The challenges associated with policy formulation along arterial routes: A case study of Ontdekkers Road, Johannesburg Metropolitan Council

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ABSTRACT

Arterial routes are key structuring components of the urban structure. These routes perform vital functions, including the connectivity of nodes or nodal areas, providing access to urban opportunities, linking metropolitan / municipal areas and providing access to the public transportation system. In order to protect the functionality of these routes, which primarily relates to a mobility function, development along these routes should be controlled. The formulation of policies for development along arterial routes is vital to ensure sustainable, integrated development along these routes without negatively impacting on the urban structure as a whole. A number of challenges are experienced during the formulation-process of these policies, especially since development along these routes is multi-faceted in nature.

A case study of Ontdekkers Road, which is a major arterial route located within the City of Johannesburg, is used as the main point of departure. A comparison of the three sections of the route extending from Krugersdorp to Johannesburg (i.e. Voortrekker, Ontdekkers and Main Road) and the applicable development policies provides insight into the key challenges experienced during the policy-formulation process and the implementation of these policies.

The study provides key recommendations in response to the challenges experienced along major arterial routes. The recommendations predominantly relate to the multi-faceted nature of development along these routes; the necessity of an interdisciplinary approach to policy-formulation; the importance of comprehensive public participation that involves the relevant stakeholders, professionals and authorities; and the continuous interaction between neighbouring municipalities to identify cross-border issues and co-ordinate planning initiatives. The dynamic nature of development along arterial routes necessitates dynamic policies that consider changing social, economic and physical conditions. To this end, the study recommends the review of development policies on an annual basis and the implementation of contingency-based planning.

Keywords: *Arterial routes, mobility spine, nodes, development policies, urban structure*

OPSOMMING

Hooftoevoerroetes is sleutel komponente van stedelike struktuur en vorm. Hierdie roetes vertolk krities belangrike rolle, wat insluit *inter alia,* die verbinding van nodusse en nodale gebiede, toegang gee tot ontwikkelingspotensiaal en geleenthede, die verbinding van metropole of munisipale gebiede en die verskaffing van toegang tot publieke vervoerstelsels. Ten einde die funksionalitiet van die roetes te beskerm, dié van beweging, moet ontwikkeling langs hierdie roetes beheer en gereguleer word. Die formulering van beleide en strategieë langs hierdie roetes is krities ten einde die volhoubaarheid en integrasie van ontwikkeling langs hiedie roetes te verseker sonder om die struktuur van die stad negatief te beïnvloed. Die formulering van beleide en strategieë is verder uitdagend omdat die ontwikkeling langs hierdie roetes multidisiplinêr van aard is.

Ontdekkersweg word as vertrek punt tot die studie gebruik aangesien Ontdekkersweg een van die hooftoevoerroetes binne die stad van Johannesburg is. „n Vergelyking van die drie seksies van die roete wat strek vanaf Krugersdorp/Mogale Stad tot Johannesburg (i.e. Voortrekkerweg, Ontdekkersweg en Hoof/Main Weg) en die toepaslike ontwikkelingsbeleide, wat insig sal lewer ten opsigte van die sleutel vraagstukke ondervind tydens die beleids formulering en implementering, sal getref word.

Hierdie studie verskaf kern aanbevelings en antwoorde in reaksie tot die uitdagings ervaar langs hooftoevoerroetes. Die aanbevelings en antwoorde hou primêr verband tot die multi-disiplinêre aard van ontwikkeling langs hierdie roetes; die noodsaaklikheid van „n multi-disiplinêre aanslag tot beleids formulering; die noodsaaklikheid van intensiewe publieke deelname van alle rolspelers wat toepaslike belange groepe, vakkundiges en besture insluit en die voordurende interaksie tussen die relevante plaaslike besture ten einde oorgrens-raakpunte en beplanningsinisiatiewe te identifiseer en aan te spreek. Die dinamiese aard van ontwikkeling langs hooftoevoerroetes vereis dinamiese beleide wat veranderlike sosiale, ekonomiese en fisiese aspekte in ag neem. Ten einde hierdie veranderlike aspekte te akkommodeer, is die aanbeveling van hierdie studie, dat die toepaslike beleide jaarliks hersien word en dat gebeurlikheids beplanning geïmplementeer word.

GLOSSARY OF TERMS

Accessibility

Accessibility is a measure of the ease of reaching opportunities (i.e. jobs, shops, and leisure activities), activities, people, resources and information (jobs, shops, leisure activities) or the ease of being reached by contacts.

Apartheid

Apartheid is the policy and system of laws implemented and continued by "White" governments in South Africa from 1948 to 1990 and, by extension, any legally sanctioned system of racial segregation to maintain separate development of government-demarcated racial groups.

Arterial routes

Roads classified as metropolitan or provincial roads fulfilling the function of collectors and distributors of traffic, designed with restricted access

Bus Rapid Transit (BRT)

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 service, modern stations, on-board fare collections and high-tech vehicles.

Building line

A line indicating the furthermost boundary of a building restriction area from a street, proposed street, street widening, or any other boundary of a property other than a street boundary and which is stipulated at a distance from the boundary of a property

Capacity

Capacity is the maximum number of vehicles (vehicular capacity) or persons (person capacity) that can pass over a given section of road in one or both directions during a given period of time under prevailing environmental, road and road-user conditions, usually expressed as vehicles per hour or persons per hour.

