 with the conversion of London’s Oxford Street from a major traffic route to a bus-and-taxi only street. A year later (1973), the 11 kilometre El Monte busway was developed in Los Angeles.

With the arrival of the “surface metro” system developed in Curitiba, Brazil, the full BRT’s promise was not realised. The first 20 kilometres of Curitiba’s system was planned in 1972, built in 1973, and opened for service in 1974.

### **2.8.3. BENEFITS OF THE BUS RAPID TRANSIT SYSTEM**

The bus rapid transit system was initially implemented as a cost effective measure to enable mass transit in cities. By correctly implementing BRT, a city creates a useful and economical alternative to a subway or elevated rail system which both cost more than BRT. Many cities profit from the system while maintaining reasonable fares for passengers. In addition, BRT is easy to maintain, quicker to implement, environmentally friendly, and reliable.

Bus rapid transit is easy to maintain in that compared to metro systems, where the trains are confined to a track, the buses are able to adapt to shifting conditions more readily. For example, if a bus station was under construction and a detour was required, a bus could easily take a different route for a certain period of time. A rail system, on the other hand, would not be able to do so and the entire rail line could be shutdown.

Bus rapid transit systems, in general, are also quicker to implement than traditional light rail or metro systems. Typically, dedicated lanes can be laid on top of existing roads. Conversely, rail

systems require the laying of tracks for many kilometres which can involve clearing of land, relocation of residents and the complexity of manoeuvring around existing roads, bridges and other obstacles. A metro system requires miles of tunnels below a city which leads to a long implementation time period. A BRT is able to extend onto existing highways and roads creating a very seamless integration. If dedicated lanes are needed, additional lanes may have to be constructed or BRT can also travel with normal traffic when necessary.

Pollution is also a growing social concern that has been addressed by the BRT system. Bus rapid transit in general lowers emissions. Due to the unique operation of the BRT, buses can travel faster to their destination, lowering idling times as well as decreasing fuel consumption. The placement of the stops and the implementation of the dedicated bus lanes are responsible for this added benefit and are seen as the unique part of the BRT system.

#### **2.8.4. MOTIVATION TO IMPLEMENT A BUS RAPID TRANSIT SYSTEM**

The Transport Research Board's (2003) report on Bus Rapid Transit Case Studies draws on the experiences of 26 urban areas in North America, Australia, Europe, and South America. Information was assembled for each case study on institutional arrangements, system design, operating practices, usage, costs, and benefits.

The case studies report that the main reasons for implementing BRT systems were lower development costs and greater operating flexibility as compared with rail transit. Other reasons included that BRT is a practical alternative to major highway reconstruction, an integral part of the city's structure, and a catalyst for redevelopment. A 1976 study in Ottawa, for example, found that a bus-based system could be built for half of the capital costs of rail transit, and it would cost 20% less to operate. In Boston, BRT was selected because of its operational and service benefits, rather than its cost advantages.

These case studies demonstrated that BRT does work. It can reduce journey times, attract new riders, and induce transit-oriented development. It can be more cost-effective and provide greater operating flexibility than rail transit, and it can serve as a cost-effective extension of rail transit lines. Generally, BRT systems can provide sufficient capacity to meet peak-hour travel demands in most corridors.

## **2.8.5. CASE STUDIES**

### **2.8.5.1. CURITIBA, BRAZIL**

Curitiba is the capital of the state of Parana in Southern Brazil. Curitiba is renowned worldwide for developing the first full bus rapid transit (BRT) system. Today, the city's integrated transport network reaches 14 of the 26 cities of the metropolitan area, which has a total population of 3.17 million. The city's integrated transport network bus system provides the backbone for the city's mixed use, transit-oriented development (TOD) initiative.

The bus system of Curitiba, Brazil, exemplifies a model Bus Rapid Transit (BRT) system, and plays a large part in making Curitiba a liveable city. The buses run frequently, some as often as every 90 seconds, and reliably; and the stations are convenient, well-designed, comfortable, and attractive. Consequently, Curitiba has one of the most heavily used, yet low-cost, transit systems in the world. It offers many of the features of a subway system, vehicle movements unimpeded by traffic signals and congestion, fare collection prior to boarding, quick passenger loading and unloading, but it is above ground and visible. Around 70% of Curitiba's commuters use the BRT to travel to work, resulting in congestion-free streets and pollution-free air for the 2.2 million inhabitants of greater Curitiba.

#### **2.8.5.1.1. THE EVOLUTION OF CURITIBA'S BRT**

In 1965, prompted by fears among city officials that Curitiba's rapid growth would lead to unchecked development and congested streets, they adopted a new Master Plan. Curitiba would no longer grow in all directions from the core, but would grow along designated corridors in a linear form, spurred by zoning and land use policies promoting high density industrial and residential development along the corridors (see Figure 6). Downtown Curitiba would no longer be the primary destination of travel, but a hub and terminus. Mass transit would replace the car as the primary means of transport within the city, and the development along the corridors would produce a high volume of transit ridership. The wide boulevards established in an earlier plan would provide the cross section required for exclusive bus lanes (refer to Figure 6) in which an express bus service would operate.

FIGURE 6 - HIGH DENSITY DEVELOPMENT ALONG THE EXCLUSIVE BUS LANES OF CURITIBA'S BRT



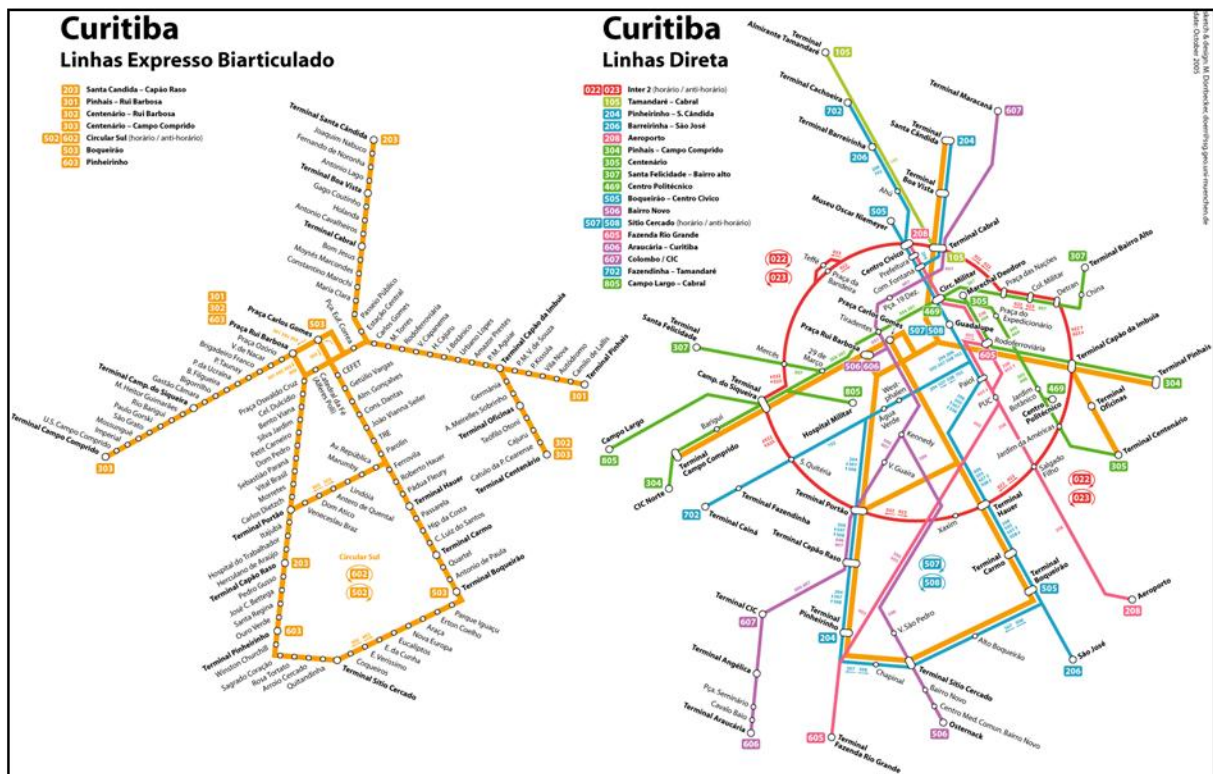
Source: <http://www.asla.org/ContentDetail.aspx?id=28358>, 2010

#### 2.8.5.1.2. CURITIBA'S HIERARCHICAL SYSTEM OF BUS SERVICES

Curitiba's bus system is composed of a hierarchical system of services (Goodman *et al.*, 2005). Minibuses routed through residential neighbourhoods feed passengers to conventional buses on circumferential routes around the central city and on inter-district routes. The backbone of the system is composed of the Bus Rapid Transit, operating on the five main arteries leading into the centre of the city like spokes on a wheel hub (Demery, 2004).

Figure 7 below indicates Curitiba's City bus system, showing express bus routes (*linhas expresso biarticulado*) and "direct" routes (*linhas direta*).

FIGURE 7 - CURITIBA'S CITY BRT SYSTEM



Source: [http://commons.wikimedia.org/wiki/File:Curitiba\\_PublicTransport.png](http://commons.wikimedia.org/wiki/File:Curitiba_PublicTransport.png), 2010

Buses running in the dedicated lanes stop at cylindrical, clear-walled tube stations (see Figure 8) with turnstiles, steps, and wheelchair lifts. Conveniences, such as public telephones, post offices, newspaper stands, and small retail facilities are located at the terminals. With a same-level bus boarding and a pre-boarding fare payment system, typical dwell time is no more than 15 to 19 seconds at a stop (Goodman *et al.*, 2005).

FIGURE 8 - THE CYLINDRICAL, CLEAR-WALLED TUBE STATIONS OF CURITIBA'S BRT



Source: <http://www.heureka.clara.net/gaia/curitiba.htm>, 2010

Ten private bus companies, which run the actual buses, are paid by distance travelled rather than passenger volume to allow a balanced distribution of bus routes and eliminate clogging of main roads. All ten bus companies earn an operating profit. The city pays the companies about one percent of the bus value per month. After ten years, the city takes control of the buses and uses them for transportation to parks, or as mobile schools (Demery, 2004).

### **2.8.5.1.3. THE INTERSECTION OF TRANSIT AND LAND USE PLANNING**

According to Goodman *et al.* (2005), Curitiba's Master Plan integrated transportation with land use planning, calling for a cultural, social, and economic transformation of the city. It limited central area growth, while encouraging commercial growth along the transport arteries radiating out from the city centre. The city centre was partly closed to vehicular traffic, and pedestrian streets were created. Linear development along the arteries reduced the traditional importance of the downtown area as the primary focus of day-to-day transport activity, thereby minimizing congestion and the

typical morning and afternoon flows of traffic. Instead, rush hour in Curitiba has heavy commuter movements in both directions along the public transportation arteries.

According to Goodman *et al.* (2005) other policies have also contributed to the success of the transit system. Land within two blocks of the transit arteries is zoned for high density, since it generates more transit ridership per square foot. Beyond the two blocks, zoned residential densities taper in proportion to distance from transit ways. Planners discourage auto-oriented centres and channel new retail growth to transit corridors. Very limited public parking is available in the downtown area, and most employers offer transportation subsidies, especially to low-skilled and low-paid employees.

#### **2.8.5.2. BOGOTA'S TRANSMILENIO BRT SYSTEM**

The TransMilenio is one of the world's premier Bus Rapid Transit (BRT) systems; based on the model used in Curitiba, Brazil, it services the city of Bogota, Colombia. The implementation of Transmilenio started in 2000, and as of April 2007, its first two phases were implemented, achieving 84 kilometres of dedicated busways (refer to Figure 9) and 541 kilometres of feeder lines with a ridership of more than 1.5 million trips daily (Bus Rapid Transit Policy Center, 2007). Trunk corridors were implemented in city areas that were in general of low and middle income socio-economic level, though they also crossed through areas that were largely high-income levels. Feeder lines were mostly located in peripheral low-income areas at the end of the trunk corridor's terminal stations (Munoz-Raskin, 2009). The city Masterplan consists of a 388 kilometre network of trunk corridors and supporting feeder routes that would carry an estimated 5 million passengers daily. TransMilenio is also the centrepiece of a long-term urban renewal and mobility strategy that prioritises walking and cycling and discourages private vehicle use (Cain, 2006).

FIGURE 9 - DEDICATED BUSWAYS OF BOGOTA'S TRANSMILENIO BRT SYSTEM



Source: [http://farm1.static.flickr.com/173/371438901\\_6be9535cee\\_b.jpg](http://farm1.static.flickr.com/173/371438901_6be9535cee_b.jpg), 2010

FIGURE 10 - STATIONS OF THE BOGOTA'S TRANSMILENIO BRT SYSTEM



Source: <http://www.terrapass.com/blog/posts/bus-rapid-transit>, 2010

## 2.9. SUMMARY

As a result of ever increasing urban populations, urban patterns began to expand outward beyond the city periphery taking up a dispersed low-density settlement structure, known as urban sprawl. Hess (2001) lists the negative effects attributed to sprawl, which include economic and racial segregation, crime, poverty, loss of community, increased infrastructure costs, deteriorating air and water quality, loss of greenfield land and open space, increased traffic congestion, and a general degradation in the quality of human life. A dispersed settlement structure, relies on access to car travel as a prerequisite for taking advantage of employment and service opportunities, and thus contributed to social segregation.

When the focus shifted towards combating low-density sprawl and integrating spatially separated areas, the compact city approach, as well as various versions thereof, emerged. According to Brehery (1992) the compact city consists of high density, mixed-use development where growth is encouraged within the boundaries of existing urban areas, but with no development beyond its periphery. This means that the settlement would be packed into one constant body with a very

intensive peak of density and activity at its centre. Activities would be time and again distributed, all at high intensity. It could depend almost entirely on public transport, cycling and walking, rather than individual vehicles. Harrison (2003) mentions key elements for the compact city approach, these include: increasing urban densities, containing sprawl, mixed use development and support for public transportation. Various versions of the compact city approach include smart growth, new urbanism and transit-orientated development (Dieleman and Wagener, 2003).

Litman (2005) argues that transit-orientated development (TOD) not only shift a number of private vehicle trips to public transit, it also increases accessibility and transportation options through land use clustering and mix, and non-motorized transportation improvements. This reduces the distance required for car trips, allows a greater portion of trips to be made by walking and cycling, and allows some households to reduce their car ownership, which together can result in large reductions in private vehicle travel.

Transport orientated development is one of the versions of the compact city approach. The Transport Research Board (TRB) (2003) found that:

- Bus rapid transit (BRT) can be used to induce transit-oriented development;
- BRT should be complemented by appropriate “Transit First” policies such as transit-oriented land development
- that BRT stimulates transit-oriented land use patterns.

It can therefore be argued that the implementation of a BRT system, which can be used to induce transit-orientated development as well as transit orientated land use patterns, can be used as a “vehicle” to combat low-density spatially separated areas in order to promote a more compact city.

The Institute for Transportation and Development Policy (ITDP) (2007) roughly defines the Bus Rapid Transit (BRT) as a high-quality bus based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service.

## SECTION THREE: POLICY AND LEGISLATIVE FRAMEWORK

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### 3.1. INTRODUCTION

This section provides a succinct overview of relevant policies divided into three categories, firstly policies relating to the planning of a transport system, secondly policies that inform the spatial analysis of a future public transport network and thirdly sustainability. Although the focus is on policy in this document, certain key planning documents and strategies have been included that are regarded as significant to the project. In one or two instances acts are mentioned that reflect relevant government policy.

- Legislations refer to proposed or enacted law or group of laws.
- Policies are a guideline to help make sure that legislation is followed.
- Policies are put in place by government whereas legislations are put in place by law.

### 3.2. LEGISLATION

The main pieces of legislation governing the development, management and regulation of the public transport system are:

- National Land Transport Act (No. 5 of 2009)
- Urban Transport Act (Act 78 of 1977)
- Road Transportation Act (Act 74 of 1977)
- Legal Succession to the SA Transport Services Act (Act 9 of 1989)
- Municipal Systems Act (Act 32 of 2000)
- Municipal Finance Management Act (Act 56 of 2003)
- Promotion of Equity and Prevention of Unfair Discrimination Act (Act 4 of 2000)

### 3.3. POLICIES

#### 3.3.1. SPECIFIC TRANSPORT POLICIES TO BE FOLLOWED WHEN PLANNING A TRANSPORT SYSTEM

### **3.3.1.1. NATIONAL LAND TRANSPORT ACT, NO. 5 OF 2009**

#### **3.3.1.1.1. OVERVIEW**

The Republic of South Africa (2009) describes the purpose of this Act:

- (a) to further the process of transformation and restructuring the national land transport system initiated by the Transition Act;
- (b) to give effect to national policy;
- (c) to prescribe national principles, requirements, guidelines, frameworks and national norms and standards that must be applied uniformly in the provinces and other matters contemplated in section 146 (2) of the Constitution; and
- (d) to consolidate land transport functions and locates them in the appropriate sphere of government.

**Key factors of the Act pertaining to the study include the following (RSA, 2009):**

**i. General principles for transport planning and its integration with land use and development planning**

Land transport planning must be integrated with the land development and land use planning processes, and the integrated transport plans required by this Act are designed to give structure to the function of municipal planning mentioned in Part B of Schedule 4 to the Constitution, and must be accommodated in and form an essential part of integrated development plans, with due regard to legislation applicable to local government, and its integrated transport plan must form the transport component of the integrated development plan of the municipality.

**ii. Intermodal planning committees**

Every municipality that is establishing an integrated public transport network or has significant passenger rail services in its area must establish an intermodal planning committee consisting of the prescribed technical officials and prescribed representatives of rail operators, other public transport modes, users and organised business. The function of an intermodal planning committee is to coordinate public transport between the modes in order to achieve the objects of this Act.

**iii. Regulation of road-based public transport**

No person may operate a road-based public transport service, unless he or she is the holder of an operating licence or a permit, issued for the vehicle concerned in terms of this Act. An operating

licence may authorise the vehicle to which it relates, to operate more than one service or type of service. Where an application in connection with an operating licence concerns services provided for in an integrated transport plan, the provisions of that plan, where appropriate and where possible, will dictate the decision of the entity considering the application.

### **3.3.1.1.2. IMPLICATIONS FOR THIS STUDY**

- Land transport planning must be integrated with the land development and land use planning processes.
- Intermodal planning committee must be established in order to co-ordinate public transport between modes.
- No person may operate a road-based public transport service, unless he or she is the holder of an operating licence or a permit.

### **3.3.1.2. WHITE PAPER ON NATIONAL TRANSPORT POLICY, 1996**

#### **3.3.1.2.1. OVERVIEW**

The White Paper sets out clear outcomes for public transport (RSA, 1996b): *“The promotion of a safe, reliable, effective, efficient, co-ordinated, integrated and environmentally friendly land passenger transport system in South African urban and rural areas, and in the Southern African region managed in an accountable manner to ensure that people experience improving levels of mobility and accessibility”*

A number of clear themes emerge which provide a policy framework for the development and management of public transport in the country (RSA, 1996b):

- **Land Use Transport Integration:** The need for closer integration in land use and transport planning with development strategies based on corridor development and densification, aimed at greater sustainability of the transport system as well as developmental objectives
- **More Competitive Environment:** A more competitive environment in the provision of public transport through competitive tendering in the provision of subsidised services.
- **Greater Participation by SMMEs:** The opening up of the public transport market especially subsidised services to new players particularly SMME and historically disadvantaged groups

- **Efficiency and Effectiveness:** Greater efficiency and effectiveness in the public transport system through integration of the various transport services and the correct placing of the various forms of transport to operate in the most economic manner and to reduce total system costs
- **Access and Mobility:** Increasing access and mobility for all users but with special attention to persons with special needs such as persons with disabilities, learners, etc.
- **Regulation and Enforcement:** A more informed regulation for entry into the transport market backed up by more effective enforcement
- **Appropriate Institutions for Transport:** Establishing appropriate institutions in the form of Transport Authorities at the municipal sphere to take overall responsibility for the total transport system

### **3.3.2.1.2. IMPLICATIONS FOR THIS STUDY**

- Closer integration in land use and transport planning.
- Development strategies based on corridor development and densification.
- Promote greater efficiency and effectiveness in the public transport system.
- Increase access and mobility for all users.

### **3.3.1.3. NATIONAL TRANSPORT MASTER PLAN 2050 (NATMAP)**

#### **3.3.1.3.1. OVERVIEW**

The Republic of South Africa (2010b) states that the National Transport Master Plan 2005-2050 (NATMAP 2050) is a dynamic; long term; and sustainable land use/multi-modal transportation systems framework for the development of networks infrastructure facilities; interchange terminal facilities and service delivery that is:

- demand responsive to national/provincial/district and /or any socio-economic growth strategy, and/or any sectoral integrated spatial development plan; and
- a coordinated implementation schedule and/or action agenda for the whole country; and/or specific national and provincial spatial development corridors and regions until 2050.

The main objective of the NATMAP 2005-2050 Project (as quoted from the Terms of Reference for the project) is to:

*"... develop a land use/transportation integrated physical development framework by which future planning and investments decisions are to be made by the three spheres of Government. This framework, to be generally referred to as a master plan, is to be the 2005-2050 long term and sustainable socio-economic growth, an integrated development plan, and an implementation action plan for the whole country,-provinces, development corridors, regions and urban areas "*.

The Master Plan is the framework by which South Africa's future state-of-the-art multi-modal transportation systems planning, implementation, maintenance, operations, investments, and monitoring decisions are to be made UNTIL 2050. The Master Plan is an action plan that; amongst many issues; identify, examine, assess, and propose;

- various land use/spatial development models to sustain investment in the state-of-the-art multi-modal urban/rural transportation systems;
- cost effective models for an integrated public/private sector corridor/regional economic development;
- a vision, goals and objectives for each of the national development corridors and/or economic regions;
- integrated growth and development strategies for each development corridor and/or region of national importance;
- potential economic development projects and compile a comprehensive economic status map of national importance;
- an integrated multi-modal infrastructure facilities development plan;
- cost effective policies promulgation, and/or changes to enhance the coordination of transportation services;
- cost effective institutional arrangements and a model for efficient and effective investment, planning, implementation, operations, maintenance, and monitoring; and
- an action agenda for the various key stakeholders, based on the preferred development strategy and integrated development plan

#### **3.3.1.3.2. IMPLICATIONS FOR THIS STUDY**

- Promote use/transport integrated planning and corridor development
- Promote the development of demand responsive and cost effective transport systems

#### **3.3.1.4. MOVING SOUTH AFRICA: TRANSPORT STRATEGY FOR 2020, 1999**

### 3.3.1.4.1. OVERVIEW

The National Department of Transport began the Moving South Africa project in June, 1997. The project encompassed a 14 month process to take the vision developed in the 1996 White Paper and develop a twenty year strategy to realise it.

The Moving South Africa Strategy for the long term re-shaping of the transport system endorsed and emphasised the national policy position in identifying three key strategic actions aimed at a sustainable and customer oriented public transport system (RSA, 1999a):

- **Densification of Transport Corridors**

This action is the linchpin of the Moving South Africa urban strategy, and aims to achieve economies of scale through the provision of public transport investments to support corridor densification.

- **Optimise Modal Economics and the Service Mix to Meet Customer Needs**

- Investment in infrastructure should support corridor development
- The planning and operation of public transport services should be reoriented to promote the mode that offers the best cost / service trade-off for a given corridor
- Differentiated public transport services, which meet a higher level of customer needs without subsidies or cross subsidies should be encouraged
- Tough road space management and car restrictions should be implemented to improve the performance of public transport

- **Improve Firm Level Performance and Productivity**

The strategic actions entail the encouragement of competition through public transport tendering; regulations to ensure that customer needs are met; reduced system costs and sustainability; and the improvement of funding for infrastructure and upgrading to ensure sustainability

### 3.3.1.4.2. IMPLICATIONS FOR THIS STUDY

- Densification of transport corridors
- Support corridor development
- Differentiated public transport services
- Improve the performance of public transport
- Promote sustainability

### **3.3.1.5. WHITE PAPER ON WESTERN CAPE PROVINCIAL TRANSPORT POLICY, 1997**

#### **3.3.1.5.1. OVERVIEW**

The promulgation of the White Paper on transport policy in the Western Cape is intended to redress existing imbalances and to provide a new sense of direction and purpose. The overall aim is to restructure the transport system throughout the province so that it becomes more efficient, effective and sustainable. Achieving minimum acceptable standards of service provision and operational performance is a priority, but this must be reconciled with the need for fundamental change in the location and intensity of spatial development in both urban and rural areas. The vision of the policy is the establishment of an integrated, accessible, well managed and maintained transport system throughout the Western Cape, which is recognised as making efficient use of resources and being socially just, in a way which advances broader developmental aims and objectives.

The mission statement reads: To utilise available knowledge, skills and competence to advise and assist transport authorities throughout the Western Cape to realise their aims and objectives by (PGWC, 1997):

- promoting a unified transport culture and ethic which is characterised by excellence and professional competence and which respects and is responsive to broader public needs and requirements,
- ensuring that appropriate capacity and capability is built in all transport authorities so that they become fully competent to fulfil assigned transport roles and functions,
- guiding and informing all planning authorities to ensure that the products of strategic planning initiatives meet declared provincial standards and requirements,
- defining minimum acceptable operational standards and requirements to which the various aspects of the transport system should conform.