Central Business District (CBD)

The central business district is the traditional business core of a community, characterized by a relatively high concentration of business and administrative activity within a relatively small area.

Collaborative Strategic Goal Oriented Programming (CoSGOP)

A collaborative and communicative strategic planning process that has defined and specific goals and encourages joint decision-making.

Compact city

A city of relatively high density and mixed use, that is based on an efficient public transport system and allows for efficient provision of social and other services.

Contingency-based planning

A planning approach that recognizes changing conditions and entails the identification of specific responses to possible future conditions

Corridor

A corridor is a broad geographical area that defines the general directional flow of traffic that may encompass a mix of streets, highways and public transport alignments.

Coverage

The area of a property which may be covered by a building, measured over the external walls, as seen vertically from above, expressed as a percentage of the total area of the property.

Floor Area

The sum of the gross area covered by the building at the floor level of each storey, mezzanine and / or basement.

Floor Area Ratio (FAR)

The ratio obtained by dividing the floor area of a building(s) by the total area of the property

Growth and Development Strategy (GDS)

A Growth and Development Strategy details the long-term strategic direction a city must take and the future efforts it has to undertake jointly with its social partners, to accelerate its economic growth and enhance its development in a way that benefits all its residents.

Integrated Development Plan (IDP)

An Integrated Development Plan is an aggregate plan for an area that provides an overall framework for development that co-ordinates and aligns many sectoral functions within the local municipal landscape from different levels of government.

Integrated Transport Plan (ITP)

An Integrated Transport Plan is a document setting out how to integrate transport systems in order to increase accessibility for all people by giving priority to public transport, non-motorised transport and traffic safety.

Intermodal

The integration and co-ordination of services, infrastructure and facilities between all modes within the transport system.

Land use

The activities on a defined piece of land such as residential, commercial, industrial or a combination of these.

Land-Use Management (LUM)

Land-Use Management is a tool exercising control over the trip-generating characteristics of land-use and is used to influence trip-making patterns, volumes and modal distributions by the effective spatial distribution and use of land, thereby forcing the resulting demand to be consistent with the existing transportation infrastructure and the level of service desired.

Mixed land use

Mixed land use refers to a combination of land uses such as a mix of commercial / industrial / residential / retail / entertainment / institutional uses.

Mobility

Mobility is the degree of free flow movement of vehicles and pedestrians. It is the ability to move at an acceptable speed and travel time without undue interruption and at acceptable levels of comfort and safety.

Mobility policy

A policy of the City of Johannesburg Metropolitan Municipality (CoJMM) that seeks to promote citizens‟ access to urban opportunities, protect the mobility function of major arterials and roads, support public transport and ensure that the mobility system links with high intensity nodes and higher density residential development.

Mobility spine

A mobility spine is an arterial along which traffic flows with minimum interruption (optimal mobility), whilst development abutting the spine is in terms of specific policy criteria relating to the type of land use to be accommodated and to level of access.

Mode

Mode refers to a particular form of travel i.e. walking, cycling, travelling by bus, car, carpool or by train.

Municipal Owned Entities (MOEs)

Separate city-owned companies dedicated to the provision of essential, specific services to the citizens of the City (i.e. City Power, Johannesburg Roads Agency, Johannesburg Water)

Objective

Objectives are broad statements of the improvements which a city is seeking in its land-use and transport system, specifying the directions for improvement, but not the means of achieving them.

Peak Hour

A Peak Hour describes the hour during which the maximum demand occurs for a given transportation corridor / road, generally specified as the morning peak hour or the evening peak hour.

Peak Period

A Peak Period is a portion of the day in which the heaviest demand occurs for a given transportation corridor or road, usually defined as a morning or evening period of two or more hours.

Regional Spatial Development Framework

A representation of a local perspective of the City"s Spatial Development Framework (SDF) and the detail of a range of policies and interventions as they impact on the Region.

Sector Plan

A sector plan is a document outlining the long-term development path and goals of a sector of governance (i.e. transport, housing, environment, health, public safety etc.), setting out medium-term objectives and programmes over a five year period as well as strategic interventions in order to achieve long-term goals.

Site Development Plan (SDP)

A plan which shows the proposed development of a property and any salient features thereof

Spatial Development Framework (SDF)

A Spatial Development Framework broadly sets out the objectives that reflect the desired spatial form of a municipality, contains strategies and policies regarding the manner in which to achieve the objectives, sets out basic guidelines for a Land-Use Management System, sets out a capital Investment Framework for the municipality's development programmes and contains a strategic assessment of the environmental impact of the spatial development framework.

Spatial integration

Spatial integration refers to a policy that addresses the spatial fragmentation legacy of the apartheid spatial planning and land-use management era. It engages issues of urban restructuring, settlement location and property development in order to reduce urban sprawl, integrating different communities (mixed income and mixed tenure), land-use activities (mixed use: commercial, retail, recreational, transport, residential, social services, etc.) and encourages the shift from a single motor car urban design concept to a new urban design concept based on public transport.