The strategic objectives are based on the national strategic objectives. These are as follows and have the intention of establishing values and direction for the provincial transport policy (PGWC, 1997):

- use transport policy and practice as strategic instruments in achieving growth, development, reconstruction and redistribution throughout the province;
- integrate transport policy with other sectoral policies in a programme-driven approach to reconstruction and development;

- reduce existing inequalities in access to opportunity through the use of both transport and spatial development policy instruments;
- significantly increase the utilisation of available transport resources such as existing road space and public transport rolling stock, through both spatial restructuring and operational improvements;
- encourage the provision of appropriate organisational and institutional structures at all levels of government which are able to efficiently and effectively undertake the planning, management, operation, implementation, funding, regulation and law enforcement of the land passenger transport system;
- ensure that the necessary mechanisms are established to provide adequate coordination between different levels of government;
- increase the accessibility, responsiveness and accountability of transport administrations and service providers to public demand;
- place all aspects involved in the planning, management and operation of land passenger transport on a sound professional and ethical basis;
- ensure that all processes are transparent and inclusive, involving all stakeholders, including different levels and departments of government as well as civil society;
- respond to specific user requirements and needs including the young, the old, women, the disabled as well as other special categories of users;
- allocate financial responsibilities between different levels of government in an efficient and equitable manner, consistent with the role and responsibilities of each;
- provide a dedicated source of funding to meet provincial obligations in the provision, maintenance and operation of infrastructure and public transport services;
- establish additional funding sources for use by district and local transport authorities;
- protect the existing investment in transport infrastructure and resources through appropriate and timeous maintenance effort;
- establish targets in the larger urban areas for containing growth in private vehicle travel, particularly for the journey to work;
- establish modal split targets in the larger urban areas;
- introduce consistent and compatible monitoring and review systems between different levels of government to facilitate information flow and feedback;
- improve user choice by encouraging the provision of viable and affordable public transport services;

- encourage the establishment of multifunctional transport services in marginalised areas, to meet the requirements of travellers, social and government service providers, producers and manufacturers;
- provide active support to local organisations in providing, operating and maintaining additional transport capacity outside of the formal sector;
- establish partnerships between each level of government and the public transport industry to foster growth, development, reconstruction and redistribution of opportunities in the industry;
- promote growth and stability in the public transport industry, facilitating investment and providing job security;
- substantially improve public safety and security on all public transport services, especially those confronting women, and other more vulnerable groups such as children, the elderly, disabled and tourists;
- substantially improve road safety through engineering improvements, the consistent enforcement of traffic rules and regulations and through road user training and education;
- provide all necessary facilities and resources to ensure that the road freight industry conforms to all legal requirements and rigorously and consistently enforce such provisions;
- maximise energy conservation and minimise ecological impacts to be responsive to achieving environmental sustainability.

The policy identifies the three basic levels within which comprehensive, integrated planning should occur:

- within the transport sector itself
- between transport and spatial planning, land use being the major determinant of movement demand
- between transport and development planning, to achieve broader reconstruction and development aims.

### **3.3.1.5.2. IMPLICATIONS FOR THIS STUDY**

- Reduce existing inequalities in access to opportunity through the use of both transport and spatial development policy instruments.
- Contain growth in private vehicle travel.
- Encourage the provision of viable and affordable public transport services.

- Encourage the establishment of multifunctional transport services in marginalised areas.
- Promote growth and stability in the public transport industry.
- Maximise energy conservation and minimise ecological impacts to be responsive to achieving environmental sustainability.

### **3.3.1.6. WESTERN CAPE PROVINCIAL LAND TRANSPORT FRAMEWORK, 2004**

#### **3.3.1.6.1. OVERVIEW**

Although the White Paper contains both Vision and Mission statements for the Province, these statements have since been revised by the Department of Transport and Public Works and now read as follows (PGWC, 2004):

**Vision:** *“The best Provincial transport system and property infrastructure for all.”*

**Mission:** *“To deliver an integrated, accessible, safe, reliable, affordable, sustainable and quality transport system and property infrastructure through socially just, developmental and empowering processes, to improve the quality of life for all.”*

The White Paper states that the overall aim with respect to transport is to *“restructure the transport system throughout the Province to make it efficient, effective and sustainable”*

Twenty six objectives which are to be taken into account when further developing transport policy are outlined in the Provincial White Paper. The objectives relevant to transport planning are listed below (PGWC, 2004):

- To use transport policy and practice as strategic instruments in achieving growth, development, reconstruction and redistribution throughout the Province;
- To integrate transport policy with other sectoral policies in a programme-driven approach to reconstruction and development;
- To reduce existing inequalities in access to opportunity through the use of both transport and spatial development policy instruments;
- To ensure that the necessary mechanisms are established to provide adequate co-ordination between different levels of government;

- To place all aspects involved in the planning, management and operation of land passenger transport on a sound professional and ethical basis;
- To respond to specific user requirements and needs including the young, the old, women, the disabled as well as other special categories of passengers;
- To establish additional funding sources for use by district and local transport authorities;
- To establish targets in the larger urban areas for containing growth in private vehicle travel, particularly for the journey to work;
- To establish modal split targets in the larger urban areas;
- To improve user choice by encouraging the provision of viable and affordable public transport services;
- To encourage the establishment of multi-functional transport services in marginalized areas to meet the requirements of travellers, social and government service providers, producers and manufacturers;
- To substantially improve road safety through engineering improvements, the consistent enforcement of traffic rules and regulations, and through road user training and education; and
- To maximise energy conservation and minimise ecological impacts to be responsive to achieving environmental sustainability.

#### **3.3.1.6.2. IMPLICATIONS FOR THIS STUDY**

- Reduce existing inequalities in access to opportunity through the use of both transport and spatial development policy instruments.
- Contain growth in private vehicle travel.
- Encourage the provision of viable and affordable public transport services.
- Encourage the establishment of multifunctional transport services in marginalised areas.
- Promote growth and stability in the public transport industry.
- Maximise energy conservation and minimise ecological impacts to be responsive to achieving environmental sustainability.

#### **3.3.1.7. INTEGRATED TRANSPORT PLAN FOR THE CITY OF CAPE TOWN 2006 – 2011, 2009 REVISION**

### 3.3.1.7.1. OVERVIEW

According to the City of Cape Town (2009f) the Integrated Transport Plan (ITP) is a holistic and overarching five year plan for managing and developing Cape Town's transport system. The ITP is a statutory requirement in terms of the National Land Transport Transition Act (No. 22 of 2000), and the replacing National Land Transport Act (No. 5 of 2009), and must be updated each year. The ITP along with the Spatial Development Framework (SDF) forms an input to and aligns with the City's Integrated Development Plan, which is the guiding document for all city planning and development initiatives. The Integrated Rapid Transit (IRT) system program for the City of Cape Town is one of many programs nested within the ITP (CoCT, 2009f).

The ITP is a tool for the identification and prioritisation of transport projects that will promote the vision and goals of the City. The ITP gives a summary of the current transport situation, identifies specific needs and assesses these in terms of the strategic informants with a view to identifying those amongst the many potential projects that best address the overall needs of the City. The result is an enabling plan and framework for the development and implementation of all transport related plans and programmes, at both the overarching and at the modal or sectoral level.

The Vision for Transport of the City of Cape Town is: ***"To provide a world-class sustainable transport system that moves all its people and goods effectively, efficiently, safely and affordably."***

The following summary points are considered key to guide the ITP implementation plan (CoCT, 2009f):

- A more compact city in which land use and transport effectively supports sustainability. Priority is given to supporting infill rather than dispersed developments and densification is encouraged where population thresholds are required along public transport priority corridors.
- A good quality transport system that provides for basic mobility for the economically disadvantaged but also provides a competitive alternative to the private vehicle with reference to convenience, comfort, network coverage and accessibility.
- A well-functioning integrated transport system that supports a growing economy and the needs of freight movement. This system must ensure coordination across the various modes

to maximize service coverage and promote comfortable transfers between them. This may be conceptualised as a “complete” transport system, as depicted in Figure 5.

- A transport system that reflects environmental sensitivities and is sustainable for future generations whilst incorporating applicable technologies and innovations to achieve its goals
- A transport system that discourages unsustainable transport modes such as the single occupancy vehicle (SOVs) and prioritises public transport and non-motorised transport. Sustainable transport is a key structuring element for the ITP and transportation projects that incorporate environmental, economic and social sustainability will be prioritised.

### **3.3.1.7.2. IMPLICATIONS FOR THIS STUDY**

- Promotion of a more compact city in which land use and transport effectively supports sustainability.
- Support infill rather than dispersed developments
- Densification of transport corridors
- Good quality transport system that provides for basic mobility for the economically disadvantaged
- Discouragement of unsustainable transport modes such as the single occupancy vehicle
- Prioritises public transport and non-motorised transport.

### **3.3.1.8. CITY OF CAPE TOWN’S PUBLIC TRANSPORT PLAN, 2006**

#### **3.3.1.8.1. OVERVIEW**

An interpretation of National and Provincial policies was undertaken to guide the development of public transport policies for the City of Cape Town. According to the City of Cape Town (2006b) the Public Transport Plan is aligned to the City’s Integrated Development Plan (IDP) which sets out as part of its vision “An accessible city that extends the benefits of urban society to all and builds the capacity of its people”. This vision is supported by a strategic theme, “Accessibility and Mobility”.

The Public Transport Vision for public transport in the City is: “A safe, effective, efficient, equitable and affordable public transport system that supports sustainable, social and economic development in an environmentally responsible manner.”

The strategic theme access and mobility has been developed in some detail as part of the restructuring and transformation of transport based on the Mobility Strategy (CoCT, 2006b). The Mobility Strategy is defined as a long term Year 2020 Vision for managing, delivering and meeting access and mobility needs of all citizens, visitors, goods and services in the City of Cape Town in an equitable and sustainable manner by Putting Public Transport, People and Quality of Life First.

The Mobility Strategy is underpinned by two key pillars (CoCT, 2006b): Social Restructuring aimed at social and economic integration and economic opportunity enhancement; Transport Restructuring aimed at transformation of public transport services for greater mobility and integration across all modes.

The Public Transport Plan sets out the City's vision, objectives, strategies and projects for developing and managing the public transport system in Cape Town (CoCT, 2006b). It is guided by the City's Integrated Development Plan (IDP), particularly Strategy 3 of the IDP – Access and Mobility, as well as the City's Mobility Strategy.

The following public transport goals and objectives for the City have been formulated in definable and measurable terms, whereby performance indicators can be developed to monitor the attainment of the objectives over time. The Goals and Objectives are (CoCT, 2006b):

- Sustainable funding of public transport
- An effective and sustainable public transport system
- Shift in the use of public transport towards the national strategic objective of a ratio of 80:20 between public and private transport
- Integrated land use and transport systems oriented towards development corridors and development nodes
- Customer orientated public transport services to meet people's needs providing high levels of mobility and accessibility commensurate with reasonable costs
- Reasonable levels of accessibility to the mainstream public transport system for passengers with special needs
- A safe and secure public transport system
- An integrated public transport system across all modes of transport
- An effectively regulated and strictly enforced public transport system
- Public transport services and infrastructure which support social and economic development
- Low cost innovative forms of transport complementary to the public transport system

- Appropriate institutional structures for the development and overall management of the public transport system

Drawing on the national and provincial policy framework, as well as the City's IDP vision and Mobility Strategy, public transport policies of the City to guide the development and management of the public transport system are set out below (CoCT, 2006b):

- to give priority to public transport over private transport
- to implement travel demand management aimed at a shift in the users of private transport to public transport
- to direct investment in transport infrastructure, facilities and public transport services to enhance social and economic development
- to provide and focus public transport on development corridors as a key structuring element
- to direct financial support for public transport to low income areas
- to reduce the need for government support for public transport services while meeting people's needs
- to provide public transport to meet the needs of all users – journeys to work, to school, to community/social activities, to health, to recreational facilities, for tourists, etc. through all day public transport services
- to support investment in rail as part of an integrated multi-modal system
- to support the use of the most appropriate mode in terms of cost/service trade-off
- to restructure the minibus-taxi industry into the unified formalised public transport sector
- to provide choice in public transport where it does not detract from financial viability and tempered by economic efficiency
- to provide access to transport for persons with special needs
- to ensure safety and security
- to support innovation and environmentally sustainable transport
- to market and promote the public transport system
- to promote and facilitate the participation of SMMEs and previously disadvantaged groups in the provision of transport services

### **3.3.1.8.2. IMPLICATIONS FOR THIS STUDY**

- Priority to public transport over private transport

- Implement travel demand management aimed at a shift in the users of private transport to public transport
- Sustainable funding of transport systems
- Provide public transport to meet the needs of all users
- Support innovation and environmentally sustainable transport

### **3.3.2. RELEVANT POLICIES TO INFORM A SPATIAL ANALYSIS OF A FUTURE PUBLIC TRANSPORT NETWORK**

#### **3.3.2.1. THE NATIONAL SPATIAL DEVELOPMENT PERSPECTIVE, 2003**

##### **3.3.2.1.1. OVERVIEW**

The National Spatial Development Perspective (NSDP), produced by the Policy Co-ordination and Advisory Services (PCAS) in the Presidency, was endorsed by Cabinet in March 2003. This perspective programme provides an indication of potential in different geographic spaces across the country and is used as an instrument that informs the respective development plans of the national, provincial and local government, which include Integrated Development Plans (IDP's), Provincial Growth and Development Strategies (PGDS's) and the Medium Term Strategic Framework (MTSF) (RSA, 2003).

The relevant principles of this document are:

- Economic growth is a prerequisite for the achievement of other policy objectives, key among which would be poverty alleviation.
- Government spending of fixed investment should therefore be focused on localities of economic growth and/or economic potential in order to attract private-sector investment, stimulate sustainable economic activities and/or create long-term employment opportunities.
- In order to overcome the spatial distortions of apartheid, future settlement and economic development opportunities should be channelled into activity corridors and nodes that are adjacent to or link the main growth centres.
- Cities such as Cape Town are considered to be primary drivers of social and economic changes.

The NSDP relies on the Provincial Growth and Development Strategies (PGDSs) and the municipal Integrated Development Plans (IDP) to provide more detail to the high level planning directives from the Presidency.

### **3.3.2.1.2. IMPLICATIONS FOR THIS STUDY**

- Development opportunities should be channelled into activity corridors and nodes that are adjacent to or link the main growth centres,
- Enhance employment opportunities through giving all users access to the key economic areas
- Activity corridors provide sustainable economic opportunities

### **3.3.2.2. THE WESTERN CAPE PROVINCIAL GROWTH AND DEVELOPMENT STRATEGY, 2007**

#### **3.3.2.2.1. OVERVIEW**

The Western Cape Provincial Growth and Development Strategy (PGDS) takes the name 'iKapa Elihlumayo'<sup>2</sup> and has a mandate from provincial stakeholders to define shared growth and integrated development targets and objectives for 2014 (PGWC, 2007). The initiative focuses on strengthening growth sectors, the management of resources and the implementation of strategies. The key pillars of the proposed development path are (PGWC, 2007):

- Grow and share the economy
  - Broadening economic participation and poverty reduction
  - Efficient and effective infrastructure
- Build a more equal and caring society where poverty has been eradicated
  - Liveable communities
  - Improved resilience and tolerance
  - Enhancement of human capacity
- Promote ecological sustainable development
  - Sustainable resource use
- Foster greater spatial integration
  - Greater spatial integration

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<sup>2</sup> *isiXhosa for 'growing and sharing the Cape'*

- Effective public and non-motorised transport
- Ensure effective governance and institutional strengthening
  - Effective governance

### **3.3.2.2.2. IMPLICATIONS FOR THIS STUDY**

- Promotion of equity and poverty reduction.
- Promotion of effective public and non-motorised transport and spatial integration
- Promotion of effective infrastructure

### **3.3.2.3. THE WESTERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK, 2009**

#### **3.3.2.3.1. OVERVIEW**

The purpose of the Provincial Spatial Development Framework (PSDF) is to (PGWC, 2009):

- be the spatial expression of the Provincial Growth and Development Strategy (PGDS);
- guide (metropolitan, district and local) municipal integrated development plans (IDPs) and spatial development frameworks (SDFs) and provincial and municipal framework plans
- help prioritise and align investment and infrastructure plans of other provincial departments, as well as national departments' and parastatals' plans and programmes in the Province;
- provide clear signals to the private sector about desired development directions;
- increase predictability in the development environment, for example by establishing no-go, conditional and 'go' areas for development; and
- address the spatial legacy of apartheid.

In the light of national guidelines provided through the National Spatial Development Perspective (NSDP), and incorporating international commitments to sustainable development, the PSDF:

- analyses the issues facing 27 sectors in the biophysical, socioeconomic and built environment;
- provides a set of normative principles or departure points that guide the Province's approach to dealing with socio-economic issues that are manifested spatially;

- provides a map giving guidance for the future spatial development of the Province based on Broad Provincial Spatial Planning Categories (BPSPCs) and a series of other relevant features; and,
- provides a set of policies, some of which are linked directly to particular conditions on the ground.

The PSDF deals both with issues that are explicitly spatial (for example, where future residential development should be located), and with issues that are often not viewed as part of spatial policy but which have significant spatial impacts (for example, recycling of waste, or limiting carbon emissions) (PGWC, 2009).

#### **3.3.2.3.2. IMPLICATIONS FOR THIS STUDY**

- Addressing the spatial legacy of apartheid.
- Supports the introduction of the urban edge and higher densities.

#### **3.3.2.4. THE CITY OF CAPE TOWN INTEGRATED DEVELOPMENT PLAN 2007/8 – 2011/12 (2008/09 REVIEW)**

##### **3.3.2.4.1. OVERVIEW**

The City of Cape Town (CoCT) adopted the Integrated Development Plan (IDP) as its principal strategic planning instrument to guide and inform its planning, management and development (Municipal Systems Act, section 35). The IDP binds the CoCT in the exercise of its executive authority, except in cases where it conflicts with national or provincial legislation, in which case such legislation prevails (CoCT, 2009b).

In July 2007 the CoCT implemented a new five year Integrated Development Plan (IDP) for the period July 2007 – June 2012 to inform the current elected public representatives' period of office.

The CoCT's long term vision reads as follow (CoCT, 2009b):

- a prosperous city in which City Government creates an enabling environment for shared growth and economic development
- a City known for its effective and equitable service delivery

- a City that distinguishes itself as a well-governed and efficiently run administration

The CoCT has opted to focus on eight strategic areas to overcome its challenges, achieve its vision statement and successfully implement its other strategic considerations. These not only form the framework of the IDP five year plan, but function as internal strategic levers to facilitate shared growth and development and enhance urban efficiency and institutional effectiveness.

Strategic focus areas (CoCT, 2009b):

1. Shared Economic Growth and Development
2. Sustainable Urban Infrastructure and Services
3. Energy Efficiency for a Sustainable Future
4. Public Transport Systems
5. Integrated Human Settlements
6. Safety and Security
7. Health, Social and Community Development
8. Good Governance and Regulatory Reform

The following draft development guidelines/objectives underpin the CoCT's approach to the long-term development of Cape Town (CoCT, 2009b):

- Promote integration between areas to improve access to social facilities and services, and increase the economic potential of fragmented or marginalised areas
- Improve the accessibility and efficiency of the City's resources and opportunities for all communities by means of appropriate investment in transport infrastructure and critical movement linkages; and support land use management decisions
- Protect, manage and enhance valuable natural and rural resources and apply precautionary principles to development proposals affecting natural resources, areas and amenities
- Focus on improving the quality of the public environment in degraded areas and as an integral part of all new developments
- Promote all new settlement areas as mixed use, mixed income sustainable developments supported by public transport and optimise the use of scarce resources
- Promote densification in selected areas and along appropriate portions of major public transport routes
- Manage urban expansion by containing the City's urban footprint and carefully direct all new development areas to appropriate and viable locations that can be sustainably served by co-ordinated infrastructure investment

- Respect the rights of others and the general public in the exercising of development rights

#### **3.3.2.4.2. IMPLICATIONS FOR THIS STUDY**

- Promote integration
- Improve the accessibility and efficiency of all communities by means of appropriate investment in transport infrastructure
- Densification of transport corridors
- Manage urban expansion by containing the City's urban footprint

#### **3.3.2.5. CAPE TOWN 2030 (2006) – A LONG TERM SPATIAL VISION FOR THE CITY OF CAPE TOWN**

##### **3.3.2.5.1. OVERVIEW**

The purpose of the document is to provide the spatial component of a broader City Strategy, incorporating economic development, social, housing, environmental, infrastructure and other components. It also provides the basis for broad debate on the future shape and form of Cape Town, which in turn will inform the preparation of a spatial development framework for the city (CoCT, 2006a). Furthermore, The Spatial Development Framework in turn is a key component of the five-year term of office IDP.

In terms of national legislation, cities and towns are expected to formulate 'land development objectives', or development performance measures, clearly outlining the key performance measures for land development and management. The following draft development guidelines/objectives underpin the approach to the long-term development of Cape Town (CoCT, 2006a):

- Promote integration between areas to improve access to social facilities and services and to increase the economic potential of fragmented or marginalised areas.
- Improve the accessibility and efficiency of the city's resources and opportunities for all communities through appropriate investment in transport infrastructure and critical movement linkages and supporting land use management decisions.
- Protect, manage and enhance valuable natural and rural resources and apply the precautionary principle to development proposals affecting the natural resources, areas and amenities.

- Focus on improving the quality of the public environment in degraded areas and as an integral part of all new developments.
- Promote all new settlement areas as mixed use, mixed income sustainable developments supported by public transport and optimising the use of scarce resources.
- Promote densification in selected areas and along appropriate portions of major public transport routes.
- Manage urban expansion by containing the urban footprint and carefully directing all new development areas to appropriate and viable locations that can be sustainably served by coordinated infrastructure investment.
- Respect the rights of others and the general public in the exercising of development rights.

### **3.3.2.5.2. IMPLICATIONS FOR THIS STUDY**

- Promote integration between areas
- Improve the accessibility and efficiency of all communities by means of appropriate investment in transport infrastructure
- City densification
- Containing the City's urban footprint by managing urban expansion

### **3.3.2.6. CITY OF CAPE TOWN SPATIAL DEVELOPMENT FRAMEWORK, 2009**

#### **3.3.2.6.1. OVERVIEW**

The goal of the Spatial Development Framework (SDF) is to achieve sustainable, equitable and managed growth. Sustainability is the capacity to sustain or support indefinitely. Sustainability must address service and infrastructure provision as much as it must address biodiversity protection. In the SDF, equity refers to life equality, where the public good prevails over private, sectional interests, and where people have access to a broadly similar range of opportunities, resources and amenities. A city that works for children, the disabled and the elderly is more likely to be a city that is equitable. The SDF is a long-term plan to manage growth and change, as it (CoCT, 2009e):

- aligns the City of Cape Town's spatial development goals, strategies and policies with relevant national and provincial spatial principles, strategies and policies;
- provides a long-term vision of the desired spatial form and structure of Cape Town;

- provides the spatial component of a cross-sectoral medium to long-term City Development Strategy;
- guides the proposals contained in the more detailed district Spatial Development Plans (SDPs), which cover a shorter planning time frame (+10 years), and the preparation of Local Spatial Plans;
- helps spatially coordinate, prioritise and align public investment in the City's Five-year Integrated Development Plan (IDP);
- identifies the areas not suited for development (especially residential development), and the areas where the impacts of development need to be managed; and
- provides policy guidance to direct decision making on the nature, form, scale and location of urban development, land use change, infrastructure development, disaster mitigation, and environmental resource protection.

The following principles underpin national legislation (particularly the Development Facilitation Act/DFA) and international and national best practice for successful city planning and management. They should be used to guide the future development of Cape Town (CoCT, 2009e).

- The city should work for all, especially children, the elderly and disabled.
- The public good should prevail over the private good.
- All residents should have equal protection and benefits, and no unfair discrimination should be allowed.
- Work harmoniously with nature; reduce the city's ecological footprint; and introduce sustainable disaster risk reduction measures.
- Adopt a precautionary approach to the use of resources; switch to sustainable patterns of resource use; and mitigate against negative development impacts.
- Encourage local, national and international connectivity.
- Improve urban efficiency, and align planned growth with infrastructure provision.
- Offer maximum access to the city's opportunities, resources and amenities, and redress spatial imbalances in this regard as far as possible.
- Be responsive to the basic needs of communities by providing a stronger link between regulatory processes (zoning schemes) and spatial plans and policies.
- Create safe, high-quality living environments that accommodate a range of living environments and lifestyles, and offer a vibrant mix of land uses.
- Promote cross-sectoral planning, budgeting and growth management approaches.

Five key spatial strategies are proposed to help Cape Town achieve its vision for a sustainable future Cape Town, and to realise the spatial goals associated with this vision (see Table 3). Five key spatial strategies and the sub-strategies that will facilitate the implementation of these five key spatial strategies are summarised in the following table (CoCT, 2009e):

TABLE 3 – KEY SPATIAL STRATEGIES AND SUB-STRATEGIES PROPOSED TO HELP CAPE TOWN ACHIEVE ITS VISION OF A SUSTAINABLE FUTURE

	<b>Key spatial strategies</b>	<b>Sub-strategies</b>
1.	<b>Enhance the value of the natural and rural environment and green spaces</b>	<ul style="list-style-type: none"> <li>• Sustainably manage urban development impacts on natural resources</li> <li>• Improve access to a quality metropolitan open space system (MOSS)</li> <li>• Protect and enhance the rural environment</li> </ul>
2.	<b>Establish an integrated grid based movement system</b>	<ul style="list-style-type: none"> <li>• Develop and enhance the non-motorised (NMT) transport system</li> <li>• Create a safe, efficient and integrated city wide public transport system that supports the accessibility grid</li> <li>• Align the land-uses with the accessibility grid</li> <li>• Facilitate the development of strategic transport infrastructure</li> </ul>
3.	<b>Consolidate and intensify development on the grid</b>	<ul style="list-style-type: none"> <li>• Enhance Cape Town and its broader region’s global economic positioning</li> <li>• Redress the spatial dislocation between jobs and the population living in the metro south-east</li> <li>• Support investors by providing improved strategic information and planning</li> <li>• Improve access to economic opportunities by SMME’s and informal traders</li> <li>• Encourage economic activity to locate on the accessibility grid</li> </ul>
4.	<b>Direct urban growth and promote</b>	<ul style="list-style-type: none"> <li>• Contain the footprint of the city</li> </ul>

	Key spatial strategies	Sub-strategies
	<b>compact urban development</b>	<ul style="list-style-type: none"> <li>• Promote appropriate densification</li> <li>• Direct new growth to appropriate locations</li> <li>• Introduce a facilitative Land Use Management (LUMS) system</li> <li>• Make efficient use of non-renewable resources</li> <li>• Promote a greater, responsible mix of people and land uses in appropriate locations</li> <li>• Ensure adequate and equitable provision of social facilities, public institutions and public open spaces</li> <li>• Transform the Metro South East and other townships and informal settlements (where appropriate) into suburbs</li> <li>• Support land reform initiatives</li> </ul>
<b>5.</b>	<b>Develop more great people places</b>	<ul style="list-style-type: none"> <li>• Enhance the value of heritage resources for the people of Cape Town</li> <li>• Promote an accessible city-wide system of destination places</li> <li>• Preserve and enhance scenic routes</li> </ul>

Source: CoCT (2009e)

### 3.3.2.6.2. IMPLICATIONS FOR THIS STUDY

- Establishment of an integrated grid based movement system
- Consolidation and intensification of development on the grid
- Direct urban growth and promotes compact urban development

### 3.3.2.7. DENSIFICATION STRATEGY FOR CAPE TOWN, 2009

#### 3.3.2.7.1. OVERVIEW

According to the City of Cape Town (2009a), densification is viewed as a necessary step to promote the longer-term sustainability of Cape Town's valuable natural, urban and rural environment. The Densification Strategy seeks to improve the City's sustainability and enhance the quality of the built environment. More specifically the strategy's objectives are to (CoCT, 2009a):

- Ensure optimal and efficient use of infrastructure, services, facilities and land.
- Support the development of a viable public transport system and improve levels of access, especially by the poor, to the City's resources and amenities.
- Provide a framework and guidelines for the assessment of development proposals that promote densification.
- Provide homeowners and property investors with certainty regarding the areas that will be targeted for various types of densification.
- Protect, manage and enhance the natural and built environment and significant cultural landscapes.
- Ensure that the scale and character (in terms of bulk, height, and architectural styling if necessary) of the higher density areas is appropriate to the immediate context.
- Support the development of mixed land uses providing for vitality, opportunities and integrated living environments.
- Contribute to place-making and the development of attractive and safe urban environments.