Spatial planning

The proposed pattern of spatial development in an area in order to guide and coordinate the spatial distribution of development, redevelopment and investment to deliver sustainable development

Sustainable development

Sustainable Development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Transit Adjacent Development (TAD)

A term used for urban development that is physically near transit facilities, but does not take advantage of the proximity to these facilities

Transit Oriented Development (TOD)

A term used for urban development that encompasses a direct and planned access to transit facilities.

Urban Development Boundary (UDB)

A demarcated line that serves to direct and control the outer limits of urban expansion.

Urban fabric

Urban fabric refers to the manner in which buildings, roads and open spaces relate to one another. A coarse urban fabric is characterised by wide streets, plenty of open spaces between buildings, and large blocks and s fine urban fabric is characterised by buildings situated closer to one another, smaller block sizes and narrower streets.

V/C Ratio

Used as a principal measure of congestion. The “V” represents the volume or the number of vehicles that are using the roadway at any particular period. The “C” represents the capacity of a roadway at its adopted Level of Service (LOS).

LIST OF ABBREVIATIONS

BRT	Bus Rapid Transit
CBD	Central Business District
CID	City Improvement District
CIF	Capital Investment Framework
CoJ	City of Johannesburg
CoJMM	City of Johannesburg Metropolitan Municipality
CoSGOP	Collaborative Strategic Goal Oriented Programming
DoT	Department of Transport
DFA	Development Facilitation Act (Act 67 of 1995)
EWDC	East-West Development Corridor
FAR	Floor Area Ratio
GDS	Growth and Development Strategy
GMS	Growth Management Strategy
GPG	Gauteng Provincial Government
GPMP	Gauteng Provincial Master Plan
IDP	Integrated Development Plan
ITP	Integrated Transport Plan
LDO	Land Development Objectives
MCLM	Mogale City Local Municipality
MOEs	Municipal Owned Entities
NATMAP	National Transport Master Plan
NDoT	National Department of Transport
NLTSF	National Land Transport Strategic Framework

NSDP	National Spatial Development Perspective
ORDP	Ontdekkers Road Development Policy
PGDS	Provincial Growth and Development Strategy
PRASA	Passenger Rail Agency of South Africa
PSDF	Provincial Spatial Development Framework
RSDF	Regional Spatial Development Framework
SDF	Spatial Development Framework
SDP	Site Development Plan
SPTN	Strategic Public Transport Network
TAD	Transit Adjacent Development
TOD	Transit Oriented Development
UDF	Urban Development Framework
UDB	Urban Development Boundary
VRDP	Voortrekker Road Development Policy
WMLC	Western Metropolitan Local Council

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CHAPTER 1

INTRODUCTION

1.1 Research orientation

This study was initiated to identify the challenges associated with policy formulation along arterial routes and potentially provide recommendations to deal with and overcome these challenges. The identification of challenges will enable the formulation and implementation of development policies that will promote effective, sustainable development along major arterial routes. Since major arterial routes are key elements of the urban structure, it is vital to identify potential challenges, constraints and opportunities in order to realise the full development potential along these routes without negatively impacting on the urban structure as a whole. This study, being a spatial planning dissertation, will attempt to focus on solutions to the numerous issues (e.g. economic, physical, social, and environmental) encountered during policy formulation and implementation of the policies along arterial routes.

1.2 Problem statement and substantiation

Roads are an important element of the urban structure and transportation network, as it is a link between places of residence and places of employment; enables the carrying out of business and facilitates the delivery of goods and services. Arterial routes are an integral part of this road network and hierarchy as they are primary movement corridors for the general public, commerce and industry; and the focus of considerable investment by the public and private sector. They are subject to various and competing demands of road users and those of properties adjoining the arterial routes.

The importance of a transport route is determined by a number of factors, which ultimately affects the development potential along the route. The importance of the Ontdekkers Road arterial route is made evident by a number of factors, including traffic volumes and modes of transport; existing development along the road; the road"s mobility functions; and pressure exerted by adjoining owners to amend existing policies. Furthermore, the significance of Ontdekkers Road has been made evident by the recent influx of queries and applications related to development along Ontdekkers Road, which has been submitted to the City of

Johannesburg Metropolitan Municipality. These queries and applications could potentially be in conflict with the principles contained in the policy.

The nature of an arterial route is such that it often traverses municipal boundaries. The implication is that planning approaches and perspectives of the applicable local authorities could be contradictory. This could ultimately affect development along the entire length of the arterial, its functions and ultimately the urban form. It is therefore evident that the alignment of planning perspectives and policies of various controlling authorities is an important aspect to consider.

Development along main routes is a contentious issue for a number of reasons, including:

- The view that development along these routes should take place ad hoc and be led by the economic climate and not dictated by a stagnant development policy
- The conflict between land use planning and transportation planning along these routes
- The probability that the market values of properties along arterial routes are influenced by policies.
- The expectations of owners and/or developers, whether they are legitimate or not

There is a need to determine whether development policies should be applied along all arterial routes and to which extent. The question of the precedence of either land use or transportation planning must be investigated and clarified, or ideally whether the two disciplines can reach a compromise.

1.3 Research aims and objectives

It is the aim of this research to substantiate the incremental implementation of dynamic and effective development policies along arterial routes.