Rapid and continuous low-density development is threatening the long-term sustainability of Cape Town and has created the following challenges for it (CoCT, 2009a):

- Good agricultural land on the urban edge and elsewhere is rapidly being consumed by urban development and valuable biodiversity resources and areas of scenic and amenity value are being threatened.
- Long travel distances have been created by urban sprawl with fragmented and dispersed urban activity patterns making it difficult to develop a viable public transport system. This negatively impacts on the mobility of poorer people who are dependent on public transport (travel and fuel costs).
- Road-based transport (including private transport) with increased traffic congestion and CO<sub>2</sub> emissions has significant environmental pollution consequences.
- Sprawl conditions are threatening the place-making qualities and urban vibrancy of neighbourhoods, districts and the City as a whole.

- Low-density development increases the cost of infrastructure provision. This is due to the servicing of large residential properties and the underutilisation of existing infrastructure, including the ad hoc development of areas and continued green field development.
- Lastly, the inefficiency caused by this fragmented and low-density form of development has serious economic implications, limiting access to opportunities, causing operational inefficiencies and a wastage of supporting economic resources (both natural and built).

**Motivation for densification (CoCT, 2009a):**

- By encouraging development upwards rather than outwards, densification helps reduce the consumption of valuable resources such as agricultural land, areas of mineral potential, aquifer recharge areas and valuable biodiversity area
- Higher densities, accompanied by increased population thresholds and mixed use development, support the efficient functioning and viable provision of public transport services, especially on major line-haul routes for mass and rapid transit.
- Higher densities in appropriate locations, especially those close to urban opportunities (services, facilities and jobs) and public transport help rationalise the housing pattern in the City and improve access to the City’s amenities and facilities.
- Higher densities, accompanied by increased population thresholds, create sufficient consumers to generate the development of economic opportunities, social facilities and services, and enable the cost-effective provision and optimal use of infrastructure.
- A mix of residential densities ensures diversification and choice of housing types and tenure options.
- Appropriately designed and located higher densities (in terms of form, scale, height and orientation) can provide an opportunity for place-making and the making of attractive and safe urban environments, particularly those in proximity to public spaces (both natural and built)

**3.3.2.7.2. IMPLICATIONS FOR THIS STUDY**

- City densification is viewed as a necessary step to promote the longer-term sustainability of Cape Town’s valuable natural, urban and rural environment.

**3.3.3. SUSTAINABILITY**

### 3.3.3.1. A NATIONAL FRAMEWORK FOR SUSTAINABLE DEVELOPMENT IN SOUTH AFRICA, 2008

#### 3.3.3.1.1. OVERVIEW

The Republic of South Africa (2008) states the purpose of this Framework as to enunciate South Africa's national vision for sustainable development and indicate strategic interventions to re-orientate South Africa's development path in a more sustainable direction. Section 24 of the Constitution obliges stakeholders - in civil society and government - to "secure ecologically sustainable development". Sustainable development is about enhancing human well-being and quality of life for all time, in particular those most affected by poverty and inequality. Resource use efficiency and intergenerational equity are the core principles.

The national vision for sustainable development is as follows (RSA, 2008): ***South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration.***

The national vision is underpinned by a set of principles that must guide all of us in all decisions and actions taken to achieve the vision. The "first order" or fundamental principles relate to those fundamental human rights that are guaranteed in the Constitution, and underpin the very nature of our society and system of governance. These principles affirm the democratic values of:

- Human dignity and social equity
- Justice and fairness
- Democratic governance

The "substantive principles" address the content or conditions that must be met in order to have a sustainable society and are based on principles already enshrined in legislation and policies. The principles underscore a cyclical and systems approach to achieving sustainable development and are as follows (RSA, 2008):

- Efficient and sustainable use of natural resources
- Socio-economic systems are embedded within, and dependent upon, eco-systems

- Basic human needs must be met to ensure resources necessary for long-term survival are not destroyed for short term gain

The “process principles” establish a few clear principles that apply specifically to the implementation of the national strategic framework for sustainable development. The most important in this regard are (RSA, 2008):

- Integration and innovation
- Consultation and participation
- Implementation in a phased manner

According to the Republic of South Africa (2008) five strategic priority areas for action and intervention are necessary to reach the desired state of sustainable development described in the national vision reflect a systemic and integrative approach and seek to transcend traditional divisions and sectors, these include:

- Enhancing systems for integrated planning and implementation
- Sustaining our ecosystems and using natural resources efficiently
- Economic development via investing in sustainable infrastructure
- Creating sustainable human settlements
- Responding appropriately to emerging human development, economic and environmental challenges

#### **3.3.3.1.2. IMPLICATIONS FOR THIS STUDY**

- Achieving sustainable development through efficient public transport that decreases CO<sub>2</sub> emissions
- Enhancing human well-being and quality of life, especially for those most affected by poverty and inequality, through access to transportation and services
- Enhancing transport systems through integrated planning

#### **3.3.3.2. CITY OF CAPE TOWN INTEGRATED METROPOLITAN ENVIRONMENTAL POLICY, 2003**

##### **3.3.3.2.1. OVERVIEW**

The Integrated Metropolitan Environmental Policy (IMEP) forms the basis of a series of strategies and programmes in order to ensure that the principles of sustainability are adhered to. It strives to meet the current needs as well as the maintenance of resources for the benefit of future generations. Sustainable development looks for a balance between economic, social and natural environmental needs. It also meets the needs of the present generations while not undermining the ability of future generations to meet their own needs. The term environment is defined by the City of Cape Town (2003) to include the natural, social, economic, urban, rural and cultural context as experienced by the communities of Cape Town.

General policy principles include (CoCT, 2003):

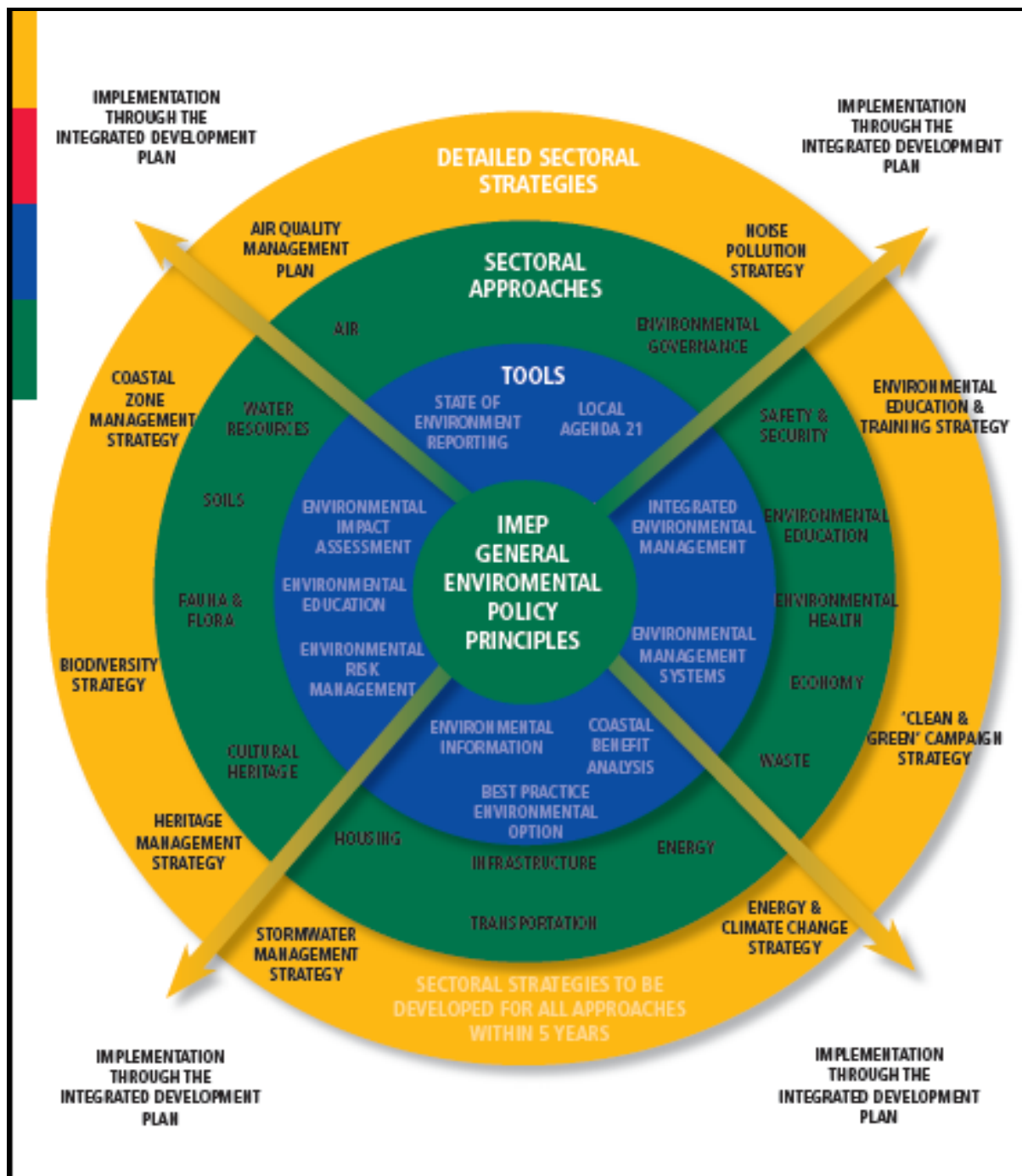
- A commitment to adopting and implementing the principles and underlying approaches to sustainable development of the City of Cape Town, and ensuring the integration of environmental issues into local government decision-making at all levels.
- A commitment to ensuring that current generations use natural resources in such a way so as to maximise the benefit to all, while ensuring that those resources are protected for the use of future generations.
- A commitment to the protection of the constitutional right to a healthy environment and the recognition of the responsibilities and obligations of sustainable service delivery and ecologically sustainable development for the benefit for all.
- A commitment by the City of Cape Town to developing and implementing detailed sectoral strategies, in order to implement and enforce the general policy principles, for all environmental issues so as to meet the commitments described in the sectoral approaches.
- A commitment to a holistic approach to the environment and to protecting the City of Cape Town's unique biodiversity. Further, it is a commitment to a special responsibility on behalf of the global community to ensure the conservation and protection of the Cape Floristic Kingdom.
- A commitment to, as a minimum, meeting or where practical exceeding the requirements of relevant international, national and provincial environmental legislation.
- The recognition by the City of Cape Town of the inherent rights of all living creatures and a commitment to the humane treatment of all animals, both domestic and wild.
- A commitment to the responsible stewardship of the resources within the local government's charge, through open, consultative, integrated and transparent governance of the City of Cape Town. This will be achieved by ensuring that best practice environmental

solutions and activities are implemented at all times and that sustained partnerships with communities are achieved.

- A commitment to applying the precautionary principle, which states that if environmental consequences of a proposed activity are of significant impact and/or concern, and are uncertain, that activity should not be undertaken.
- The commitment by the City of Cape Town to the integration of environmental considerations in all its functions and activities, including strategic planning initiatives such as the Integrated Development Plan (IDP), and international initiatives such as Local Agenda 21.
- A commitment to the involvement of, and partnerships with, civil society in decision-making processes regarding environmental management of the City of Cape Town.
- A commitment by the City of Cape Town to recognising and minimising the impact of its activities on the global environment, through understanding and monitoring its ecological footprint.
- A commitment to promoting an ethic of collective environmental responsibility in the City of Cape Town by means of environmental education and awareness programmes.
- A commitment by the City of Cape Town to recognising the role of disadvantaged communities (particularly the youth, women and persons with disabilities) in the development and enhancement of the City.
- A commitment by the City of Cape Town to open, transparent and effective environmental governance.

The IMEP is a statement of intent, a commitment to certain principles and ethics and to the development of sectoral strategies which will detail goals, targets, programmes and actions needed to ensure sustainable resource use and management of this unique environment for the benefit of all communities (refer to Figure 11 below).

FIGURE 11 – SECTORAL STRATEGIES OF THE INTEGRATED METROPOLITAN ENVIRONMENTAL POLICY



Source: Integrated Metropolitan Environmental Policy (IMEP), refer to City of Cape Town, 2003.

### 3.3.3.2.2. IMPLICATIONS FOR THIS STUDY

The IMEP recognises the need to manage uncontrolled urban expansion (which threatens the resources of the CoCT and which leads to unwanted social, environmental and economic costs) by working towards creating a more compact metropolitan area.

### **3.3.3.3. CITY OF CAPE TOWN ENVIRONMENTAL AGENDA, 2009 - 2014**

#### **3.3.3.3.1. OVERVIEW**

According to the City of Cape Town (2009b), following the Five-Year Review of the City's first Integrated Metropolitan Environmental Policy (IMEP), adopted by Council in 2001, the need for a driven and targeted sustainability agenda was realised if current environmental decline is to be reversed. Thereafter, the IMEP was revised and refined to represent key measurable environmental commitments by the City of Cape Town for the next five year period. These environmental commitments to a sustainable future are represented in the City's Environmental Agenda. Direct action to achieve each environmental target is led by a responsible department with the commitment of proactive support and integration by all other relevant line functions in the City of Cape Town in meeting those targets. These environmental targets fall within the following categories (CoCT, 2009b):

- Biodiversity
- Alien Invasive Species
- Air Quality
- Carbon Footprint
- Energy Efficiency
- Climate Change Adaptation
- River Health
- Water
- Waste Minimisation
- Housing
- Coastal Protection
- Urban Edge
- Environmental Compliance
- Environmental Education and Communication
- Outdoor Advertising
- Cultural Heritage
- Administrative Operations

### **3.3.3.3.2. IMPLICATIONS FOR THIS STUDY**

- Priority to reduce the per capita Carbon Footprint
- Containment of urban development by setting an urban and coastal edge

### **3.3.3.4. CITY OF CAPE TOWN ENERGY AND CLIMATE CHANGE STRATEGY, 2006**

#### **3.3.3.4.1. OVERVIEW**

The City of Cape Town strives to be a sustainable, world-class African city that is caring and committed to creating a better life for all people. The Energy and Climate Change Strategy has been compiled as part of the City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) framework which forms the foundation for environmental management. The Energy and Climate Change Strategy is based on Cape Town's State of Energy Report and co-ordinates a number of fragmented energy and climate change activities and issues. It includes an array of short and long-term implementation measures (CoCT, 2006c).

The strategy aims to improve quality of life by improving energy efficiency and energy supply options, guiding transport issues and contributing to sustainable growth and development through cost-effective energy provision. The Energy and Climate Change Strategy Visions are listed below (CoCT, 2006c):

- A city where all people have access to affordable, appropriate, safe and healthy energy services.
- A leading African city in meeting its energy needs in a sustainable way, and thus fulfilling its constitutional and global obligations.
- A city that uses and manages energy in an efficient way. This applies to both the City of Cape Town's operations as well as to residential, commercial, industrial and other sectors of the City.
- A city with an efficient and equitable transport system, based on public transport and compact planning to enable all residents to enjoy the benefits of urban life in residential, commercial, industrial and other sectors of the City.
- A city where energy supports economic competitiveness and increases employment in residential, commercial, industrial and other sectors of the City.

With global concerns about climate change, this strategy recognises the responsibility of all players, including local authorities, to be proactive on this issue. The City continues to explore feasible approaches in this regard, in particular the Clean Development Mechanism (CDM). The CDM is a mechanism under the Kyoto Protocol, whereby industrialised countries can invest in projects in developing countries that reduce greenhouse gas (GHG) emissions. CDM projects should promote local sustainable development.

#### **3.3.3.4.2. IMPLICATIONS FOR THIS STUDY**

- The vision of the Climate Change Strategy states that the CoCT will be a city with an efficient and equitable transport system, based on public transport and compact planning.

#### **3.3.3.5. AIR QUALITY MANAGEMENT PLAN FOR THE CITY OF CAPE TOWN, 2005**

##### **3.3.3.5.1. OVERVIEW**

The purpose of the Air Quality Management Plan (CoCT, 2005) is to ensure that clean air is achieved and maintained in the CoCT over the next 10 to 20 years. The plan contains the vision, mission, objectives, strategies and actions needed to achieve this.

**The City's vision:** "To be the City with the cleanest air in Africa."

**The mission includes:** "To reduce the health effects of poor air quality on the citizens of Cape Town especially during "brown haze" episodes.

**The objectives of the Air Quality Management Plan include:**

- To formulate an air quality management system for the CoCT.
- To specify ambient air quality standards and targets for Cape Town.
- To monitor priority pollutants which cause brown haze and affect human health.
- To improve air quality in informal areas.
- To enforce current and future legislation for air quality management.
- To compile a comprehensive emissions inventory database for the CoCT.
- To control vehicle emissions in the City.
- To consider air quality, land use and transport planning.

- To determine the detrimental health effects of poor air quality on the population of the CoCT.
- To establish a comprehensive education and communication strategy for air quality management.
- To periodically review the air pollution situation, report on progress and adjust and update strategies and objectives where needed.

### **3.3.3.5.2. IMPLICATIONS FOR THIS STUDY**

- Control vehicle emissions in the City.
- Consider air quality in land use and transport planning.

### **3.3.3.6. CITY OF CAPE TOWN GREEN BUILDING GUIDELINES (DRAFT)**

#### **3.3.3.6.1. OVERVIEW**

The City of Cape Town's Energy and Climate Change Strategy (CoCT, 2006c), highlights its determination to ensure access to affordable, clean, and secure sources of energy to underpin sustainable economic development and to protect the environment. This concurs with the global agenda to tackle climate change by reducing greenhouse gas emissions, as well as the demand for energy. Due to a rapid increase in demand for energy in the CoCT, there is an urgent need to reduce the energy and other resources consumed in the construction and use of buildings, as well as to improve the efficiency of urban planning.

The aim of the Green Building Guidelines for the City of Cape Town is to (CoCT, Undated):

- Actively promote resource efficient construction of new or renovated buildings in Cape Town.
- To minimise the negative environmental impacts of the built environment.
- Maximising positive social and economic impacts.

Including principles of sustainability into the lifecycle of buildings including materials, manufacture, design, construction and operation enables designers and developers to minimise the environmental impact of a development at little or no cost.

Building Guidelines document is currently a guideline, in the long-term the CoCT will work towards design manuals and legislation to ensure the implementation of green buildings. This document is aligned with the Green Building Council of South Africa, which has incorporated the Green Star Rating system of the Green Building Council of Australia. It foresees that the CoCT will incorporate the Green Star Rating system in the future. The following inter-related principles are intrinsic to the Green Building Guidelines (CoCT, Undated):

- Local appropriateness
- Sustainable procurement
- Positive legacy
- Resource efficiency
- Lifecycle approach
- Zero Waste
- Use of renewable resources
- Conservation of the natural environment
- Human health and wellbeing
- Local production for local use
- Monitoring and evaluation

It is vital that these principles are implemented in the planning, design, operation, maintenance and eventual demolition of developments and are not seen as 'add-ons' but rather as an essential part of the design and construction process with the ultimate goal being the promotion of a more sustainable lifestyle.

In terms of site selection, the following recommendations should be implemented where possible (CoCT, Undated):

- The redevelopment of a Grey- or Brownfield site is generally favoured above the development of a Greenfield site
- Appropriate rehabilitation needs to be done on degraded sites to reduce any negative environmental and health impacts
- Appropriate Environmental Impact Assessments (EIAs) need to be done
- Compact urban development should be supported to reduce urban sprawl and make efficient use of infrastructure
- Access to amenities and public transport should be taken into account when selecting a site

- The influence that topography and soil conditions of a particular site have in relation to implementing sustainable interventions should be taken into account when selecting a site.

### 3.3.3.6.2. IMPLICATIONS FOR THIS STUDY

- Compact urban development is supported to reduce urban sprawl and create economic corridors

## 3.4. SUMMARY

This section provided a brief overview of relevant policies relating to the study. These policies were divided into three categories:

- policies relating to the planning of a transport system
- policies that inform the spatial analysis of a future public transport network
- policies relating to sustainability.

The implications of these policies are summarised in Table 4 below:

TABLE 4 – SUMMARY OF POLICY IMPLICATIONS FOR THE STUDY

Policy category	Implication for the study
<b>Planning of a transport system</b>	<ul style="list-style-type: none"> <li>– Land transport planning must be integrated with the land development and land use planning processes.</li> <li>– Intermodal planning committee must be established in order to co-ordinate public transport between modes.</li> <li>– No person may operate a road-based public transport service, unless he or she is the holder of an operating licence or a permit.</li> <li>– Closer integration in land use and transport planning.</li> <li>– Development strategies based on corridor development and densification.</li> <li>– Promote greater efficiency and effectiveness in the public transport system.</li> <li>– Increase access and mobility for all users.</li> <li>– Densification of transport corridors</li> </ul>

Policy category	Implication for the study
	<ul style="list-style-type: none"> <li>– Support corridor development</li> <li>– Differentiated public transport services</li> <li>– Improve the performance of public transport</li> <li>– Promote sustainability</li> <li>– Reduce existing inequalities in access to opportunity through the use of both transport and spatial development policy instruments.</li> <li>– Contain growth in private vehicle travel.</li> <li>– Encourage the provision of viable and affordable public transport services.</li> <li>– Encourage the establishment of multifunctional transport services in marginalised areas.</li> <li>– Promote growth and stability in the public transport industry.</li> <li>– Maximise energy conservation and minimise ecological impacts to be responsive to achieving environmental sustainability.</li> <li>– Contain growth in private vehicle travel.</li> <li>– Promotion of a more compact city in which land use and transport effectively supports sustainability.</li> <li>– Support infill rather than dispersed developments</li> <li>– Good quality transport system that provides for basic mobility for the economically disadvantaged</li> <li>– Discouragement of unsustainable transport modes such as the single occupancy vehicle</li> <li>– Prioritises public transport and non-motorised transport.</li> <li>– Priority to public transport over private transport</li> <li>– Implement travel demand management aimed at a shift in the users of private transport to public transport</li> <li>– Sustainable funding of transport systems</li> <li>– Support innovation and environmentally sustainable transport</li> </ul>
<b>Informing the spatial</b>	<ul style="list-style-type: none"> <li>– Development opportunities should be channelled into</li> </ul>

Policy category	Implication for the study
<p><b>analysis of a future public transport network</b></p>	<p>activity corridors and nodes that are adjacent to or link the main growth centres,</p> <ul style="list-style-type: none"> <li>– Enhance employment opportunities through giving all users access to the key economic areas</li> <li>– Activity corridors provide sustainable economic opportunities</li> <li>– Promotion of equity and poverty reduction.</li> <li>– Promotion of effective public and non-motorised transport and spatial integration</li> <li>– Promotion of effective infrastructure</li> <li>– Addressing the spatial legacy of apartheid.</li> <li>– Supports the introduction of the urban edge and higher densities.</li> <li>– Promote integration</li> <li>– Improve the accessibility and efficiency of all communities by means of appropriate investment in transport infrastructure</li> <li>– Densification of transport corridors</li> <li>– Manage urban expansion by containing the City’s urban footprint</li> <li>– Promote integration between areas</li> <li>– City densification</li> <li>– Containing the City’s urban footprint by managing urban expansion</li> <li>– Establishment of an integrated grid based movement system</li> <li>– Consolidation and intensification of development on the grid</li> <li>– Direct urban growth and promotes compact urban development</li> <li>– City densification is viewed as a necessary step to promote the longer-term sustainability of Cape Town’s valuable natural, urban and rural environment.</li> </ul>
<p><b>Sustainability</b></p>	<ul style="list-style-type: none"> <li>– Achieving sustainable development through efficient public</li> </ul>

Policy category	Implication for the study
	<p>transport that decreases CO<sub>2</sub> emissions</p> <ul style="list-style-type: none"> <li>– Enhancing human well-being and quality of life, especially for those most affected by poverty and inequality, through access to transportation and services</li> <li>– Enhancing transport systems through integrated planning</li> <li>– Manage uncontrolled urban expansion (which threatens the resources of the CoCT and which leads to unwanted social, environmental and economic costs) by working towards creating a more compact metropolitan area.</li> <li>– Priority to reduce the per capita Carbon Footprint</li> <li>– Containment of urban development by setting an urban and coastal edge</li> <li>– Control vehicle emissions in the City.</li> <li>– Consider air quality in land use and transport planning.</li> <li>– Compact urban development is supported to reduce urban sprawl and create economic corridors</li> </ul>

In light of the three categories within which the policies above were discussed the following guidelines/requirements were developed that should be addressed by the development and implementation of the new integrated rapid transport system:

- Promotion of corridor development and densification
- Promotion of city densification management of uncontrolled urban expansion (urban sprawl) creating a more compact city structure.
- Promote the integration between areas
- Promote integrated transport planning
- Prioritises public transport and non-motorised transport over private transport
- Improve the accessibility and efficiency of all communities by means of appropriate investment in transport infrastructure
- Promotion of quality transport system that provides for basic mobility for the economically disadvantaged
- Promotion of equity and poverty reduction
- Support and promote innovation and environmentally sustainable transport

- Promotion of environmental sustainability
- Reduction of the cities per capita Carbon Footprint

## SECTION FOUR: EMPIRICAL STUDY

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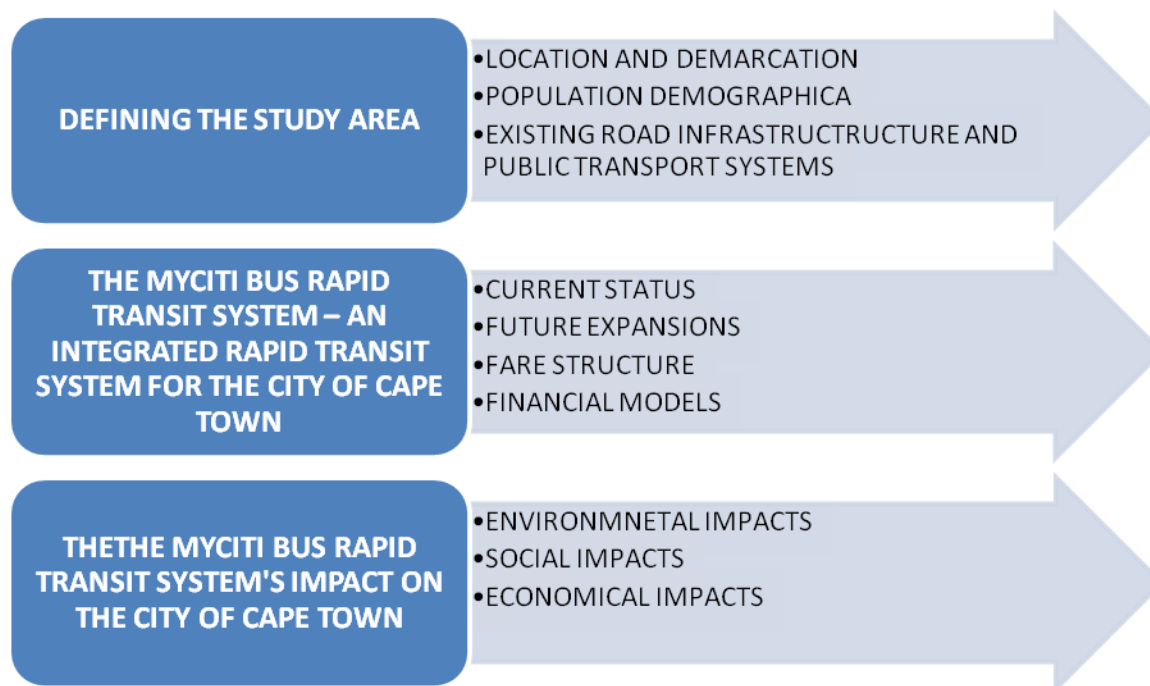
### 4.1. INTRODUCTION

In this section the status quo of the City of Cape Town (CoCT) in terms of city structure, population growth and distribution, road infrastructure and public transport systems will be looked at.

The City of Cape Town (CoCT) is in the process of implementing an Integrated Rapid Transport System (IRT) which is an initiative to transform the public transport sector to integrate all modal options. The Cape Town MyCiTi Bus Rapid Transit (BRT) system will be discussed in terms of its current status, future expansions, its fare structure and financial models.

With the development and implementation of a BRT system, various environmental, social and economic impacts will have an effect on the surrounding areas. These impacts and their applicability to Cape Town will then be discussed. Figure below is a graphical representation of the structure of this section:

FIGURE 12 – OUTLINE OF THE EMPIRICAL SECTION



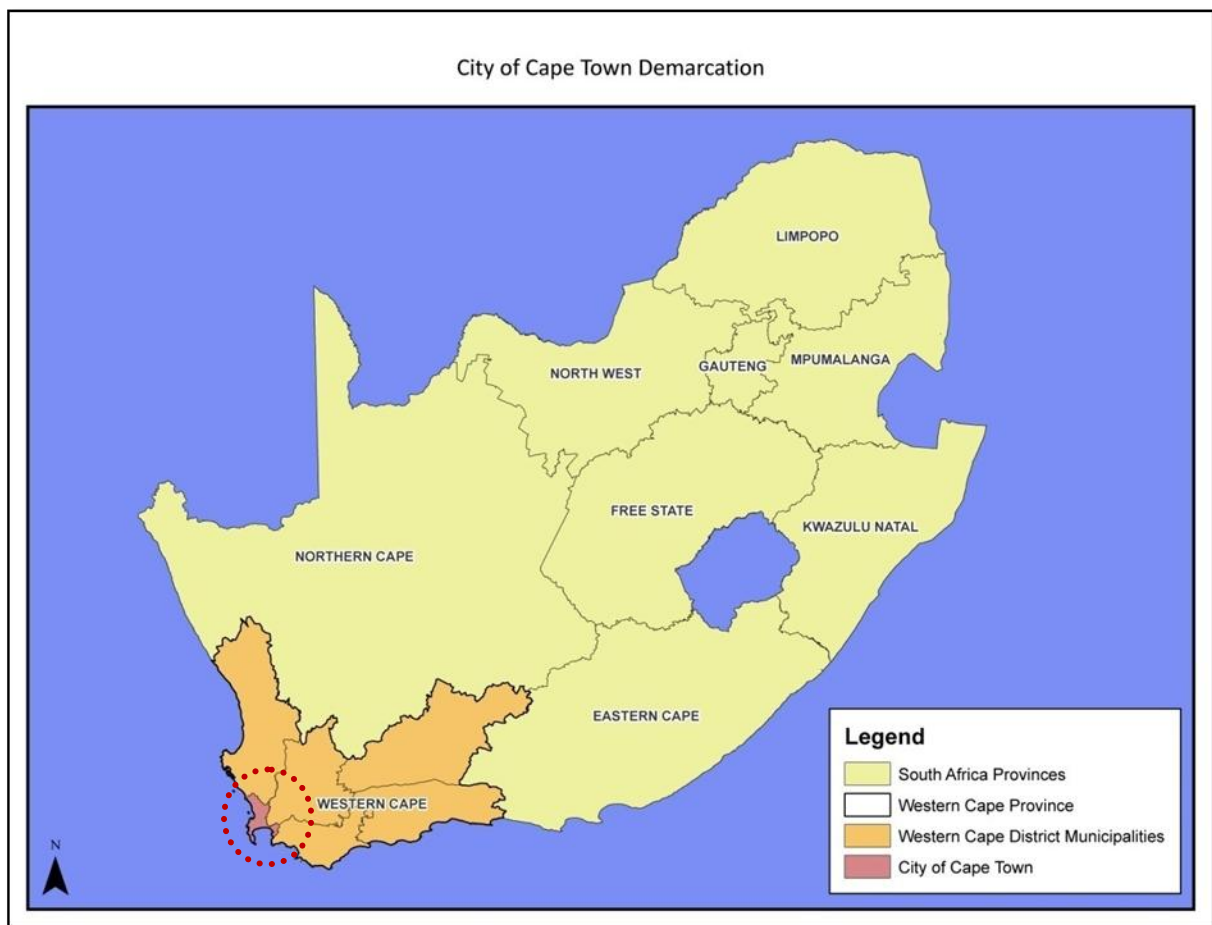
Source: Own construction, 2010

## 4.2. DEFINING THE STUDY AREA

### 4.2.1. LOCATION AND DEMARCATION OF THE STUDY AREA

The City of Cape Town (CoCT) is one of five District Municipalities within the Western Cape Province, South Africa (refer to Map 1 below). It is the provincial capital and primate city of the Western Cape, as well as the legislative capital of South Africa, where the National Parliament and many government offices are located.

MAP 1 – CITY OF CAPE TOWN DEMARCATION



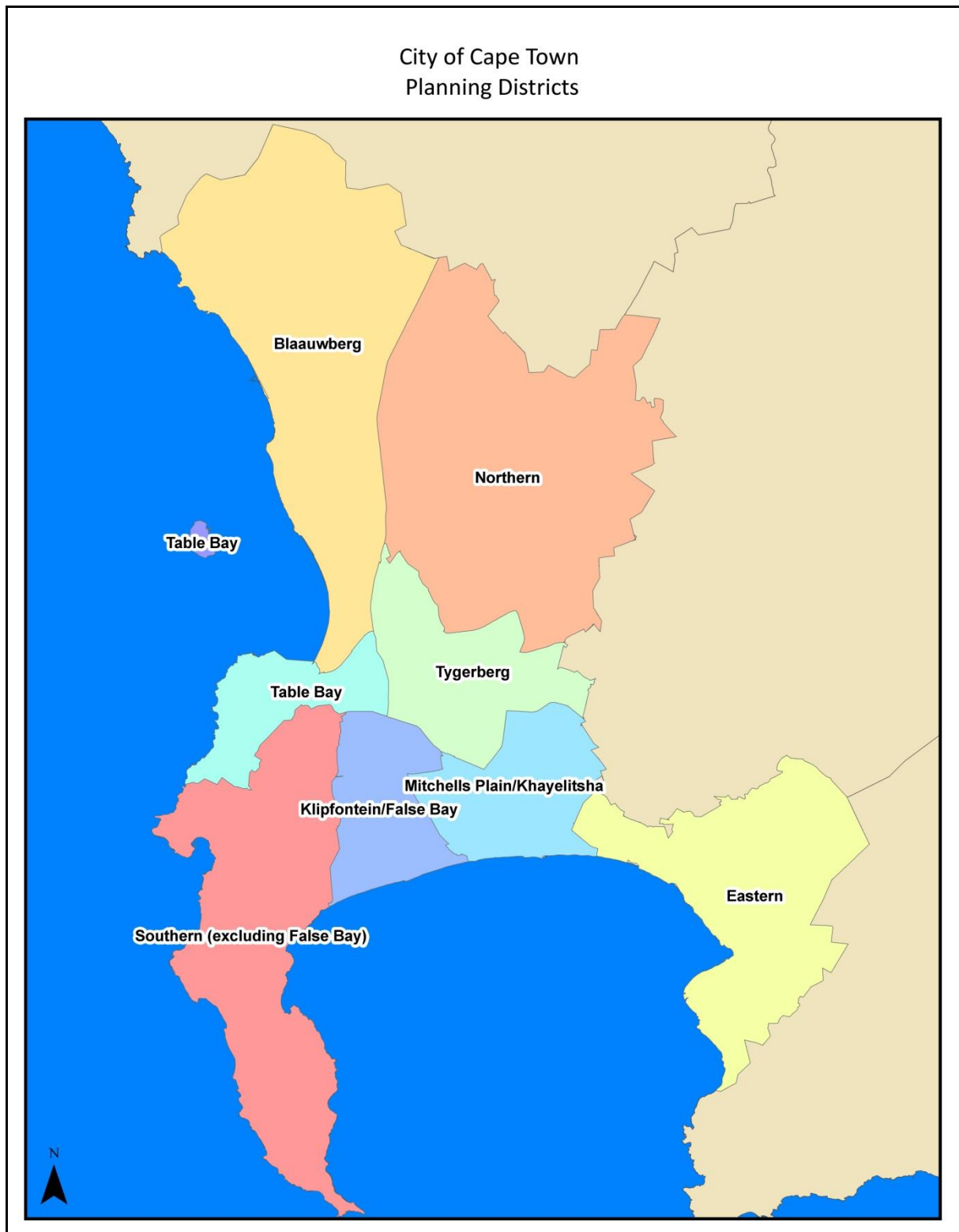
*Source: Own construction - GIS Mapping based on Data obtained from the Municipal Demarcation Board (2010)*

With a population that totalled approximately 3.5 million in 2009 (refer to Map 4), Cape Town is an intense movement of people, goods and services, extensive development and multiple business districts and industrial areas. It represents centres of economic activity with complex and diverse economies, a single area for which integrated development planning and strong interdependent social and economic linkages between its constituent units is desirable. The City of Cape Town is

subdivided into eight planning districts and 46 Main Places (refer to Maps 2 and 3 below). The Planning Districts includes the:

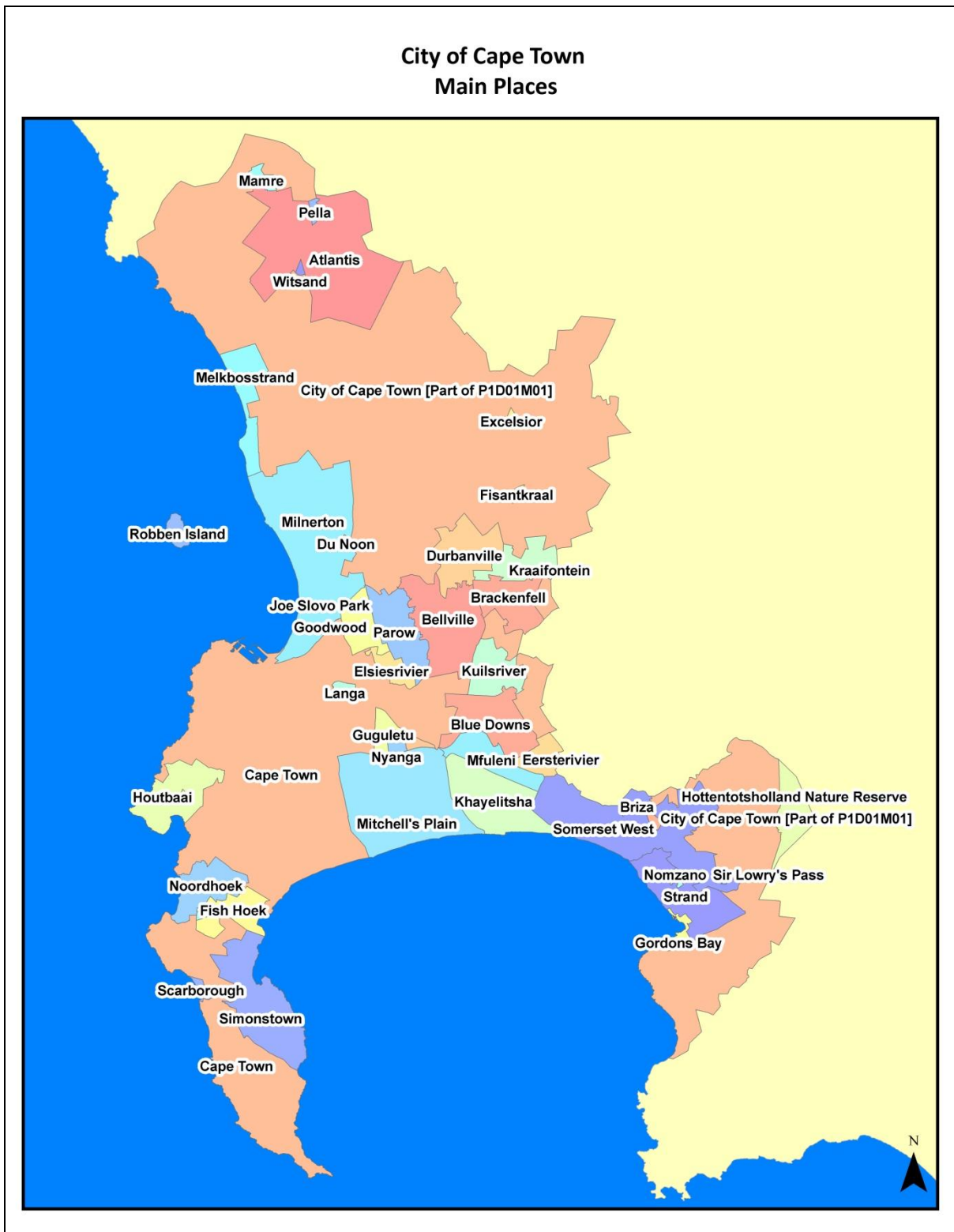
- A. Table Bay
- B. Blaauwberg
- C. Northern
- D. Tygerberg
- E. Eastern
- F. Mitchells Plain/Khayelitsha
- G. Klipfontein/False Bay
- H. Southern (excluding False Bay)

MAP 2 - CITY OF CAPE TOWN PLANNING DISTRICTS



Source: Own construction - GIS Mapping based on Corporate GIS Data (refer to CoCT, 2010c)

MAP 3 - CITY OF CAPE TOWN MAIN PLACES

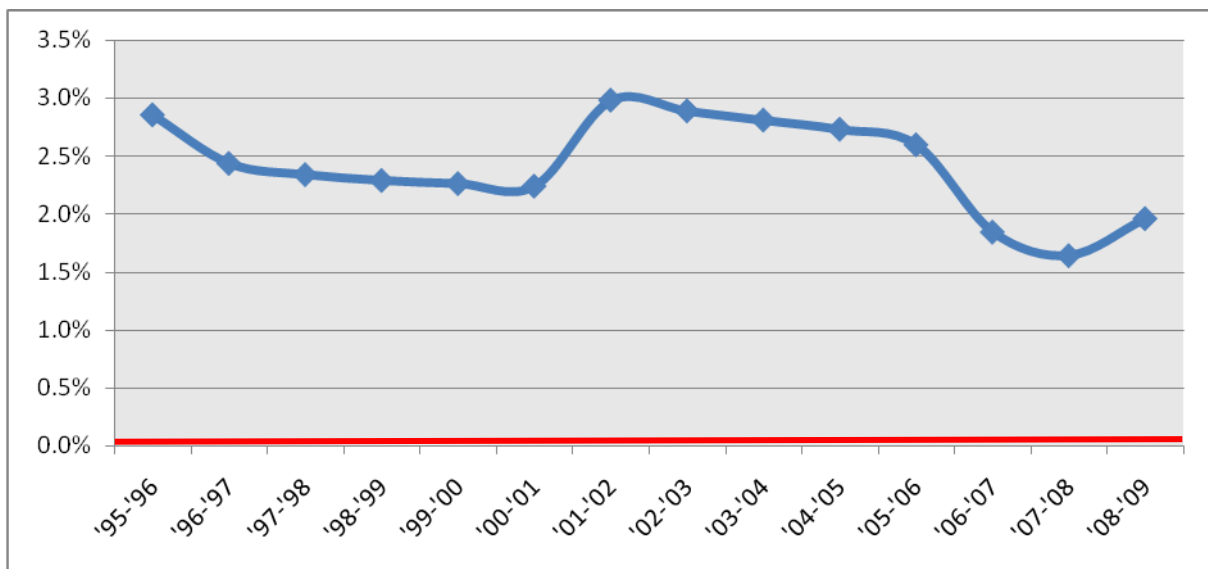


Source: Own construction - GIS Mapping based on Corporate GIS Data (refer to CoCT, 2010c)

## 4.2.2. POPULATION DEMOGRAPHICS

Coinciding with an increase in population is an increase in private vehicle ownership and usage, therefore in order to understand the demand for transport services in a specific region; one must look at the population growth, which is a key driver thereof. The average annual population growth rate for the CoCT from 1995 to 2009 is depicted in Figure 13 below. During this period the CoCT experienced a positive annual growth rate, which never dropped below 1.5%.

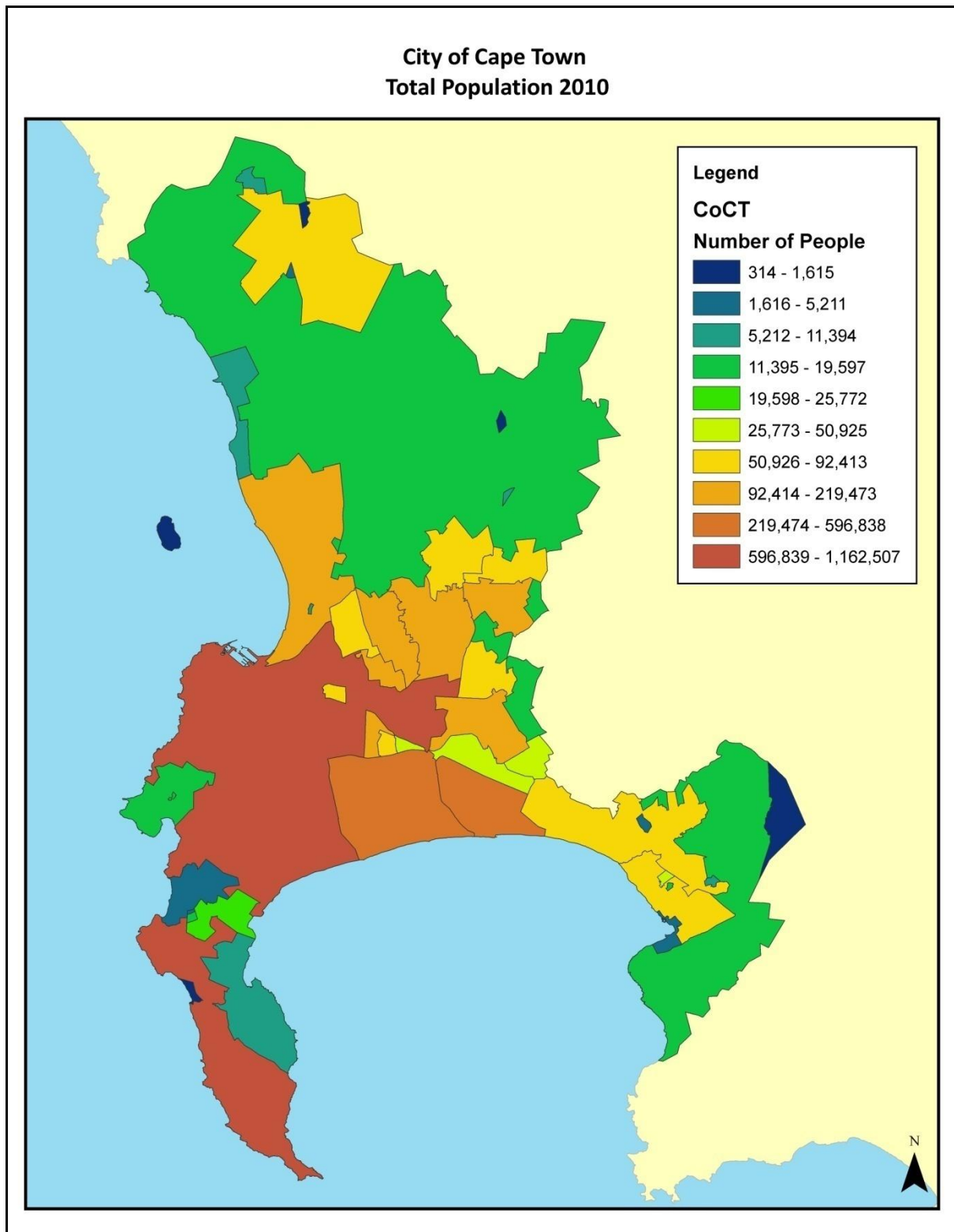
FIGURE 13 - AVERAGE ANNUAL POPULATION GROWTH RATE FOR THE COCT FROM 1995 TO 2009



Source: Own construction based on Standardised Regional Data (2010)

Over the last decade (1999 to 2009) the average annual population growth trend showed a positive growth rate of 2.4%.

MAP 4 - CITY OF CAPE TOWN POPULATION DISTRIBUTION



Source: Own construction - GIS Mapping based on NSI Data (refer to RSA, 2010c) and Standardised Regional Data (2010)

## **4.2.3. EXISTING ROAD INFRASTRUCTURE AND PUBLIC TRANSPORT NETWORKS**

### **4.2.3.1. ROAD INFRASTRUCTURE**

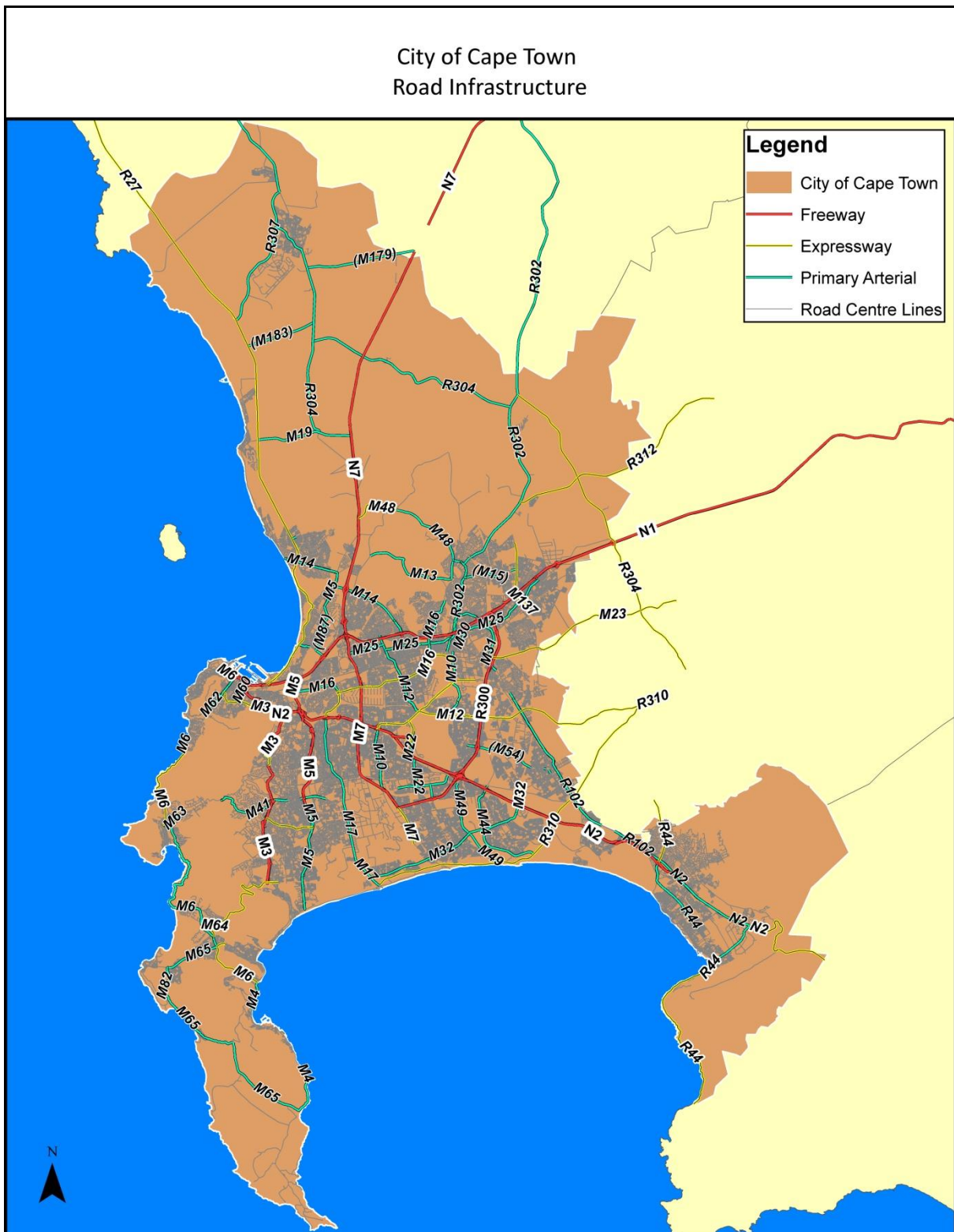
Three national roads start in Cape Town (see Map below 5):

- the N1 which links Cape Town with Bloemfontein, Johannesburg, Pretoria and Zimbabwe;
- the N2 which links Cape Town with Port Elizabeth, East London and Durban; and
- the N7 which links Cape Town with the Northern Cape Province and Namibia.