The main objectives of the study are:

- To address the land use and traffic management interrelationships that exist on arterial routes
- Determine the necessity of effective development policies along main transportation routes
- Ascertain the importance of dynamic development policies along these routes
- Illustrate the differences in effectiveness and efficiency between arterial routes that are subject to development policies and arterial routes that are not encumbered by development policies.

- Analyse the approaches of various controlling authorities, disciplines and sectors to policy development along arterial routes; and
- Determine the necessity of the alignment of planning perspectives and policies of the various controlling authorities

1.4 Delineation of the study area

The main focus area of this research will be the Ontdekkers Road arterial route, which spans three cities (i.e. Mogale City, Roodepoort and Johannesburg). The extensions of Ontdekkers Road to the east (known as Main/Perth Road) and to the west (known as Voortrekker Road) are included in the study to draw a comparison between the status of the different sections of the route and the effectiveness of the policies along the route. Figure 1.1 illustrates the delineated study area.

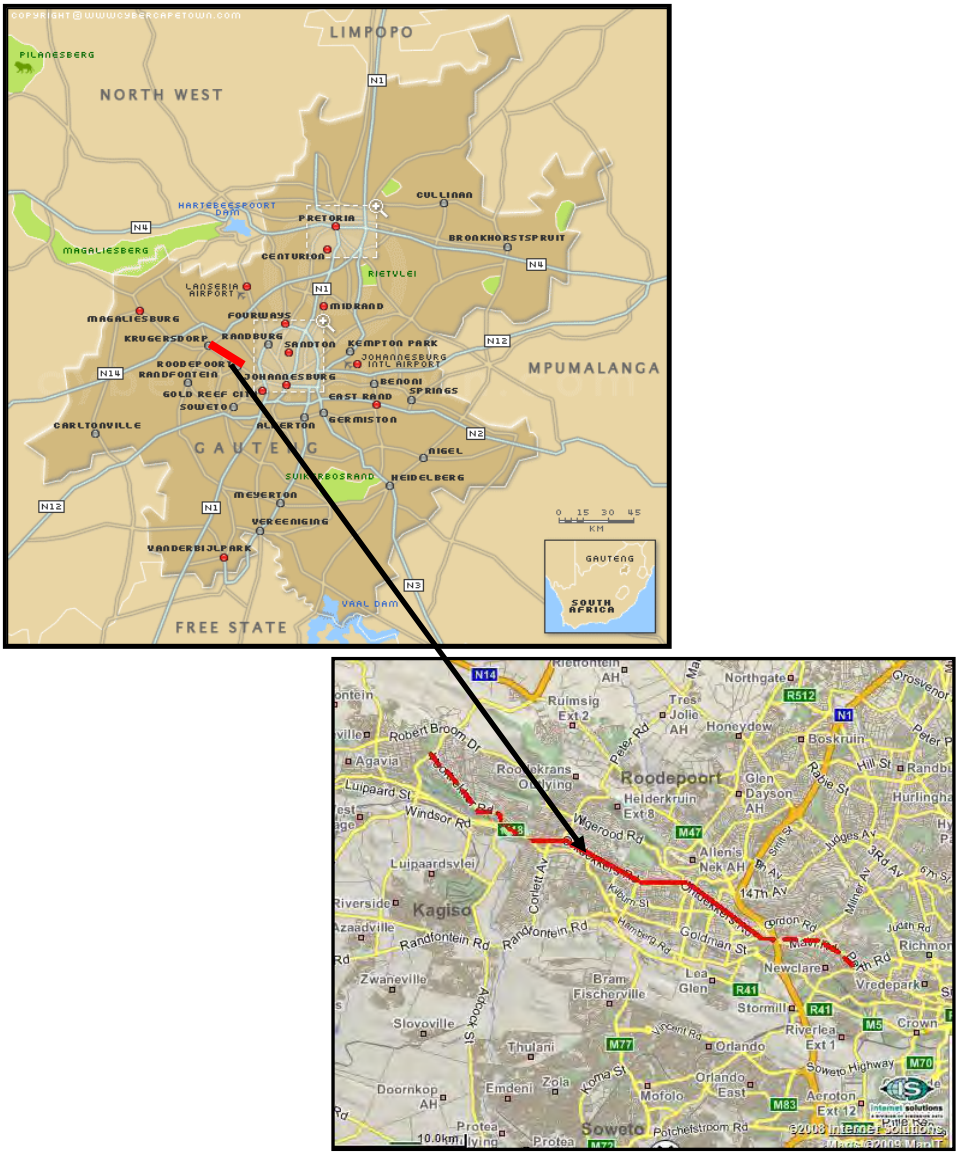


Figure 1.1 Delineated study area

1.5 Research methodology

The study will consist of two research elements - a literature study and an empirical study.

The literature study will entail the investigation of a wide variety of sources, which will include books, reports, journal articles and internet resources, in order to obtain a broad theoretical basis. The literature predominantly relates to theories / models of urban form, the structuring elements of urban spatial structure and the classification of these elements. The history of land use and transportation planning, development policy formulation and the basis of spatial planning are also key focus areas in the literature study.