The N1 and N2 both start in the Central Business District, and split to the east of the CBD, with the N1 continuing to the north east and the N2 heading south east past Cape Town International Airport. The N7 starts in Mitchells Plain and runs north, intersecting with the N1 and the N2 before leaving the city.

Cape Town also has a system of freeway and dual carriageway M-roads, which connect different parts of the city. The M3 splits from the N2 and runs to the south along the eastern slopes of Table Mountain, connecting the City Bowl with Muizenberg. The M5 splits from the N1 further east than the M3, and links the Cape Flats to the CBD. The R300, which is informally known as the Cape Flats Freeway, links Mitchells Plain with Bellville, the N1 and the N2.

MAP 5 – CITY OF CAPE TOWN ROAD INFRASTRUCTURE



Source: Own construction - GIS Mapping based on NSI Data (refer to RSA, 2010c)

The Integrated Development Plan of the CoCT identifies the following Integrated Transport Corridors depicted in Map 6 below. According to the IDP, Integration of land use and transport through

Integrated Transport Corridors and the building of homes close to transport corridors is needed to ensure improved access to community facilities) and economic opportunities.

MAP 6 - INTEGRATED TRANSPORT CORRIDORS



Source: *Integrated Transport Plan, see CoCT (2006)*

#### 4.2.3.2. PUBLIC TRANSPORT IN CAPE TOWN

Cape Town has a relatively widespread, but poorly integrated and inadequate public transport system. Inadequate public transport results in greater use of private vehicles and a sharp rise in

traffic congestion with pressures for costly road expansions and higher vehicle emissions. Public transport provides the opportunity to make significantly more efficient use of the transport network, by increasing the number of people moved per vehicle, and so managing congestion and freeing up road space for improved economic use.

Providing transport across the greater part of the metropolitan area is the bus service operated by Golden Arrow Bus Services. Service frequencies are very low on many routes and night services are extremely limited. Both rail and bus services are subsidised. Unsubsidised services are provided by minibus taxis, which operate over most of the metropolitan area, providing greater penetration than other modes, especially in low income, high-density residential areas. The City also has an active metered taxi component, one that has recently seen some growth in demand through the introduction of shared metered taxi services. Finally, these services are backed up by more tourist oriented bus services, such as the City Hopper, which operates on key scenic routes around the City. In support of tourist activities, additional train services are operated during holiday periods, mainly on the line between Muizenberg and Simon's Town. Finally, there is a Dial-a-Ride service that caters for registered special needs users.

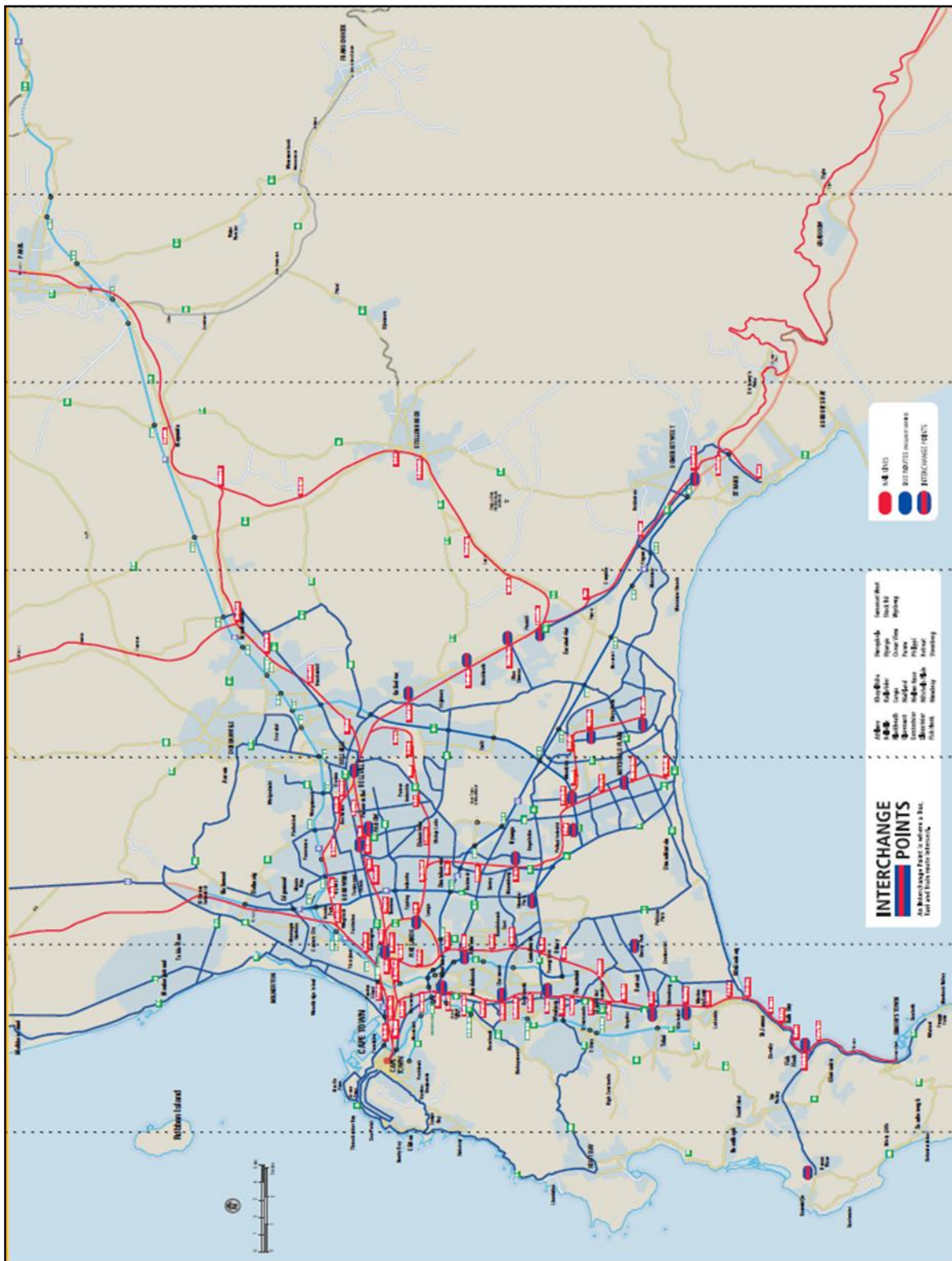
The responsibility for the provision of rail, bus and minibus taxi transport services in Cape Town is vested in separate independently functioning organisations. According to the Current Public Transport Record of the City of Cape Town (2006), the following passenger trips are made daily by the various modes of public transport in the City of Cape Town area:

- 600 000 rail passenger trips a day are made on Metrorail services (54% of total share of passengers using public transport)
- 330 000 passenger trips a day are made using minibus taxi services (29% of total)
- 200 000 passenger trips a day are made on bus services (17% of total)

In the Cape Town CBD area, the all-day share of public transport passenger trips is 54% by train, 33% by minibus taxi and 13% by bus. The share between public and private passenger trips in the Cape Town CBD area during the day (06h00 to 19h00) is 33% and 67% respectively. Nevertheless, during the morning and evening commuter peak periods there is an almost equal share of trips between public and private passenger trips.

Map 7 below indicates rail lines, bus routes, interchange points is where a bus, taxi and train route intersects, national roads and M-way roads in the City of Cape Town.

MAP 7 - CAPE TOWN PUBLIC TRANSPORT GUIDE, 2010



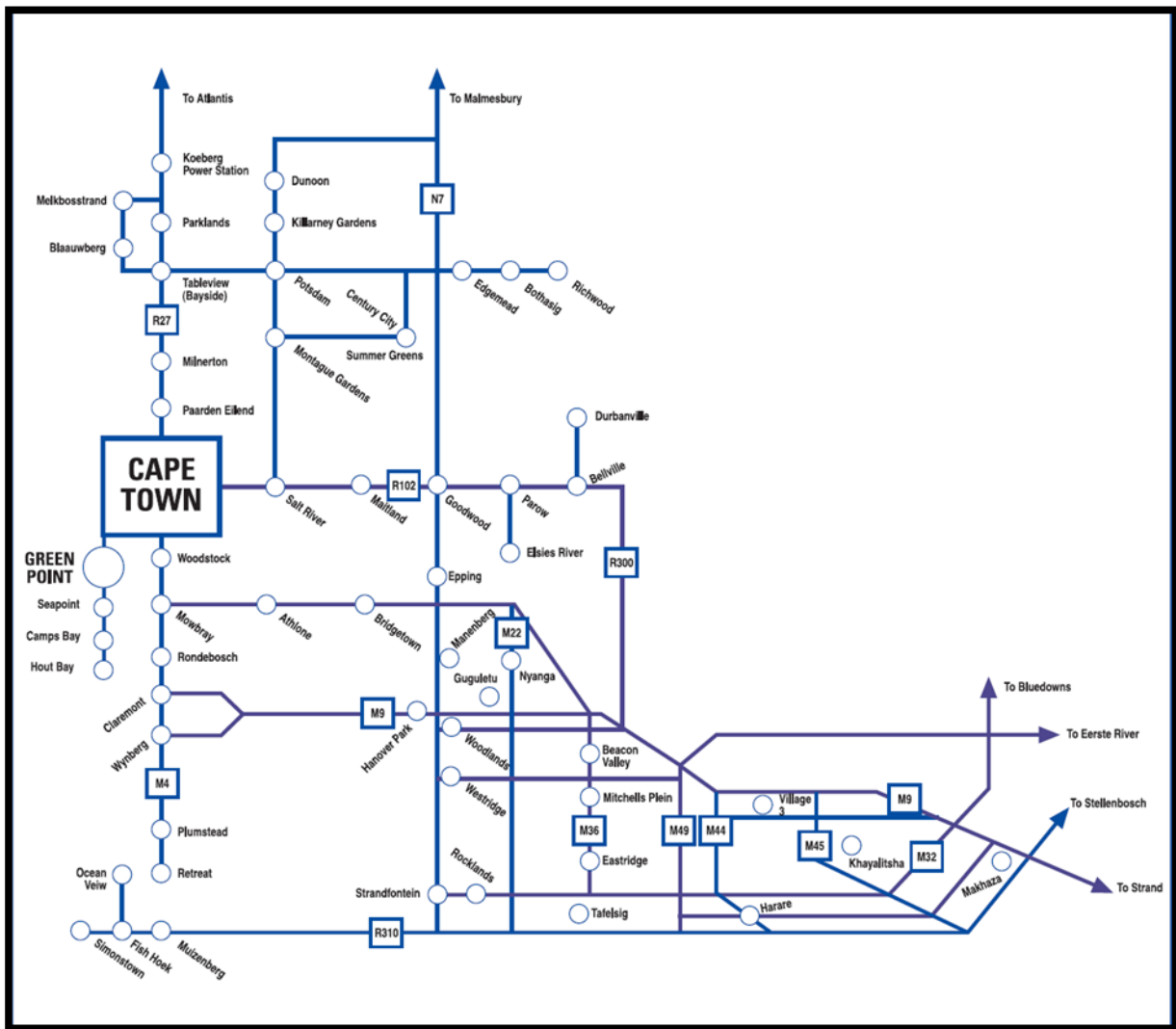
Source: [http://www.capemetrorail.co.za/routes/Routemap\\_index.htm](http://www.capemetrorail.co.za/routes/Routemap_index.htm), 2010

Rail passenger services are the responsibility of the South African Rail Commuter Corporation (SARCC), which owns and finances all passenger coaches, rail lines and stations, approves rail fares



Cape Town, covering a total area of approximately 2 460 km<sup>2</sup>. The fleet conveys around 55.9 million passengers annually, at a rate of approximately 270 000 per week day. Bus services are provided from depots at Montana, Woodstock, Atlantis, Philippi, Simon’s Town and Blackheath. The services from Atlantis have been subcontracted to Sibanye Bus Services, a joint venture established in 2001 between Golden Arrow, Abahlobo Transport Services and Siyakhula Bus Services. Map 9 below indicates the Golden Arrow Bus Service’s bus routes.

MAP 9 - GOLDEN ARROW BUS SERVICE’S BUS ROUTES



Source: [http://www.capemetrarail.co.za/routes/Routemap\\_index.htm](http://www.capemetrarail.co.za/routes/Routemap_index.htm), 2010

Minibus taxi services are provided by private operators who obtain licences from the Operating Licensing Board to operate a passenger service. The operating licences specify the rank and roads along which the services are to be provided.

Metered taxi services are provided by private operators who obtain licences from the Operating Licensing Board to operate passenger services. As with the minibus taxi services, the operating licence specifies the rank or location from which the service is to be provided, a radius distance from the rank within which the service can operate and the fare to be charged.

#### **4.2.3.3. INTEGRATED RAPID TRANSPORT**

Cape Town is in the process of implementing an Integrated Rapid Transport System (IRT) which is an initiative to transform the public transport sector by dramatically improving the customer experience. The IRT seeks to integrate all modal options into a coherent package for the customer, inclusive of:

- Metrorail services,
- road-based services on trunk routes,
- minibus taxi integration,
- feeder bus services,
- conventional bus services,
- improved pedestrian and bicycle access,
- metered taxi integration, and
- Park-and-ride facilities.

The corridor idea is not new. Governments in a number of countries have produced policies that seek to integrate land-use and transport, in so doing bringing about the corridor-type developments in urban areas leading to the implementation of the BRT System. Below are case studies of successful integrated rapid transport systems that have been implemented in other countries. A lot can be learned from these case studies in terms of project successes and failures.

### **4.3. THE MYCITI BUS RAPID TRANSIT SYSTEM – AN INTEGRATED RAPID TRANSIT SYSTEM FOR THE CITY OF CAPE TOWN**

#### **4.3.1. OVERVIEW**

In February 2007 the City of Cape Town performed a scoping study on an integrated public transport network and identified the potential for a city-wide network of bus rapid transit (BRT) routes and related motorised and non-motorised feeder services to complement the existing rail system as part

of an integrated public transport system. The Council approved the implementation of the IRT Phase 1A in August 2008. In April 2010 the name 'MyCiTi' (see Figure 14 below) was chosen to denote a new generation of high-quality public transport.

FIGURE 14 - CITY OF CAPE TOWN MYCITI IRT LOGO



Source: <http://www.capetown.gov.za/en/irt/Pages/Gallery.aspx>, 2010

BRT is a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective urban mobility with segregated right-of-way infrastructure (see Image 6 below), rapid and frequent operations, and excellence in marketing and customer service (ITDP, 2007). BRT supports the shift from private to public transport by providing a high quality of service. One of the key strengths of a BRT system is its flexibility, both in serving varying passenger demand levels as well as penetrating the existing urban structure at a much finer level than, rail for example. By combining different vehicle sizes and frequencies it can meet a wide range of demand levels cost effectively and conveniently. BRT allows greater ease of movement across transport routes, facilitating growth along corridors, whereas rail tends to divide urban space.

FIGURE 15 - THE MYCITI IRT ALONG HERTZOG BOULEVARD



Source: <http://www.capetown.gov.za/en/irt/Pages/Gallery.aspx>, 2010

The 'MyCiti' BRT system will consist of four phases, which is aimed to be completed within the next 15 to 20 years. Phase 1A, which is covered in detail below, is aimed to be completed by June 2013. The specifics of remaining three phases have not been finalised, therefore only Phase 1A is mentioned in detail below, while the other Phases are covered briefly.

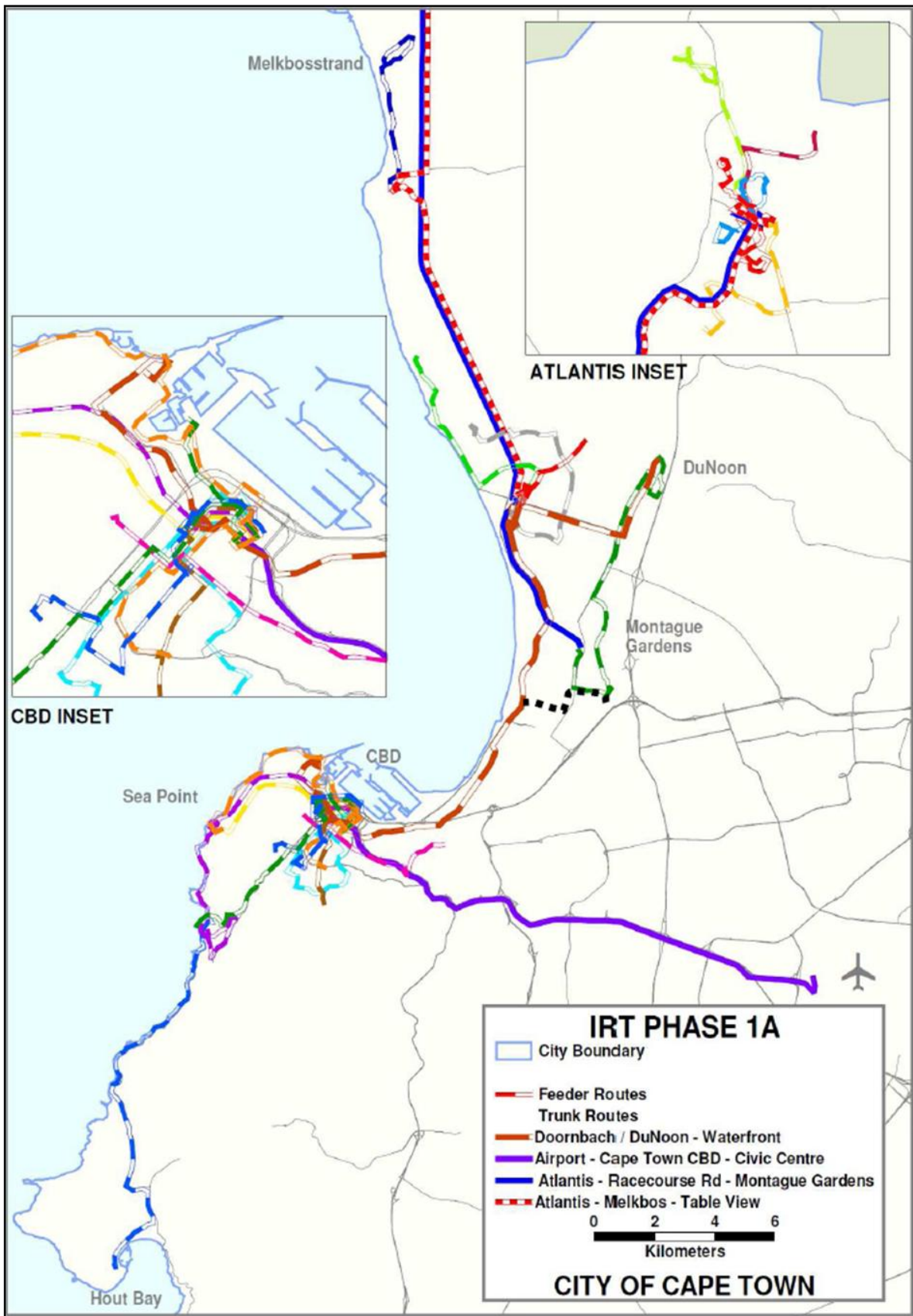
## **4.3.2. THE MYCITI IRT PHASES**

### **4.3.2.1. PHASE 1A**

Phase 1A includes the Cape Town International Airport-CDB link, Inner City, Woodstock rail station, Paarden Eiland, Montague Gardens and extends to Hout Bay and Atlantis. It includes the rapidly growing residential areas in Blaauwberg north of the Diep River, and the low-income communities of Atlantis, Mamre, Du Noon and Doornbach. This corridor faces some of the worst peak period congestion levels, especially to the south and east of the bridges over the Diep River.

A key motivation for starting with the Blaauwberg-Du Noon-Atlantis corridor is that no rail service exists in that part of the city. Currently, customers have no alternative to the existing road based system, which is heavily congested. The inner city service will provide a convenient, cost-effective way of getting around the CBD and City Bowl areas for the many thousands of people who live and work in this economic hub. Map 11 below depicts the full extent of Phase 1A after completion.

MAP 10 – FULL EXTENT OF THE MYCITI IRT PHASE 1A AFTER COMPLETION



Source: <http://www.capetown.gov.za/en/irt/Pages/Businessplan.aspx>, 2010

Stations of Phase 1A as proposed includes:

- 43 trunk stations (made up of 71 platforms) on four trunk services.
- 590 feeder stations/stops, including closed feeder stations where free feeder-to-feeder transfers will occur (this represents approximately 295 locations, since each location has a feeder station/stop on either side of the road).

Trunk stations (refer to Figure 16 below) are closed and located in the median, with raised platforms to facilitate ease of access with level boarding onto high-floor vehicles. The station includes a ramp for wheelchair access. A ticket booth and fare collection section at the station entrance ensures easy access to ticket sales and pre-board fare collection.

FIGURE 16 - THE COMPLETED MYCITI IRT STATION AT THE CAPE TOWN CIVIC CENTRE



Source: <http://www.capetown.gov.za/en/irt/Pages/Gallery.aspx>, 2010

Feeder services will operate in mixed traffic. Feeder stops are located on the kerbside to provide access to the left-sided doors on the low-floor feeder vehicles (see Figure 17 below). Feeder vehicles will also have a right-sided door to enable docking at closed-feeder median stations.

FIGURE 17 - GRAPHIC REPRESENTATION OF AN OPEN FEEDER STOP AT A CURBSIDE



Source: <http://www.capetown.gov.za/en/irt/Pages/Businessplan.aspx>, 2010

Trunk and Feeder Routes of Phase 1A as well as the trunk routes of the remainder of Phase 1 are indicated in Table 5 below.

TABLE 5 – TRUNK AND FEEDER ROUTES OF PHASE 1A AND THE REMAINDER OF PHASE 1

Phase 1A	
Trunk Number	Trunk Corridor
T1	Doornbach / Du Noon – Cape Town CBD
T2a	Airport - Cape Town CBD
T3 & T4	Atlantis – Melkbosstrand – Bayside - Montague Gardens
Feeder Number	Feeder Areas
F00 – F07 & F65	Inner City (including Hout Bay)
F08 – F13	Atlantis & Melkbos
F14 – F16	Table View
F66	Du Noon – Montague Gardens
F67	Century City – R27 trunk

Remainder of Phase 1	
Trunk Number	Planned Trunk Route Name
T5	Century City - Cape Town Waterfront
T6	Table View - Montague Gardens - Century City
T7	Table View – Koeberg Road – Salt River Circle
T8	Durbanville - Bellville - Airport - Claremont - Constantia

Source: *Business Plan: Phase 1A of Cape Town’s MyCiTi Integrated Rapid Transport system (City of Cape Town, 2010a)*

The trunk services will operate with larger vehicles along higher-density corridors where vehicles will have exclusive rights-of-way. Vehicles for trunk services will be high-floor articulated 18m vehicles (refer to Figure 18) or solo 12m vehicles (refer to Figure 19) with right-sided doors to service the median stations. The trunk services will operate as a ‘closed system’ in mostly segregated busways, mainly in the middle of the road with pre-board fare collection and verification. The trunk is designed for higher carrying capacities and greater travel speeds along higher density corridors (CoCT, 2010a).

FIGURE 18 - THE TRUNK SERVICES VEHICLE: AN 18 METER ARTICULATED HIGH-FLOOR VEHICLE



Source: <http://www.capetown.gov.za/en/irt/Pages/Businessplan.aspx>, 2010

FIGURE 19 - THE FEEDER SERVICES VEHICLE: A 12 METER SOLO VEHICLE



Source: <http://www.capetown.gov.za/en/irt/Pages/Businessplan.aspx>, 2010

The feeder services will link to the trunk services and also provide distribution within the local area. Two types of vehicles have been identified for feeder services. These include a 12m solo vehicle (see Image 19 above) and an 8m vehicle. These will be low-entry vehicles and will have two sets of left sided doorways and a right-sided door for those services that will make use of closed median stations on low-floor platforms. The feeder services will operate in areas where geometric design does not allow the use of bigger buses, and in lower-density areas, the feeder services will use smaller vehicles in most cases in mixed traffic lanes with kerbside stations, as seen in Figure below.