The empirical study involves a wide variety of spheres and elements – therefore the research is complex in nature and an integrated approach will be followed. The empirical investigation will include the investigation of applicable policies and legislation and the effect it has on development policies along arterial routes. Aerial photography and statistics will be analysed to determine the status quo along the various arterial routes and the developmental changes that took place along the arterial routes over a number of years. Detailed land use surveys and site inspections will be carried out to determine the demand for certain land uses along arterial routes and to determine the existence of illegal land uses and the implications on development along the arterial routes. Previous studies will be analysed to determine the growth and developmental changes along the route.

Semi-structured interviews will be carried out with officials of the various controlling authorities that are familiar with the study area and this field of research and development (i.e. Johannesburg Metropolitan Municipality and Mogale City Local Municipality). These interviews will be used to gather information relating to movement patterns, trends, economic inter-dependency, shared geographic and demographic characteristics, if any, policy formulation and implementation and to determine the viewpoints of the applicable authorities. Technical data relating to travel patterns, public transportation utilisation, existing land uses and proposed land uses will be used to supplement this information.

Development along existing arterial routes and the existence of development policies along these arterial routes will be investigated and compared. Various factors related to the development of the routes will be considered simultaneously by superimposing these elements on a plan of the delineated study area. Throughout the study, figures, tables, and diagrams will be used to illustrate, explain, and summarise information.

The development policy applicable to the study area (i.e. Ontdekkers Road Development Policy) will be investigated, compared to other development policies and the broader city-wide and region-specific approaches of the controlling authority.

Figure 1.2 illustrates the conceptual model of the research process, summarising the method of investigation followed.

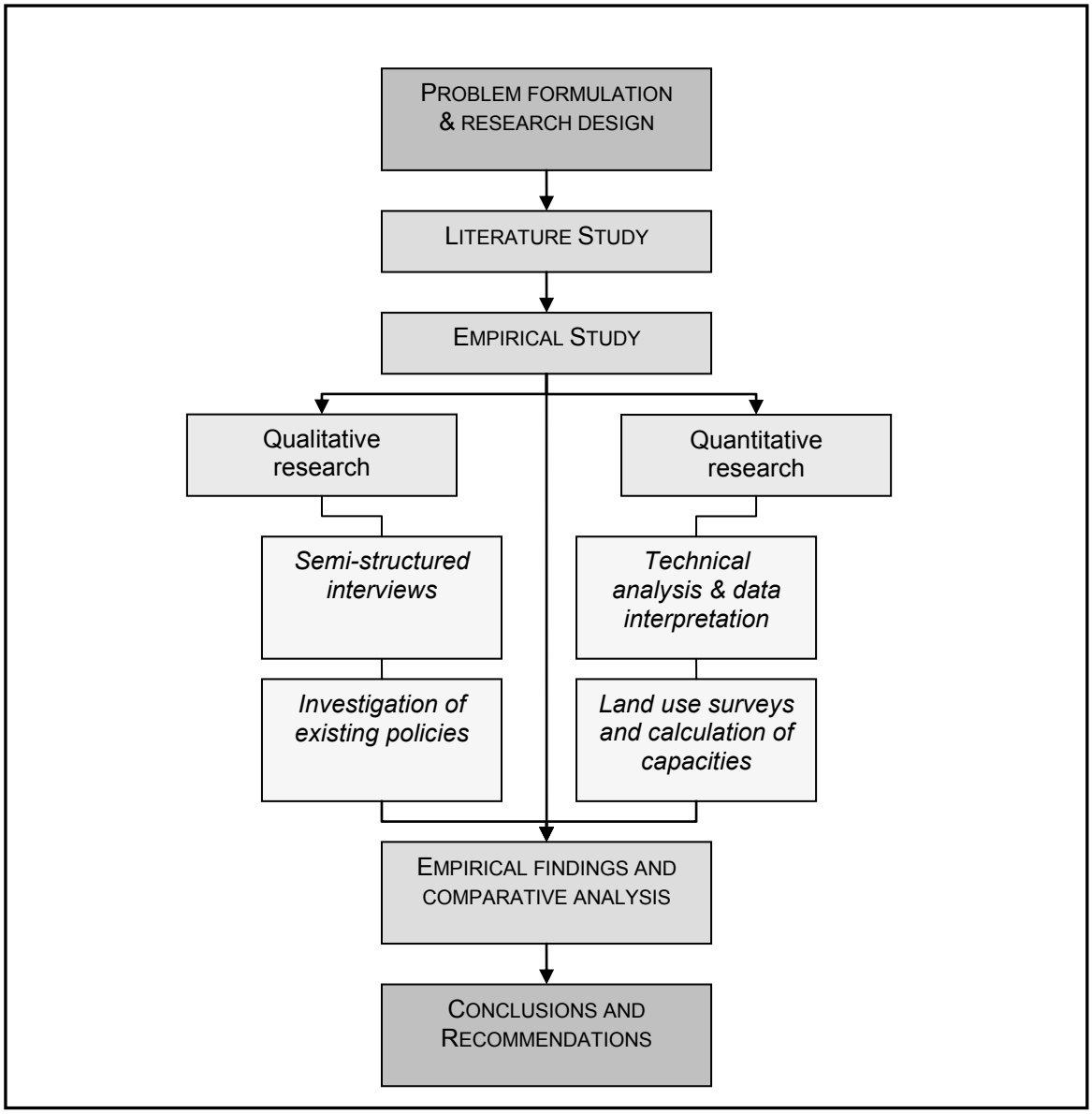


Figure 1.2: Research methodology

1.6 Limitations of the research

A comparison of arterial routes within the study area was made to determine possible constraints to policy formulation and implementation. Since the study was limited to a specific area within the Gauteng province and all regions have different development conditions, only the elements and impacts present are of importance to other metropolitan areas in South Africa.

1.7 Structure of the dissertation

The research document will consist of eight chapters, as indicated in Figure 1.3. The chapters will be arranged as follows:

Chapter One is the *Introduction* which includes the research orientation, problem statement and substantiation, aims and objectives of the study, delineation of the study area, research methodology and structure of the dissertation.

Chapters Two and Three will focus on the theoretical component of the study. Aspects relating to urban form, components of the urban structure, elements of spatial planning, as well as the history of land use and transportation planning and development policy formulation will be given attention.

Chapters Four, Five, Six, Seven and Eight include the empirical investigation.

- **Chapter Four** focuses on policy and legislative documents related to arterial routes and the implications thereof.
- **Chapter Five** will investigate the status quo of the demarcated study area and development trends along the route. A detailed comparison of the policies applicable to the study area and the developments will also be included.
- **Chapter Six** will describe the policy formulation and implementation considerations, with specific reference to the Ontdekkers Road Development Policy. The multi-faceted nature and approaches will be discussed.
- **Chapter Seven** is primarily a case study of the Johannesburg Metropolitan structure and its elements. The role of Ontdekkers Road within the metropolitan structure will be detailed and the impact of the elements on Ontdekkers road will be detailed.
- **Chapter Eight** will summarise the main challenges identified and provide recommendations in terms of the necessity of development policies along arterial routes; the formulation of policies along arterial routes and determine the approach to policy formulation.

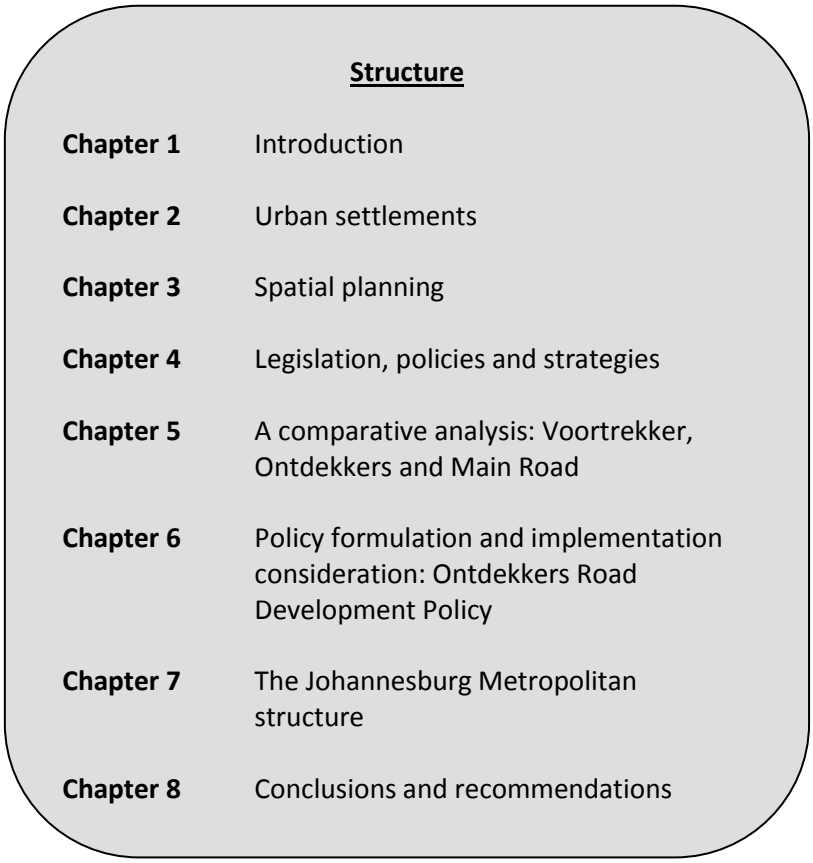


Figure 1.3 Structure of the dissertation

CHAPTER 2

URBAN SETTLEMENTS

2.1 Introduction

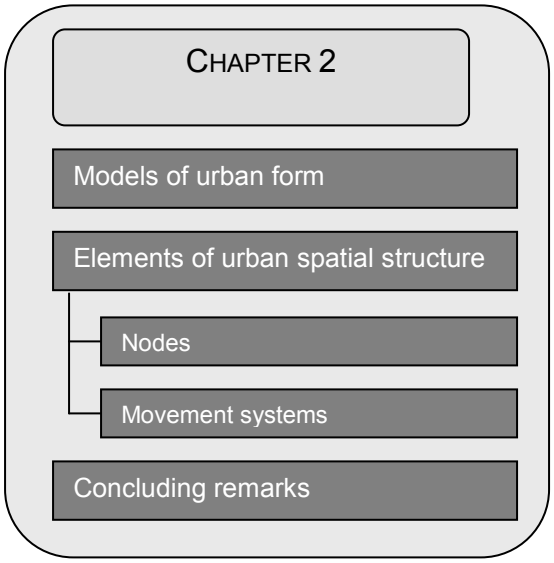


Figure 2.1 Components of Chapter 2

In order to understand the significance of an arterial route and the role it plays in the urban system, attention must be given to theories of urban form and the elements of urban structure. The theories related to urban form reveal the fundamental forces that determine urban morphology. The urban structure and its numerous elements will be dealt with so that the spatial structure and the network of a city can be fully understood. Figure 2.1 depicts the key components of this chapter.