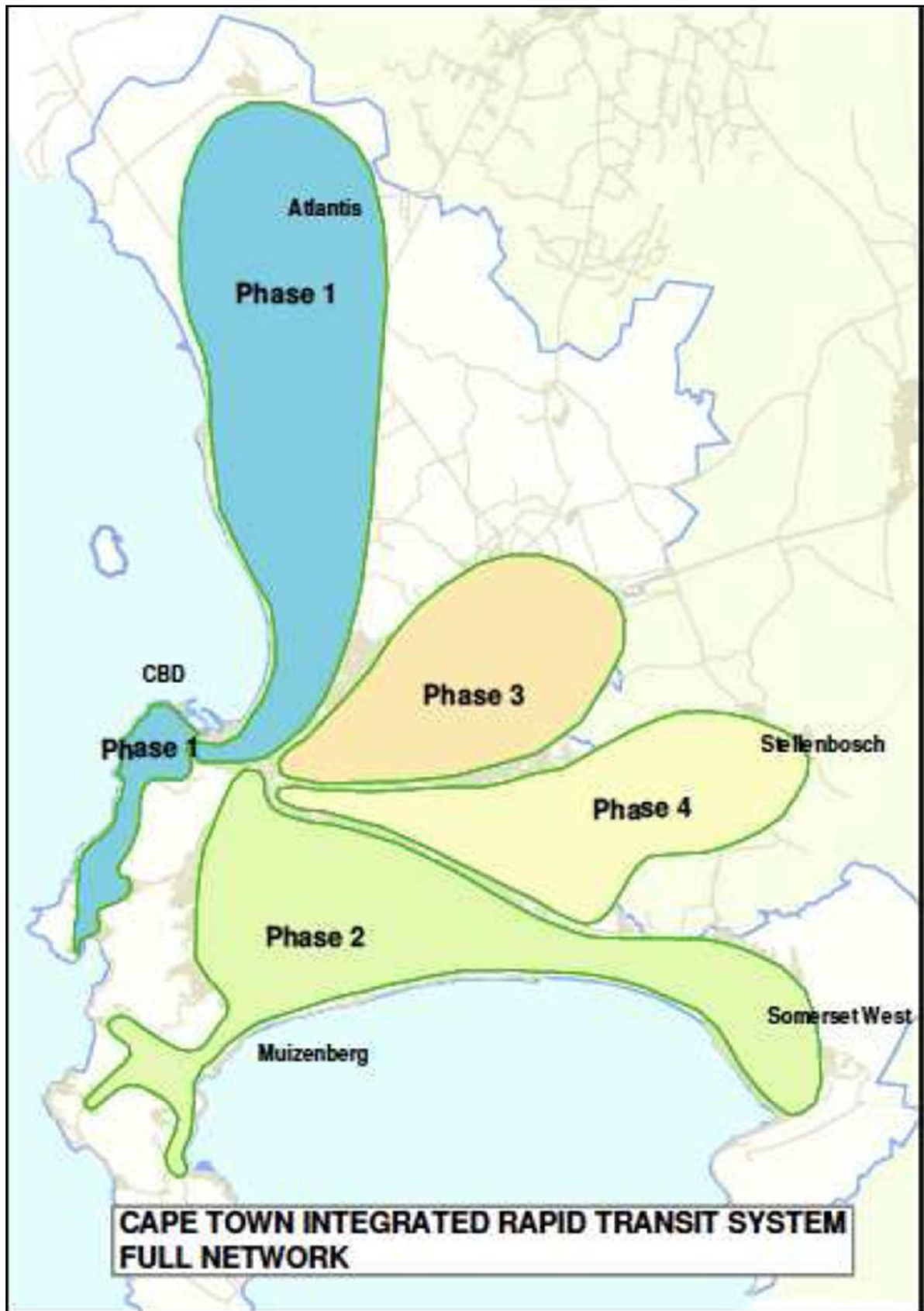
#### 4.3.2.2. EXPANDING THE MYCITI IRT SYSTEM IN PHASES

The MyCiti system is designed to be rolled out in four phases, for completion within 15 to 20 years, with the initial focus on implementing Phase 1A by June 2013, to match funding availability, and the remainder of Phase 1 by 2015. Phase 1 focuses on the central city and the Blaauwberg corridor towards Table View/Du Noon, as far as Atlantis and Mamre.

Phase 2 is currently intended to address the substantial public transport needs of the metro south-east, including Khayelitsha and Mitchells Plain. Phases 3 and 4 of the system will then deliver services within other areas of the city, including the northern suburbs, such as Bellville and Durbanville, the Delft and Blue Downs areas, as well as the greater Helderberg.

Map 12 below indicates the service areas of the proposed four phases of the MyCiti BRT system.

MAP 11 – SERVICE AREAS OF THE PROPOSED FOUR PHASES OF THE MYCITI BRT SYSTEM



Source: <http://www.capetown.gov.za/en/irt/Pages/Businessplan.aspx>, 2010

### **4.3.3. THE MYCITI IRT SYSTEM FARE STRUCTURE**

The fares seek to make the IRT services accessible to as many people as possible. The airport shuttle runs between Civic Centre Station on Hertzog Boulevard and the airport, and departs every 20 minutes. Children under the age of four travel for free, children aged four to 11 travel for R25, half of the with standard adult fare of R50. A ticket aimed at airport workers will offer an unlimited number of trips per month; at a cost of R400 (these tickets are non-transferable).

The inner city service will run between the Civic Centre Station and the V & A Waterfront, Cape Town railway station, the Loop and Long Street areas, and up to the Gardens Centre. A standard ticket will cost just R5. A ticket for one week of unlimited travel on the inner city service will cost R40.00. A one-month clip card, which is valid for 10 trips in the month, is also available for R40.00. Visitors to the city can purchase a ticket which provides one day of unlimited travel at R15.00 (CoCT, 2010b).

### **4.3.4. FINANCING THE MYCITI IRT SYSTEM**

From a financial perspective there are three broad cost components to the MyCiTi system.

- The capital and operating costs arising from infrastructure and system implementation, including compensation of existing operators;
- The cost of managing MyCiTi development and operations within the City of Cape
- Town administration and any Municipal Entity which is created;
- The cost of the contracted service providers for running public transport operations, including vehicle operating companies, the Station Services contractor, the control centre and the fare collector.

The main source of funding for the project is national government's Public Transport Infrastructure and Systems Grant (PTISG). The PTISG is a national grant with the strategic goal of 'promoting the provision of accessible, reliable and affordable Integrated Rapid Public Transport Network (IRPTN) services in the major cities of South Africa. This funding is supplemented by the City's own capital and operating contributions.

The intention of national government is that existing bus subsidies paid by provinces to contracted service providers out of the Public Transport Operations Grant (PTOG) be shifted to cities where the

provincially subsidised services are replaced by the city systems. This is according to Regulation 877 of the National Land Transport Act (5 of 2009).

Initial modelling indicates that the amount currently provided through the PTOG for the whole metropolitan area, which is in excess of R600 million per annum, will be sufficient to cover the deficit once the system is fully rolled out. However, this is not projected to be the case for Phase 1A on its own. To the extent the available PTOG amount is insufficient, and in relation to estimated project costs there remains a deficit of R809.9 million still to be funded.

**Apart from fares there are five key sources of funding. These are:**

- Public Transport Infrastructure and Systems Grant (PTISG)
- Loan funding from the Capital Replacement Reserve and External Financing Fund (EFF)
- Public Transport Operating Grant (PTOG)
- Local tax income such as property rates, a share of the fuel levy and other general income
- Other sources such as advertising and parking revenue.

#### **4.4. IMPACTS OF THE MYCITI IRT SYSTEM ON THE CITY OF CAPE TOWN**

The development and implementation of a BRT system has environmental, social and economic impacts on the surrounding areas. The nature and extent of these impacts, and whether beneficial or not, will be discussed below in terms of previous experiences and findings as well as their applicability to the City of Cape Town.

##### **4.4.1. ENVIRONMENTAL IMPACT**

The environmental impact consists of two dimensions:

- The natural environment
- The built environment

The natural environment includes all living and non-living things occurring naturally on the planet, as well as their interaction. The natural environment is contrasted with the built environment, which comprises the areas and components that are strongly influenced by humans. The term built environment refers to the human-made surroundings that provide the setting for human activity,

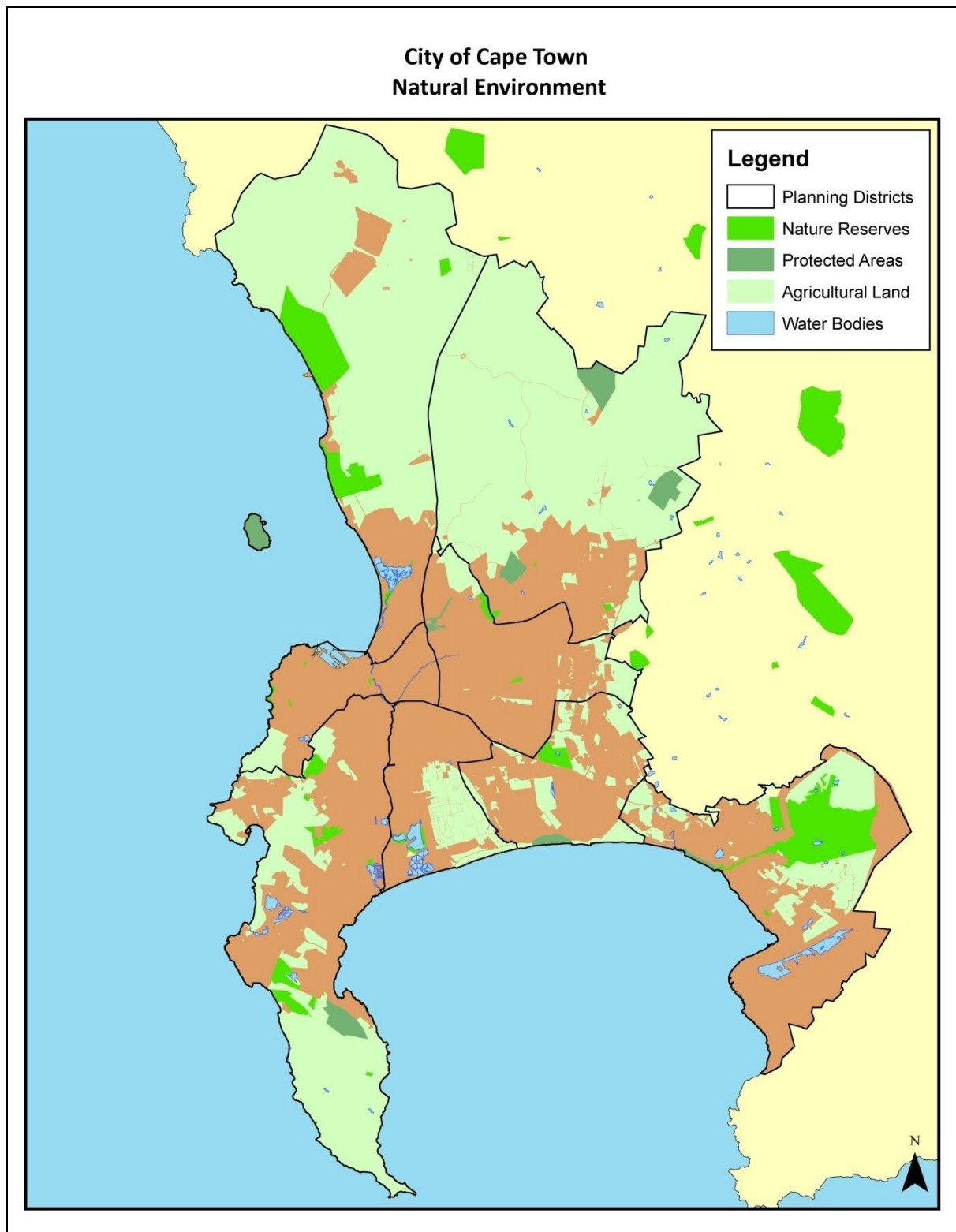
ranging in scale from buildings to neighbourhoods and cities, and can often include their supporting infrastructure, such as water or energy supply and road networks.

#### **4.4.1.1. NATURAL ENVIRONMENTAL IMPACTS**

The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (UNFCCC, 2010).

Direct and indirect benefits can be derived from the natural environment. Map 13 below indicates the natural environment of the City of Cape Town. These natural anchors should play an important role in shaping where and how the city develops, and this development must respect the presence, role and function of these natural anchors, and should make the most of the possible benefits residents and visitors could derive from them.

MAP 12 – THE NATURAL ENVIRONMENT OF THE CITY OF CAPE TOWN



Source: Own construction - GIS Mapping based NSI Data (refer to RSA, 2010a)

The Pew Centre (2010) argues that climate change or global warming is largely the result of greenhouse gas (GHG) emissions<sup>3</sup> from human activity. The GHG, carbon dioxide (CO<sub>2</sub>) is released into the atmosphere by the burning of solid waste, wood and wood products, as well as fossil fuels (oil, natural gas, and coal). Globally, transport related emissions of carbon dioxide are growing rapidly. Transport related emissions is set to double by 2030 in industrialised and poorer nations, 80% of this growth will come from the developing world, where major cities are already struggling to provide mobility to their rapidly growing populations (The New York Times, 2009).

A *carbon footprint* is a measure of the impact our activities have on the environment, and in particular climate change. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels for electricity, heating and transportation etc. The carbon footprint is a measurement of all greenhouse gases we individually produce and has units of tonnes (or kg) of carbon dioxide equivalent.

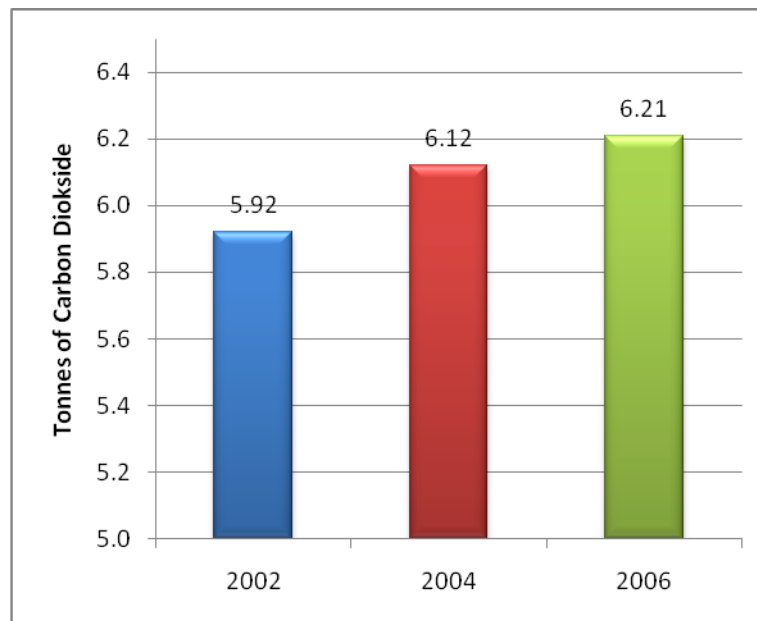
With transportation responsible for as much as a quarter of global GHG emissions, reducing fossil fuel use in the sector is considered vital. In terms of fuel consumption, the transport sector is the largest consumer of energy, accounting for 47% of the Cape Town's total energy consumption, followed by commerce and industry (38%) and households (14%). Within the transport sector, 60% of liquid fuel consumption is in the form of petrol, and 20% in the form of diesel (Sustainability Institute, 2008)

In the City of Cape Town, vehicles account for 65% of air pollution and poor air quality (Enviroworks, refer to City of Cape Town, 2009c). In 2009, the per capita carbon footprint of Cape Town was 6,21 tonnes of CO<sub>2</sub> equivalent, indicating an increase of 290 kg per capita since 2002. One of the 2014 environmental targets of the City of Cape Town Environmental Agenda 2009 – 2014 includes reducing the per capita carbon footprint to an annual 5 tonne of CO<sub>2</sub> equivalents. Figure 20 below shows an increasing trend of per capita CO<sub>2</sub> emissions per annum, although a smaller increase was experienced between 2004 and 2006 than between 2002 and 2004 (State of the Environment Report 2007/8, refer to CoCT, 2008).

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<sup>3</sup> The greenhouse effect is the warming that happens when certain gases in Earth's atmosphere trap heat. These gases let in light but keep heat from escaping, like the glass walls of a greenhouse.

FIGURE 20 – PER CAPITA CO<sub>2</sub> AND CO<sub>2</sub> EQUIVALENTS PRODUCED BY CAPE TOWN



*Source: State of the Environment Report 2007/8, refer to CoCT (2008)*

A study done by the Bus Rapid Transit Policy Centre (Bus Rapid Transit Policy Centre, 2007), which is a non-profit program that promotes BRT as a sustainable solution to mobility and air quality problems, estimate that two BRT lines in Los Angeles saves around 19 000 barrels of oil per annum.

Therefore the MyCiti BRT system will not only lessen the carbon footprint of the City of Cape Town, but it will also decrease the use of finite fossil fuels and make MyCiti eligible to become a CDM project.

After monitoring the main corridor of the TransMilenio (Caracas Avenue), Cain (2006) reported that that TransMilenio has had a positive impact on air quality in the Caracas Ave vicinity, with a 43% reduction in sulphur dioxide, an 18% reduction in nitrogen dioxide, and a 12% reduction in particulate matter. This shows the TransMilenio BRT system's positive impact on air quality.

Controlling vehicle emissions is one of the Air Quality Management Plan for the City of Cape Town (2005) direct objectives. With reducing CO<sub>2</sub> emissions and therefore the use of fossil fuel use vital, the MyCiti BRT system may prove to be a sustainable solution to mobility and air quality problems.

The UN HABITAT, State of World Cities 2008/2009 report (UN HABITAT, 2008) suggests that urban density and CO<sub>2</sub> emissions have a direct, inverse correlation, namely: the lower the density of a city (characterised by urban-sprawl), the higher its emissions from the transport sector. This suggests

that more compact cities are not only more energy-efficient but are also less carbon-intensive. The prevalence of freeways encourages car use, which also impacts carbon emissions. Urban sprawl can be loosely defined as the tendency for cities to spread outwards instead of upwards, growing in size but not in density (State of the Environment Report 2007/8, refer to CoCT, 2008).

Convincing evidence also indicate that urban form and density and environmentally-friendly public transport systems strongly influence energy consumption at the city level and that some cities in developed countries now produce fewer carbon emissions per capita than cities in some less developed countries. Cities that are more compact, use more clean energy and are less dependent on motorised transport are not only more energy-efficient but contribute less to GHG emission (UN HABITAT, 2008)

The UN HABITAT, State of World Cities 2008/2009 report (UN HABITAT, 2008) shows Transport-related carbon emissions in various regions around the world. Studies showed that emissions are highest in North America and Australia. North American cities are suffering from urban sprawl and expansion and increased use of private motorised transport, which contribute to the exceptionally high levels of emissions. Western Europe, in contrast, produces approximately a quarter of the transport-related emissions of North America, a difference that can be explained by the tendency of European cities to promote the use of clean energy and the more prevalent use of public transport in the region. Increased use of environmentally-friendly public transport systems and curbing of urban sprawl in cities can therefore substantially reduce their emissions.

#### **4.4.1.2. BUILT ENVIRONMENT IMPACTS**

The apartheid regime created upside down cities in South Africa with high densities on the periphery instead of the centre, therefore decreasing connectivity and creating longer commutes. The World Bank (2009) emphasises a BRT system's potential to not only increase connectivity but also significantly reduce long commutes, increasing the attractiveness of its usage in comparison to private vehicles. Passengers using the TransMilenio BRT system reported a 32% reduction in travel time, while passengers of a BRT line in Beijing, China reported a save of some 23 minutes from an otherwise hour-long trip.

A study by Manville and Shoup (2005) found that the coefficient between urban population density and per capita annual vehicle mileage is -0.58, meaning that each 1% increase in population density

is associated with a 0.58% reduction in vehicle mileage travelled. Studies by Newman and Kenworthy (1989) as well as Kenworthy and Laube (1999) also show that increased urban density significantly reduces per capita vehicle travel. Holtzclaw (1994) found that population density and transit service quality affect annual vehicle mileage per household with a reduction from 20 to 5 dwelling units per square meter (i.e., urban to suburban densities) increases average vehicle travel by about 40%.

Similarly, Santos and Catchesides (2005) also found that per capita vehicle mileage decreases with population density and transit availability. Brownstone and Golob (2009) found that, after accounting for demographic factors (income, size, number of children and workers, etc.), a residential density reduction of 1,000 housing units per square mile (1.56 units per square meter) increases average vehicle travel by 5%, and increases fuel consumption by 6%. Levinson and Kumar (1997) found that as land use density increases, both travel speeds and trip distances tend to decline. As a result, automobile commute trip times are lowest for residents of medium-density locations.

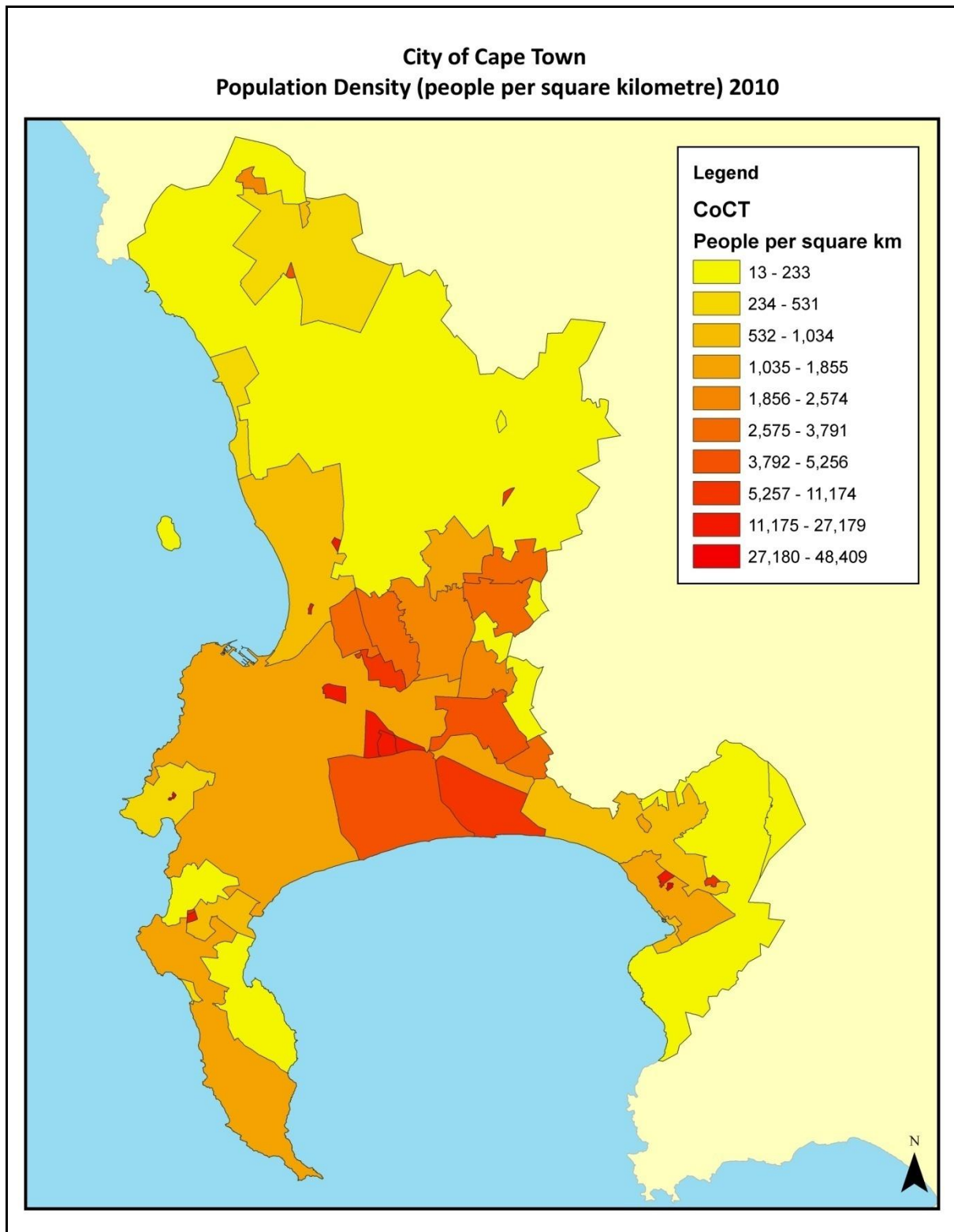
Although not consistently so, the CoCT's present spatial structure is dominated by sprawling, low density development patterns. Together with the geographical eccentricity of its historical core area in which a large proportion of economic activities and employment opportunities continue to be concentrated, this imposes long average trip lengths on much of the population. Cape Town is a good example of a low-density city; most of its residents live in single residential dwellings on separate stands. In wealthier suburbs, large gardens are common, and even low-cost housing is generally built along the principle of one plot, one dwelling. According to the *Densification Strategy for Cape Town (2009)* densification is seen as a necessary step to promote the longer-term sustainability of Cape Town's valuable natural, urban and rural environment. The key spatial strategies of the *CoCT SDF (2009)* also highlight the importance of promoting appropriate densification. One of the strategic actions of the *Moving South Africa* strategy includes corridor densification promoting densification of existing corridors and creation of new corridors for major new developments (refer to RSA, 1999a). According to the *Moving South Africa* strategy (RSA, 1999a) the transport benefits of corridor densification are extensive. 'Corridorisation' lowers overall system costs and also enables lowers subsidies, raises travel speeds, and improves frequencies.

It is difficult to measure the rate of urban sprawl; however, one measure that provides a good idea is the number and type of building plans approved. The more low-density building types a city contains, the more urban sprawl there tends to be. In 2007/08 the building plans of 6 689 full-sized

detached residential dwellings that was approved, which amounts to a total of 958 529 m<sup>2</sup>. This was a 9.5% decrease from 2006/07 approval of 7 391 (1 004 645 m<sup>2</sup>) full-sized detached residential dwellings, which could be indicative of a shift to higher-density living (State of the Environment Report 2007/8, refer to CoCT, 2008).

The City of Cape Town is a large urban area covering a geographical area of around 2 500 square kilometres. With a population total of approximately 3.5 million, the City has a high population density of approximately 1 400 people per square kilometre. Urban sprawl and the location of townships far from employment areas result in long daily commutes. Map 14 below depicts the population density distribution of the CoCT, thus reflecting the areas with the highest number of persons per kilometre.