2.2 Models of urban form

The spatial patterns created by the distribution of people, buildings and land use activities within a city translate into the spatial form of a city.

A number of models were developed to explain the internal spatial structure of cities and the forces that determine urban morphology. Hurd (1923) first illustrated the urban form in geometrical terms in his model of axial-central growth. Hurd suggested that both axial and central growth compete with each other in the process of urban development. Thereafter, a number of theorists made valuable contributions to the original model and developed their own models. The most important models relating to the geometry of urban form, include, but are not limited to the concentric zone model, the sector model and the multiple nuclei model.

2.2.1 Concentric Zone Model: Burgess

Ernest W. Burgess formulated the concentric zone model during 1925, which illustrated the central forces responsible for urban form. The model was primarily developed to explain the distribution of social groups within urban areas.

This model depicts urban land use in concentric rings, starting from the Central Business District (CBD) and expanding in concentric zones. Burgess (1925) noted that there was a correlation between the distance from the CBD and the socio-economic status of the area; therefore each concentric zone represents a specific socio-economic urban landscape.

The identified zones are:

1. The Central Business District (CBD)
2. The transition zone of mixed residential and commercial uses
3. Low-class residential homes (inner suburbs), in later decades called inner city
4. Better quality middle-class homes (Outer Suburbs)
5. Commuters zone

According to Burgess (1925), the expansion of the city is determined by the CBD, which causes it to expand outwards; this in turn forces the adjoining zone to expand outwards into the other zone. Therefore, urban growth is a process of expansion and reconversion of land uses.

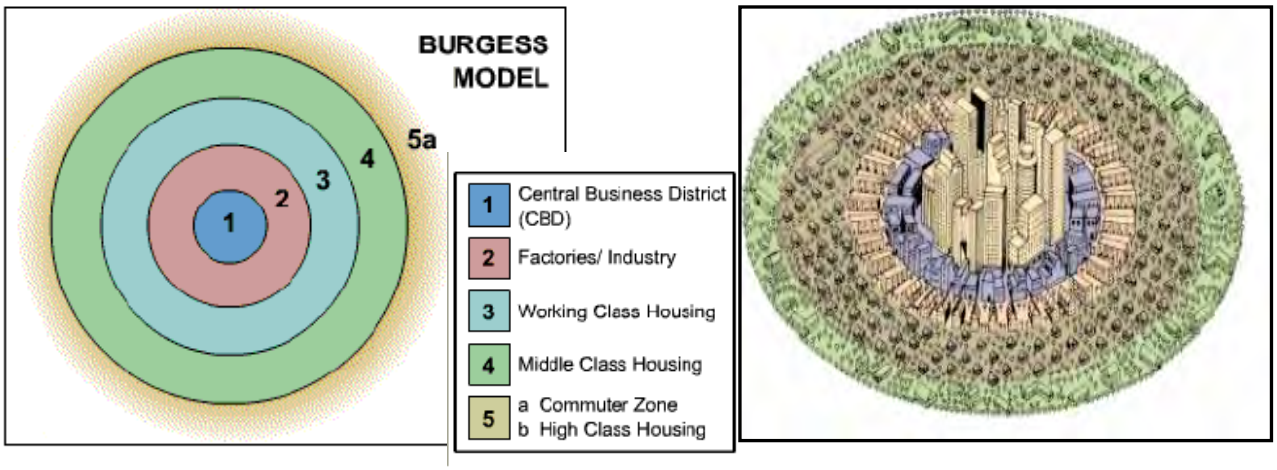


Figure 2.2 Concentric Zone Model

Source: Campbell (1998)

There are a number of criticisms against this model, including its relevance in the twenty first century due to the advancement in transportation and information technology and accessibility. However, the model remains a useful tool to explain the concept of concentric urban development and the complexity of urban land uses and their relationships.

The Burgess model is of importance in this study, as it reflects the importance of accessibility to the Central Business District (CBD) or the economic centre of the area. The concepts of commuting and commuting distances from places of employment are also relevant.

2.2.2 The Sector Model: Hoyt

The economist, Homer Hoyt formulated another urban land use model, the sector model, in 1939. This model is a modification of the concentric zone model of Burgess (1925), as it also accepts the existence of a central business district; however it allows for an outward progression of growth.

Hoyt (1939) recognized the importance of transportation routes into an urban area and suggested that the zones expand outwards from the city centre, along transportation routes (such as highways and railroads). In essence, the sector model is based on the premise that cities tend to grow in wedge-shape patterns, emanating from the central business district and centred on major transportation routes.