MAP 13 – CITY OF CAPE TOWN POPULATION DENSITY, 2010

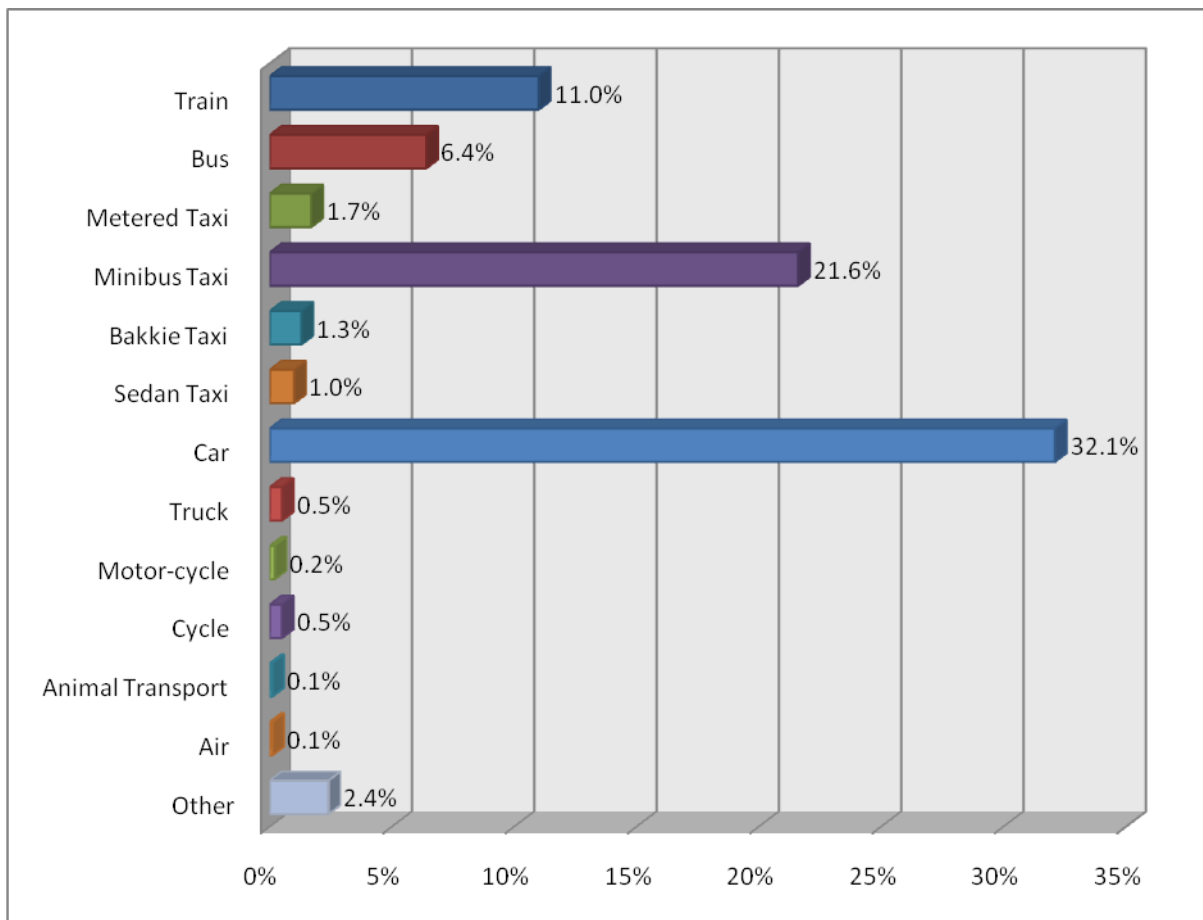


Source: Own construction - GIS Mapping based on NSI Data (refer to RSA, 2010c) and Standardised Regional Data (2010)

Rapid urbanization and urban growth have resulted in a larger number of people in the City, and therefore a higher number of potential users of transport including private motor vehicles. Private motor usages encourages sprawl by (i) demanding significant amounts of urban land for roads and parking; (ii) by degrading the urban environment; and (iii) by accommodating urban edge development (Young, 1995). The increase in private motor vehicle usage results in an increase in vehicle fuels and thus vehicle emissions. Petroleum and diesel fuels used in motor vehicles produce CO<sub>2</sub>, with 1 kilolitres (1 000 litres) of petrol producing 2,3 tonnes of CO<sub>2</sub>, and 1 kilolitres of diesel producing 2,6 tonnes of CO<sub>2</sub>.

Depicted in Figure 21 below is the main mode of transport used in the CoCT by Capetonians over a period of seven consecutive days (National Household Travel Survey, refer to RSA, 2007). From Figure 21 it is evident that the main mode of transport used in the CoCT is by car (32.1%), followed by minibus taxi (21.6%), train (11.0%) and bus (6.4%). This shows the high private vehicle usage in Cape Town.

FIGURE 21 – USE OF TRAVEL MODES IN THE LAST SEVEN DAYS



Source: Department of Transport, refer to RSA (2007)

Although it can be argued that roads and the vehicles have limited impacts on the extent of urban sprawl itself, they are a required condition for sprawl to take place. The total number of motor cars and station wagons as well as the total number live vehicles from 2006 to 2009 registered in the Western Cape Province’s annual growth are indicated in Table 6 below. Both these categories show an annual increase, with an average annual growth of 2.5% and 3.0% respectively. The National Traffic Information System (eNaTIS) indicates in its Live Vehicle Population from 31 December 2008 to 31 December 2009 system records indicate that at the end of December 2009 a total number of motor cars and station wagons that were registered in the Western Cape totalled 969 006, the total number of live vehicles registered totalled 1.6 million.

TABLE 6 – ANNUAL GROWTH OF LIVE VEHICLE IN THE WESTERN CAPE

<b>Annual Growth</b>	<b>'06-'07</b>	<b>'07-'08</b>	<b>'08-'09</b>	<b>Average '06-'09</b>
<b>Motor cars and station wagons</b>	4.7%	1.6%	1.1%	2.5%
<b>Total Number of Live Vehicles</b>	5.4%	2.3%	1.2%	3.0%

*Source: eNaTIS, 2010*

The eNatis system records for February 2009 indicate that there are 1 023 107 vehicles (all classes) registered in the City of Cape Town (excludes military, police and provincial government vehicles), of which 691 000 was classified as light passenger vehicles. Car ownership in Cape Town can consequently be expressed as 20 cars per 100 individuals. According to the Carlisle (2010) the inner-city of Cape Town absorbs over 200 000 vehicles daily transporting some 275 000 people. Some 69% of Cape Town’s residents travel to work by private car transporting an average of 1.4 individuals per vehicle.

The total vehicle count (all classes) in Cape Town currently show an average annual growth rate of around 3.8% in licensed vehicles since February 2002 with a 3.4% average annual growth in the number of registered motorcars. The rate of growth in car usage exceeds population growth in general (average annual growth rate of 2.4% from 1999 to 2009) as well as growth in vehicle registrations, and has resulted in relatively sharp increases in daily traffic volumes on the major road network with a related intensification of peak period congestion levels.

With urban sprawl increasing the distances between work and residence, the unattractiveness of the public transport systems to choice users, as well as a consequent lack in provision of services, results in more people driving further within the metropolitan area. The BRT system, as an adequate transit

service can promote increased urban population density, and thus has the potential to reduce private vehicle dependence, vehicle mileage travelled and therefore fuel consumption.

In order to achieve a more sustainable pattern of resource use in Cape Town's transport sector, the routine movement of both people and goods would need to become as non-dependent on carbon energy sources as possible (Behrens and Wilkinson, 2003). One approach could include promoting the use of more fuel-efficient and less polluting modes of motorised transport, particularly public transport, instead of private vehicles. Vital to reducing the environmental impact of transport is the provision and promotion of public transport. The promotion of public transport and the resultant reduction of private car use as well as the related congestion will have a positive impact on land use and air pollution in particular.

#### **4.4.2. SOCIAL IMPACT**

Social impact can be roughly defined as the intended and unintended social effects or consequences, both positive and negative, of planned interventions and any social change processes invoked by those interventions (such as the BRT system).

A useful definition of poverty is provided by the City of Cape Town's Going Global Working Local strategy, which states that "Poverty is more than a lack of income. Poverty exists when an individual's or a household's access to income, jobs and/or infrastructure is inadequate or sufficiently unequal to prohibit full access to opportunities in society". The condition of poverty is caused by a combination of social, economic, spatial, environmental and political factors."

Poverty is a multi-dimensional problem and needs to be addressed as such (Booth et al, 2000). There are six dimensions of poverty, which are (refer to Figure 22 below):

- Income/consumption;
- Capabilities;
- Private and social assets;
- Free time;
- Empowerment or attainment of minimal social-participation.
- Security, in respect to risks, shocks and violence.

FIGURE 22 – DIMENSIONS OF POVERTY AND THEIR INTERACTION



*Source: Adapted from Booth et al, 2000*

Hanmer et al (2000) lists the following important links between transport infrastructure and services and the poverty dimensions:

- Inadequate infrastructure is a common symptom of the inadequacy of the poor's access to social (common property) assets. Geographical isolation and difficulty of access by transport networks can limit poor communities' participation in labour and product markets and constrain their economic opportunities. Lack of affordable transport services or means of transport can mean that provision of transport infrastructure alone may not alleviate this constraint. Inadequate transport infrastructure can thus contribute to the causes of lack of income and consumption and inability to accumulate private and social assets.
- Particularly in rural areas lack of transport infrastructure and services may constrain access to facilities and resources, such as schools, health centres and water, by the poor. Lack of

transport services and infrastructure can thus contribute to inability to strengthen human capabilities.

- Poor people's lack of access to assets and technology mean that production for the market and for the household is time and energy intensive. Improving transport infrastructure and services can be an essential component of a poverty reduction strategy that aims to reduce time spent in low productivity, high energy consuming tasks.
- Lack of individual or household ownership of transport assets is frequently one of the criteria that the poor cite as a factor differentiating poor from non-poor members of the community.
- Poverty creates an environment for individuals which separate them from decision making in the broader society, participating in cultural events and the development of social relations. Lack of transport services and infrastructure can be a contributory factor to creating an isolated environment characterised by poor communications and lack of links with the broader society.
- Lack of income and consumption, inability to accumulate private and social assets and inability to strengthen human capabilities all combine to increase insecurity and vulnerability to natural, social and economic shocks. Inadequate transport services and infrastructure constrain livelihood strategy options and thus restrict poor people's capacity to cope, respond and adapt to risks, shocks and violence.

Lower inequality would mean a more connected and consistent society, which would foster greater and more equitable economic growth. Punte (2009) argues that poorer households are more affected by unsustainable transport networks largely due to the fact that transport makes up a higher proportion of their expenditure due to their being unable to afford to live close to areas of high economic (employment) opportunities. Safe, reliable, affordable and sustainable public transport alternatives could therefore be vital to address inequality in any region (Broades, 2010).

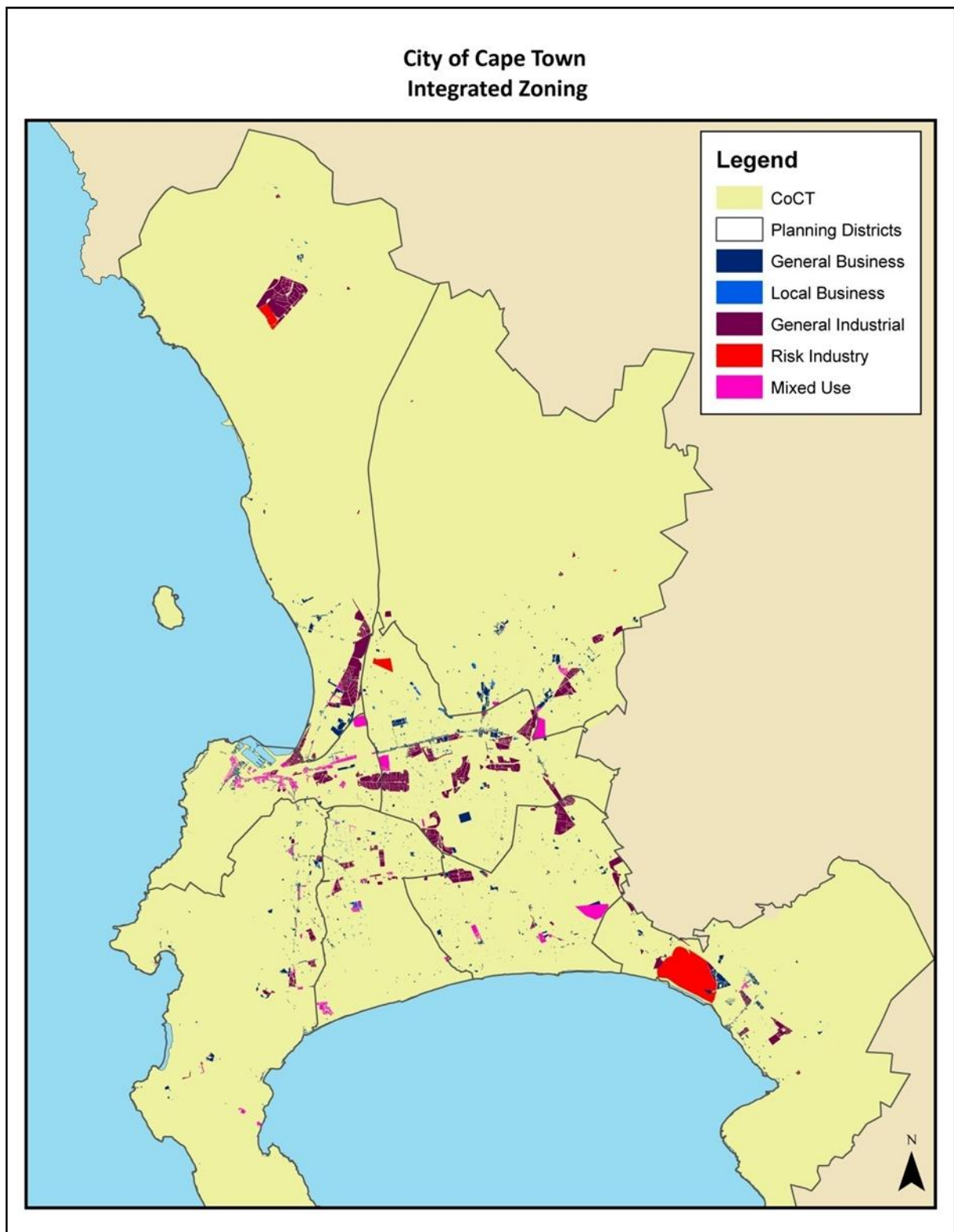
Broades (2010) is of opinion that by linking areas within a region through BRT systems like Bogotá's TransMilenio, better connectivity and consistency would be promoted and so providing poorer communities with improved access to economic centres and employment opportunities. Improving access to schools and employment opportunities can help historically disadvantaged and economically excluded groups break from the cycle of poverty and inequality.

The benefits of achieving a healthy lifestyle and a high level of education might, in theory, be equal for all people; the costs of achieving these goals are quite different for a family living far from a city centre and a family living nearby. Farther distances imply reduced access to schools and health services, greater transport costs, and higher opportunity costs (the benefits you could have received by taking an alternative action). Broades (2010) concludes that improved transport systems are crucial for advances in human development and reduced inequality.

Using the integrated zoning of the CoCT and mapping the industrial, business and mixed land use areas, a geographical representation of the areas with high economic and employment opportunities can be made (refer to Map 15 below).

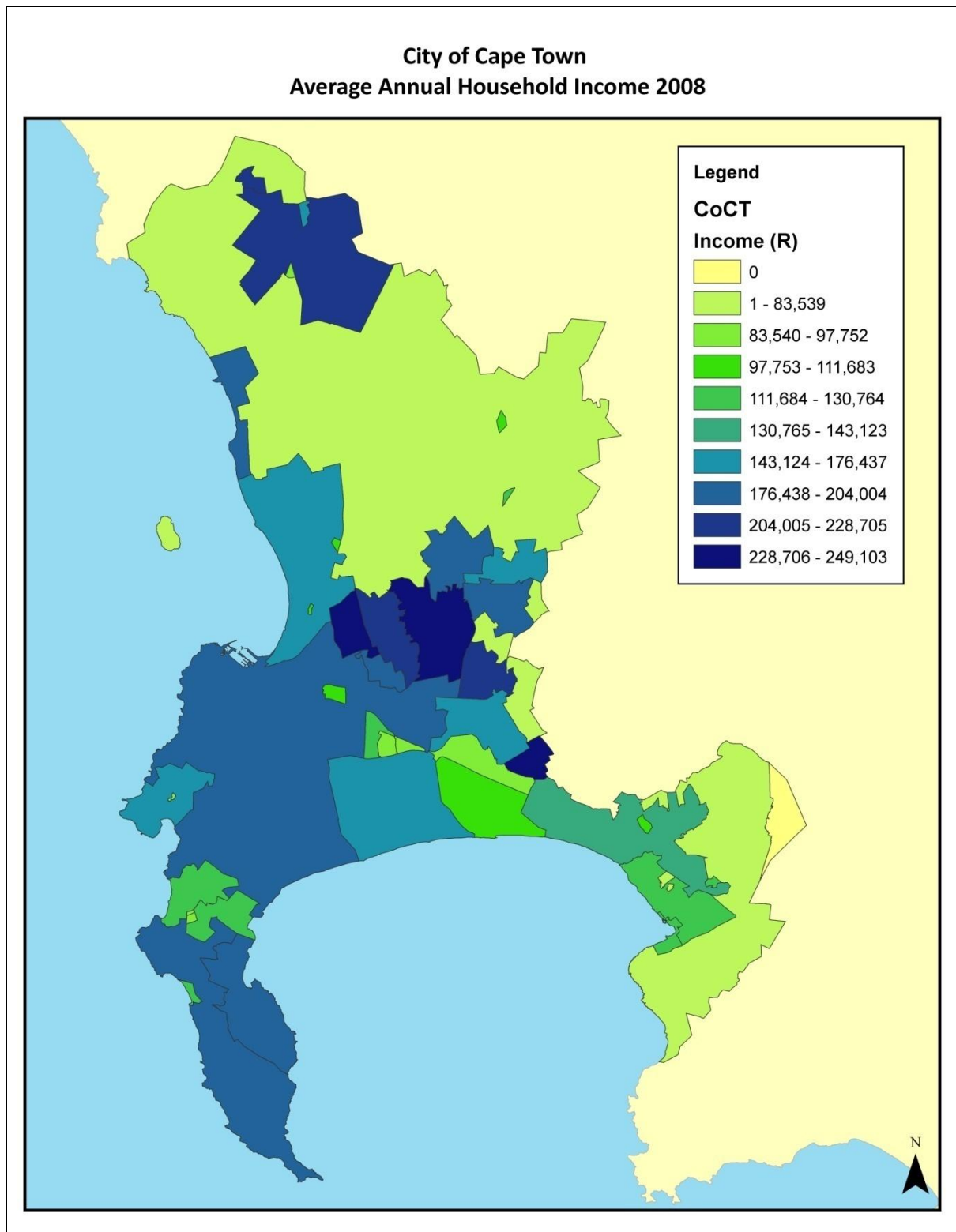
Poverty is widespread throughout the CoCT, but most pronounced in rural areas. A large portion of households, 44.9%, earn less than R3,200 per month and can be regarded as poor. In terms of Cape Town's unemployment rate (unemployed individuals as a percentage of the labour force), 22 of the City of Cape Town's 46 main places' unemployment rate is higher than 20%. Approximately 50.1% of Cape Town's population resides within these 22 main places. This highlights unemployment as a key social focus area within the City of Cape Town. The geographical spread of poverty (in terms of average annual household income) as well as unemployment in the City of Cape Town is respectively depicted in Map 16 and 17 below.

MAP 14 – CITY OF CAPE TOWN INTEGRATED ZONING



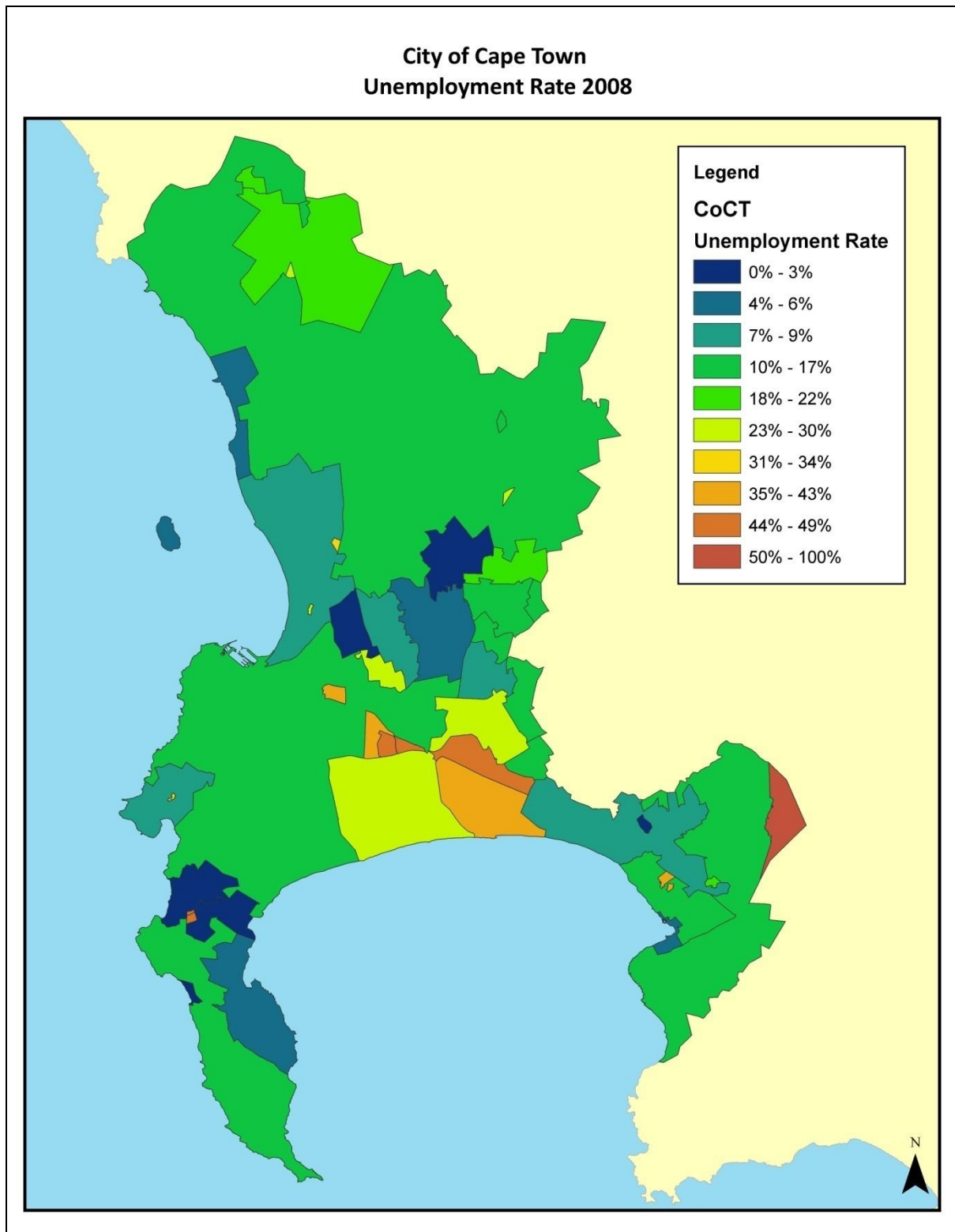
Source: Own construction - GIS Mapping based on NSI Data (refer to RSA, 2010c)

MAP 15 – CITY OF CAPE TOWN AVERAGE ANNUAL HOUSEHOLD INCOME, 2008



Source: Own construction - GIS Mapping based on NSI Data (refer to RSA, 2010c) and Standardised Regional Data (2010)

MAP 16 – CITY OF CAPE TOWN UNEMPLOYMENT RATE, 2008



Source: Own construction - GIS Mapping based on NSI Data (refer to RSA, 2010c) and Standardised Regional Data (2010)

In order to determine the areas within the City of Cape Town with the most significant social inequality, three criteria were used namely (i) high population density (refer to Map 13 above); (ii) low household income (refer to Map 15 above); and (iii) high unemployment rate (refer to Map 16 above). In terms of these criteria, the top twenty areas (main places) within the City of Cape Town are listed in Table 7 below:

TABLE 7 – CITY OF CAPE TOWN SOCIAL INEQUALITY

	Population density	Household income	Unemployment
1.	Imizamo Yethu	Robben Island	Lekkerwater
2.	Lwandle	Nomzano	Mfuleni
3.	Nomzano	City of Cape Town [Part of P1D01M01]	Nyanga
4.	Joe Slovo Park	Lwandle	Masiphumelele
5.	Nyanga	Lekkerwater	Crossroads
6.	Langa	Imizamo Yethu	Guguletu
7.	Du Noon	Masiphumelele	Nomzano
8.	Crossroads	Witsand	Lwandle
9.	Masiphumelele	Mfuleni	Khayelitsha
10.	Guguletu	Nyanga	Langa
11.	Elsiesrivier	Crossroads	Imizamo Yethu
12.	Lekkerwater	Briza	Du Noon
13.	Khayelitsha	Du Noon	Fisantkraal
14.	Fisantkraal	Joe Slovo Park	Joe Slovo Park
15.	Sir Lowry's Pass	Excelsior	Mitchell's Plain
16.	Mitchell's Plain	Langa	Witsand
17.	Blue Downs	Khayelitsha	Blue Downs
18.	Witsand	Noordhoek	Elsiesrivier
19.	Brackenfell	Fisantkraal	Kraaifontein
20.	Kraaifontein	Strand	Mamre

Source: Own construction based on previous findings in terms of criterion used to determine social inequality (refer to Maps 13, 15 and 16), Standardised Regional Data (2010)

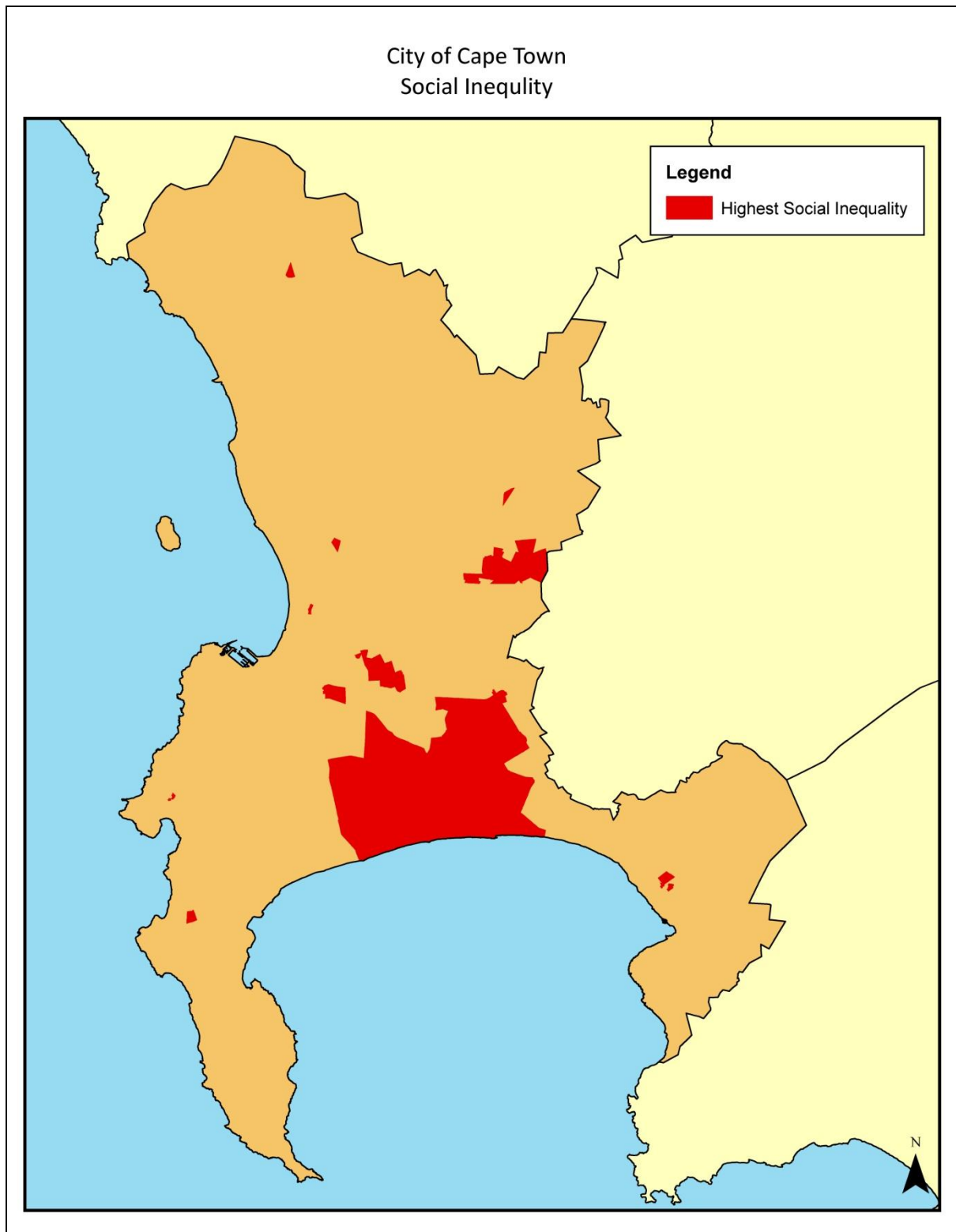
After listing the main places with the according to the criterion set out above, the areas which fell in two (highlighted in orange) or three (highlighted in red) of these categories were then regarded as

the areas with the highest inequality in the CoCT. Determining the areas with the most significant social inequality according to the above mentioned categories, the following areas of which the majority of the areas are informal areas, were identified:

- Lekkerwater
- Nyanga
- Masiphumelele
- Crossroads
- Nomzano
- Lwandle
- Khayelitsha
- Langa
- Imizamo Yethu
- Du Noon
- Fisantkraal
- Joe Slovo Park
- Witsand
- Mitchell's Plain
- Blue Downs
- Kraaifontein
- Guguletu
- Elsiesrivier
- Mfuleni

These areas in particular should be implemented and incorporated into benefits the IRT system could offer. The areas identified with the most significant inequality were then mapped in order to create a geographical representation (see Map 17 below).

MAP 17 – CITY OF CAPE TOWN SOCIAL INEQUALITY



Source: Own construction based on previous findings, 2010

#### 4.4.3. ECONOMIC IMPACT

Economic impact can roughly be defined as any increase or decrease in the productive potential of the economy. Economic impact goes beyond the boundaries of any single organisation and is linked to both the social and environmental elements of sustainable development.

According to Rodrigue et al. (2009) improvements in public transportation services may lead to economic productivity changes as a consequence of both expanded public transportation service and reduced traffic congestion. This may include:

- **Mobility and Market Access** - The IRT will provide household mobility benefits in terms of access to work, school, health care and/or shopping destinations. Business productivity benefits from this increased household mobility through access to a broader and more diverse labour market with a better fit of workers skills as well as access to a wider customer market.
- **Spatial Agglomeration Economies** - Business productivity benefits from agglomeration or clustering of similar and complementary activities, which will be enabled by the IRT public transportation services and station facilities. Public transportation supports economic growth through the concentration of economic activity and the clustering of offices, shops, entertainment centres, and other land uses around public transportation stops. Such clustering activity may provide increased efficiency through reduced labour cost, improved communication, lower infrastructure costs, and increased interaction with similar businesses. Clustering provides an opportunity for more face-to-face contact and for access to specialised labour, which result in higher productivity and more economic growth.

Traditional bus transit services have barely noticeable influences on urban form and land-use patterns because, in contrast to many rail systems, they fail to confer appreciable accessibility benefits. This is especially the case in the developed world where high levels of private automobile ownership means conventional buses are noticeably slower than cars for the vast majority of trips. The exception to this rule, however, could be BRT wherein buses are provided with an exclusive, dedicated lane, signifying a significant improvement in service quality in the minds of real-estate developers and property owners (Polzin and Baltes, 2002).

Cervero and Kang (2009) argues that significant gains in bus speeds should be followed by significant land-use changes, such as densification and property value increases, especially in congested metropolitan cities. Land markets can be expected to place a high premium on parcels close to transit corridors that enjoy significant travel-time savings due to the scarcity thereof.

A paper by the National Bus Rapid Transit Institute (2009) and the University of South Florida's Center for Urban Transportation Research (2010) show that BRT can spur development around its lines and stations. The study examined the effect of distance to the nearest BRT station on assessed property values (property values are used as an alternative for the desirability of land). The study found that closer proximity to a BRT station increases property values. The effects on property values are stronger nearer to stations. For instance, moving from 101 feet to 100 feet away from a station (1 foot closer) increases a property's value by approximately \$19.00, while moving from 1,001 to 1,000 feet away from a station (also 1 foot closer) increases value by approximately \$2.70.

A study conducted by Rodriguez and Targa (2003) analysed the effects of the TransMilenio on advertised residential rent values. The study indicated that, if all other independent variables remained constant, there is a 0.0421 % increase in rent value for every additional 1% increase in the proximity to the TransMilenio, and that for every 5 minutes of additional proximity on foot to the BRT station, the rental price of the property increased by between 6.8% and 9.3% (Rodriguez and Targa, 2003)

A study by the Breakthrough Technologies Institute found that the proximity of BRT had strong positive impacts on the market potential of development sites and their ability to attract financing. Findings also indicated that BRT helped raise property values and boost the overall appeal of a site to tenants/purchasers.

The findings of various other studies done in the 1990's and 2000's on the impact of transport projects on adjacent land values were summarised by Cervero and Kang (2009). All the research reviewed delivered the similar key findings:

- The value and land-use mix of urban real estate responds positively to improved urban transport
- Appropriate zonings and land-use approvals enhances this response
- Competitive bidding processes for land parcels enjoying significant gains in accessibility boosts the prices achieved
- The value increase occurs in the short-term, while land-use benefits tend to lag as a result of approval processes and so forth.
- These benefits are felt as a result of rail projects and BRT projects, but not from other systems such as bus systems that must share lanes with private vehicles.

From the above, it can be argued that, in general, due to increased accessibility of that land and mobility along that route, land values will increase along major transport routes. This introduces higher financial returns for local property investors along those “corridors”.

#### **4.4.3.1. EXISTING CLIMATE INSTRUMENTS AND MULTILATERAL DEVELOPMENT BANKS FINANCING**

Environmental benefits render opportunities to tap into global environmental funds and carbon trading systems. Climate instruments and Multilateral Development Bank (MDBs) are closely linked, the majority of Global Environmental Facility (GEF) and Climate Technology Fund (CTF) funding to date has been programmed as co-financing for MDB projects (Huizenga and Bakker, 2010). The growing importance for climate change mitigation in transport among MDBs is expected to result in additional funding which initially will be largely directed towards urban transport.

Punte (2010) and Huizenga and Bakker (2010) lists various climate instruments as sources of funding for sustainable transport systems, these include but are not limited to the following:

##### **4.4.3.1.1. CLEAN DEVELOPMENT MECHANISM**

The Clean Development Mechanism (CDM) allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one tonne of CO<sup>2</sup> (UNFCCC, 2010). These CERs can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol<sup>4</sup>. The CDM expires 2012.

The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction limitation targets.

##### **4.4.3.1.2. GLOBAL ENVIRONMENT FACILITY**

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<sup>4</sup> The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC). The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.

An independent financial organization, the Global Environment Facility GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants (GEF, 2010). These projects benefit the global environment, linking local, national, and global environmental challenges and promoting sustainable livelihoods.

The GEF supports projects in (GEF, 2010):

- Climate Change Mitigation: Reducing or avoiding greenhouse gas emissions in the areas of renewable energy; energy efficiency; sustainable transport; and management of land use, land-use change ,and forestry (LULUCF)
- Climate Change Adaptation: Aiming at developing countries to become climate-resilient by promoting both immediate and longer-term adaptation measures in development policies, plans, programs, projects, and actions.

The GEF also serves as financial mechanism for the following conventions (GEF, 2010):

- Convention on Biological Diversity (CBD)
- United Nations Framework Convention on Climate Change (UNFCCC)
- Stockholm Convention on Persistent Organic Pollutants (POPs)
- UN Convention to Combat Desertification (UNCCD)
- The GEF, although not linked formally to the Montreal Protocol on Substances That Deplete the Ozone Layer (MP), supports implementation of the Protocol in countries with economies in transition.

#### **4.4.3.1.3. CLIMATE INVESTMENT FUNDS / CLEAN TECHNOLOGY FUND**

Under the Climate Investment Fund (CIF) two strategic funds were set up: Clean Technology Fund (CTF) and the Strategic Climate Fund (CIF, 2010). The CTF provides scaled-up financing for transformational actions that contribute to demonstration, deployment and transfer of low carbon technologies with a significant potential for long-term GHG emissions reductions.

The CTF utilizes a range of concessional financing instruments, such as grants and concessional loans, and risk mitigation instruments, such as guarantees and equity investment. For the transport sector, measures which the CTF supports may include (CIF, 2010):

- Modal shift to low carbon public transportation in major metropolitan areas, with a substantial change in the number of passenger trips by public transport;
- Modal shift to low-carbon freight transport, with a substantial change in tonnage of freight moved by road transport to rail;
- Improvement of fuel economy standards and fuel switching;
- Deployment of electric and hybrid (including plug-in) vehicles.

#### 4.4.3.1.4. MULTILATERAL DEVELOPMENT BANKS

Multilateral Development Banks are institutions that provide financial support and professional advice for economic and social development activities in developing countries. The term Multilateral Development Banks (MDBs) typically refers to the World Bank Group and four Regional Development Banks:

- The African Development Bank
- The Asian Development Bank
- The European Bank for Reconstruction and Development
- The Inter-American Development Bank Group

#### 4.4. SUMMARY

This section looked at the status quo of the City of Cape Town in terms of city structure, population growth and distribution, road infrastructure and public transport systems. It was concluded that the City of Cape Town is a low density city with inadequate public transport services.

In terms of public transport systems, the Cape Town MyCiTi BRT system was introduced and discussed in relation to its current status, future expansions, its fare structure and financial models. Thereafter the environmental, social and economic impacts of a BRT system were discussed and related to Cape Town’s current environment, which is summarised in Table 8 below:

TABLE 8 – SUMMARY OF THE ENVIRONMENTAL, SOCIAL AND ECONOMICAL IMPACTS OF A BRT SYSTEM AND ITS RELATION TO THE CITY OF CAPE TOWN

Impact Area	BRT Potential	Cape Town Status Quo
Environment	• Transportation is responsible for	• The transport sector is the largest

Impact Area	BRT Potential	Cape Town Status Quo
	<p>as much as a quarter of global GHG emissions, reducing the use of fossil fuel in this sector by promoting public transportation (the BRT system) is considered vital.</p> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> emissions and urban density have a direct, inverse correlation, namely: the lower the density of a city (characterised by urban-sprawl), the higher its emissions from the transport sector. This suggests that more compact cities which could be promoted by a BRT system are not only more energy-efficient but are also less carbon-intensive.</li> <li>• Cities that are more compact, use more clean energy and are less dependent on private vehicle usage and more on public transportation are not only more energy-efficient but contribute less to GHG emission</li> </ul>	<p>consumer of energy in Cape Town, accounting for 47% of the cities total energy consumption</p> <ul style="list-style-type: none"> <li>• Vehicles account for 65% of air pollution and poor air quality in Cape Town</li> <li>• In 2009, the per capita carbon footprint of Cape Town was 6,21 tonnes of CO<sub>2</sub> equivalent, indicating an increase of 290 kg per capita since 2002.</li> <li>• The main mode of transport used in the CoCT in 2007 is by car (32.1%), followed by minibus taxi (21.6%), train (11.0%) and bus (6.4%).</li> <li>• In 2007, vehicles (all classes) registered in the CoCT totalled 1 023 107 of which 691 000 was classified as light passenger vehicles.</li> <li>• Car ownership in Cape Town can consequently be expressed as 20 cars per 100 individuals.</li> <li>• Some 69% of Cape Town's residents travel to work by private car transporting an average of 1.4 individuals per vehicle.</li> <li>• Rapid urbanization and urban growth have resulted in a larger number of people in the City, and therefore a higher number of potential users of transport</li> </ul>

Impact Area	BRT Potential	Cape Town Status Quo
		<p>including private motor vehicles.</p> <p>The rate of growth in car usage exceeds population growth in general (average annual population growth rate of 2.4% from 1999 to 2009)</p> <ul style="list-style-type: none"> <li>• Although it is difficult to measure sprawl, one measure that provides a good idea is the number and type of building plans approved. In 2007/08 the building plans of 6 689 full-sized detached residential dwellings that was approved, which amounts to a total of 958 529 m<sup>2</sup>. Although this is less than the previous year (2006/2007), full sized detached residential dwellings are nevertheless being approved.</li> </ul>
<b>Social</b>	<ul style="list-style-type: none"> <li>• Better connectivity and consistency would be promoted through linking areas within a region through BRT systems, providing poorer communities with improved access to economic centres and employment opportunities.</li> <li>• Creating a more connected and consistent society through by means of the BRT system could lower inequality, which would foster greater and more equitable economic growth.</li> </ul>	<ul style="list-style-type: none"> <li>• Poverty is widespread throughout the Cape Town, but most pronounced in rural areas. A large portion of households, 44.9%, earn less than R3,200 per month and can be regarded as poor.</li> <li>• Within the City of Cape Town, 22 of its 46 main places' unemployment rate are higher than 20% (meaning that 20 out of every 100 persons between the ages of 15 and 64 are unemployed). Approximately 50.1% of Cape Town's population resides within these 22 main places.</li> </ul>

Impact Area	BRT Potential	Cape Town Status Quo
	<ul style="list-style-type: none"> <li>Improving access to schools and employment opportunities through the BRT system can help historically disadvantaged and economically excluded groups break from the cycle of poverty and inequality.</li> </ul>	
<b>Economical</b>	<ul style="list-style-type: none"> <li>Due to increased accessibility of land and mobility along that route, land values will increase along major transport routes. This introduces higher financial returns for local property investors along these “corridors”.</li> <li>Various climate instruments as funding sources for sustainable transport systems exist, these include but are not limited to the following: <ul style="list-style-type: none"> <li>Clean Development Mechanism</li> <li>Global Environment Facility</li> <li>Climate Investment Funds / Clean Technology Fund</li> <li>Multilateral Development Banks</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Apart from fares the MyCiTi BRT has five key sources of funding , which include: <ul style="list-style-type: none"> <li>Public Transport Infrastructure and Systems Grant (PTISG)</li> <li>Loan funding from the Capital Replacement Reserve and External Financing Fund (EFF)</li> <li>Public Transport Operating Grant (PTOG)</li> <li>Local tax income such as property rates, a share of the fuel levy and other general income</li> <li>Other sources such as advertising and parking revenue.</li> </ul> </li> </ul>

Source: Own construction based on this section’s contents, 2010

## SECTION FIVE: CONCLUSION AND RECOMMENDATIONS

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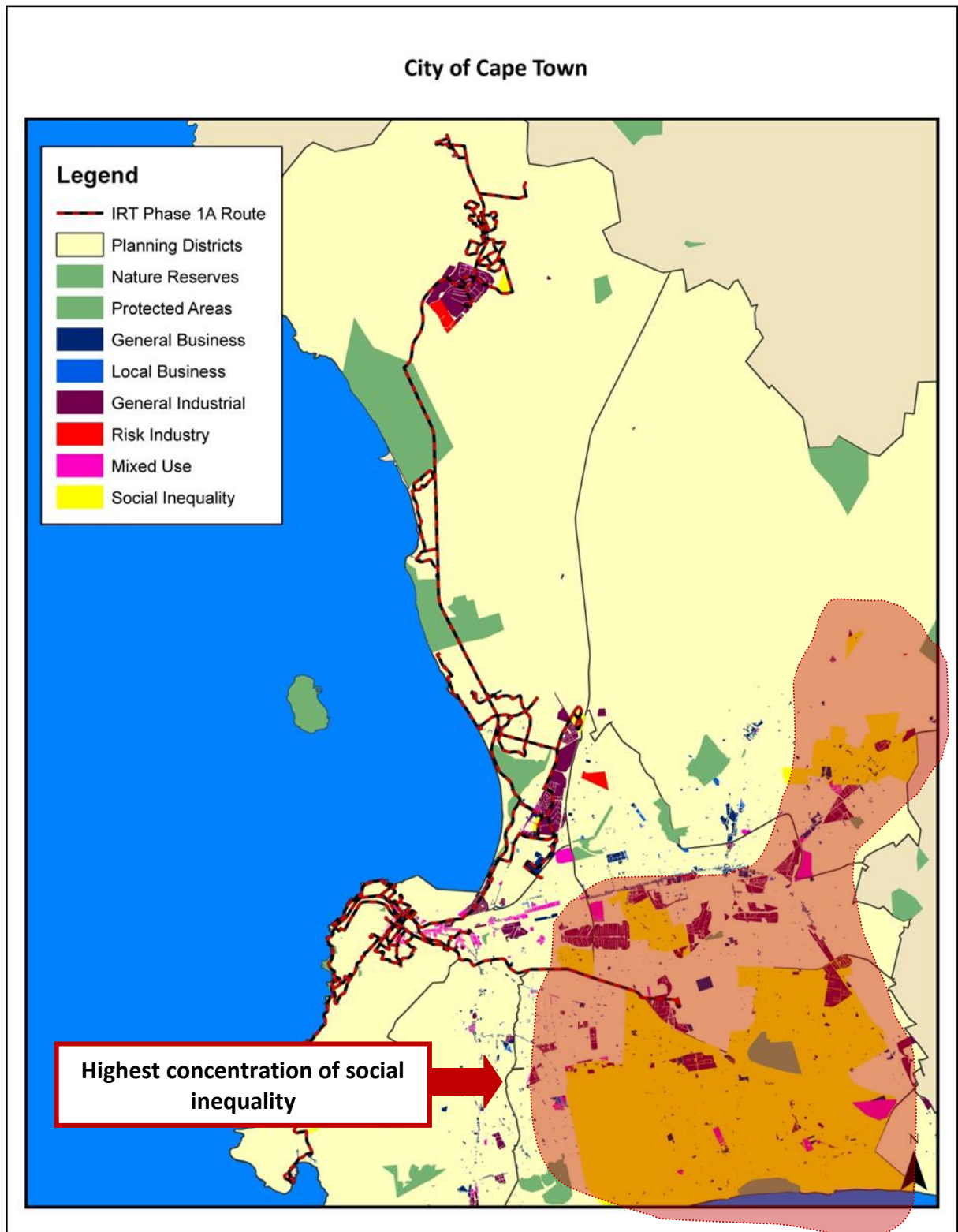
Various environmental, social and economic benefits arise from implementing a BRT system (discussed in section four).

In terms of environmental benefits, the MyCiTi BRT system is proposed to promote city densification, thus creating a denser city structure. Cities that are more compact not only use more clean energy and are less dependent on motorised transport but are also more energy-efficient (the transport sector accounts for 47% of Cape Town energy usage), contributing less to GHG emissions (vehicles account for 65% of air pollution and poor air quality in Cape Town) and promoting sustainable development.

In terms of social benefits, the MyCiTi BRT system is proposed to promote better connectivity and consistency through linking areas within a region, thus providing poorer communities with improved access to economic centres and employment opportunities. Improving access to schools and employment opportunities which can help historically disadvantaged and economically excluded groups to break from the cycle of poverty and inequality. Lower inequality would mean a more connected and consistent society, which would foster greater and more equitable economic growth. These disadvantaged individuals living within these social inequality areas have low access to services and employment opportunities.

Using population density, unemployment and household income the areas with the highest social inequality were then mapped with GIS (the highest concentration highlighted with red), including economic clusters and employment opportunities, using the integrated zoning of the CoCT as well as the MyCiTi IRT Phase 1A (refer to Map 18). In my opinion, the cluster of high social inequality highlighted in red in Map 18, is a high priority area to be serviced by the CoCT MyCiTi IRT system. From Map 12 which shows the full completed network of the IRT system, indicate that this cluster of high social inequality will only be addressed in Phases 2 and 4 of the IRT system. In my opinion these areas should have been incorporated earlier into the IRT system.

MAP 18 – IRT PHASE 1A, SOCIAL INEQUALITY, ECONOMIC AND EMPLOYMENT CLUSTERS



Source: Own Construction, 2010

As seen from above, there are various socio-economic and environmental arguments in favour of the MyCiTi BRT, all of which addresses issues of developing sustainable cities. In terms of economic benefits, environmental benefits that arise from the MyCiTi BRT system render opportunities to tap into global environmental funds and carbon trading systems.

In 2006 Bogotá's TransMilenio BRT system, became the world's first mass transport project to be approved for participation in the Kyoto Protocol's Clean Development Mechanism (CDM) (Bus Rapid Transport Policy Centre, 2007). Under the CDM, qualified industries in the developing world that reduce their emissions of carbon dioxide (CO<sub>2</sub>) and other climate-altering pollutants receive credits that they can then sell to industrial-country polluters looking to offset their own emissions. Under the recently approved deal, Bogotá's BRT system, the TransMilenio, will sell the credits earned from emissions reductions of nearly 250,000 tons of CO<sub>2</sub> equivalent per year achieved through more-efficient passenger transport and the substitution of private vehicle use to the government of the Netherlands (Cain, 2006). According to a 2002 report from the World Bank (2009), the TransMilenio resulted in a 40% reduction in certain Bogotá air pollutants between its December 2000 launch and May 2001.

Furthermore, other economic benefits arise from increased accessibility of land and mobility along transport routes route. Due to the increased accessibility of land and mobility along transport route land values will increase. In South Africa various departments and authorities are major land owners. As the next phases of MyCiTi BRT routes and interchange points are being planned, pro-active planning should include studies to determine the specific areas which are more likely to grow in land value. Last mentioned areas should then be incorporated as a consideration in the MyCiTi BRT's route planning. With this process the land value increases be leveraged to fund the transport system project (by means of rates and taxes and direct property asset investments).

The City of Cape Town transport systems are primarily being funded via national government subsidies, commercial loans, and commuter fees. The options of using land-value adding and environmental finance, currently not sufficiently utilised by planning authorities involved in public transport, could be used to encourage a more sustainable public transit model in Cape Town.

The policy section (in section three) provided a brief overview of relevant policies relating to the study. These policies were divided into three categories:

- i. policies relating to the planning of a transport system

- ii. policies that inform the spatial analysis of a future public transport network
- iii. policies relating to sustainability.

In light of the three categories (mentioned above) within which the relevant policies were discussed, broad policy guidelines/requirements were developed that should be addressed by the development and implementation of the new integrated rapid transport system. From the literature review and the empirical study, the MyCiTi BRT systems potential to address these guidelines/requirements are accessed in Table below:

TABLE 9 - THE MYCITI BRT SYSTEMS POTENTIAL TO ADDRESS THE RELEVANT POLICY GUIDELINES/REQUIREMENTS

<b>Guidelines/Requirements</b>	<b>Addressed or Potential to Address</b>
Promotion of corridor development and densification	Yes
Promotion of city densification management of uncontrolled urban expansion (urban sprawl) creating a more compact city structure	Yes
Promote the integration between areas	Yes
Promote integrated transport planning	Yes
Prioritises public transport and non-motorised transport over private transport	Yes
Improve the accessibility and efficiency or all communities by means of appropriate investment in transport infrastructure	Yes
Promotion of quality transport system that provides for basic mobility for the economically disadvantaged	Yes
Promotion of equity and poverty reduction	Yes
Support and promote innovation and environmentally sustainable transport	Yes
Promotion of environmental sustainability	Yes
Reduction of the cities per capita Carbon Footprint	Yes

From Table above it is evident that the MyCiTi BRT system has the potential to address all of the relevant policy guidelines/requirements set out.

In conclusion, the study started out asking the question whether the City of Cape Town is utilising the full potential of the new Integrated Transport System currently being developed and implemented in Cape Town, namely the MyCiTi BRT System. From the research done it is evident that the MyCiTi BRT system has the potential to positively influence the natural, built and social environment of Cape Town. The CoCT seems to be utilising the full potential of the MyCiTi BRT system in terms of potential environmental benefits. Although the social benefits are being utilised, the urgency of addressing social inequality is not reflected in the phased timeframe set out for the system. In terms of economic benefits, the options of using land-value adding and environmental finance, currently not sufficiently utilised and should be used to encourage a more sustainable public transit model, in this case the MyCiTi BRT system, in Cape Town.

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