Since higher levels of access translated into higher land values, many commercial functions would remain in the city centre; while manufacturing functions would develop in a wedge/sector surrounding transportation routes. Low income- housing would border manufacturing/industrial sectors; while middle- and high-income housing sectors would be located furthest from these land uses.

Hoyt's model attempts to state a broad principle of urban organization, while taking the distance and direction from the city centre into consideration.

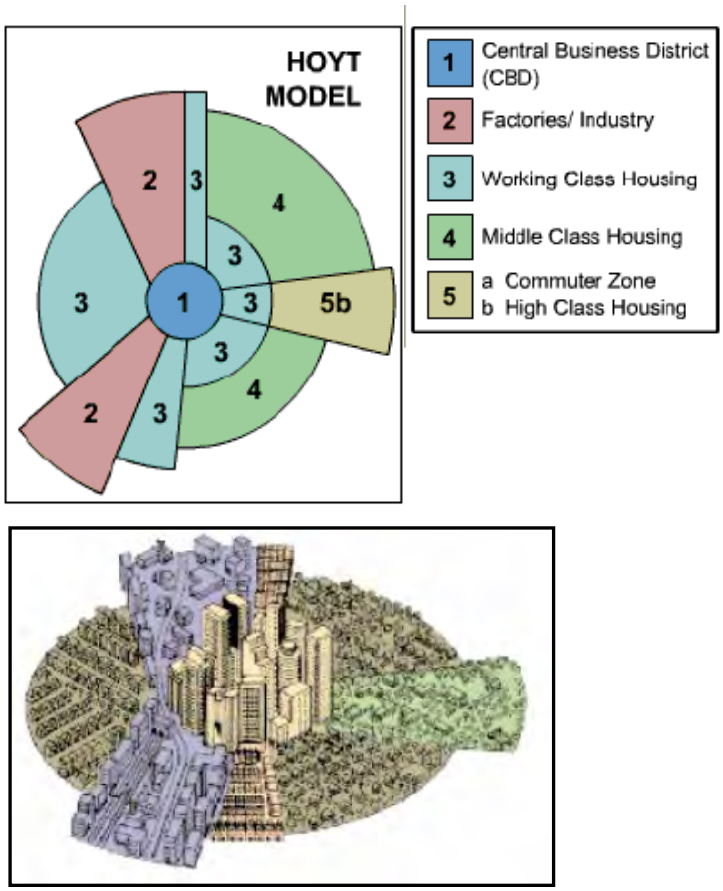


Figure 2.3 The Sector Model

Source: Campbell (1998)

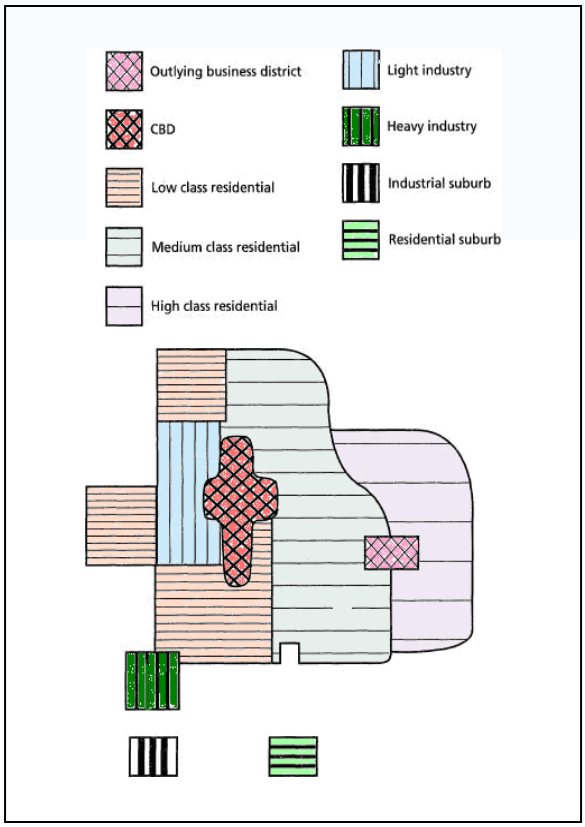
2.2.3 Multiple Nuclei Model: Harris and Ullman

C. Harris and E. Ullman (1945) postulated that most cities grow around many nuclei rather than a single central point or Central Business District. Some of these nuclei are pre-existing settlements, while other points develop due to urbanisation and external economies (i.e. urban growth).

The theory is based on the notion that people have increased mobility due to increased car ownership; this allows for specialisation of centres (i.e. industrial parks, medical precincts and office parks). The conglomeration of complementary land uses with common land use and financial requirements leads to the establishment of a number of centres or satellite nodes. These expanding centres or nodes eventually merge together into a non-regularly structured pattern.

Distinctive land use zones develop due to the nature of certain activities, locational priorities and the compatibility of certain land uses. The new suburban commercial clusters challenge the prominence of the CBD in the urban fabric. The growth of the city is made evident by the number and nature of the nuclei.

The model illustrates a generalised urban form; however it acknowledges that each city is different and the urban form differs for each city. The significance of transportation routes and accessibility is highlighted in this model.



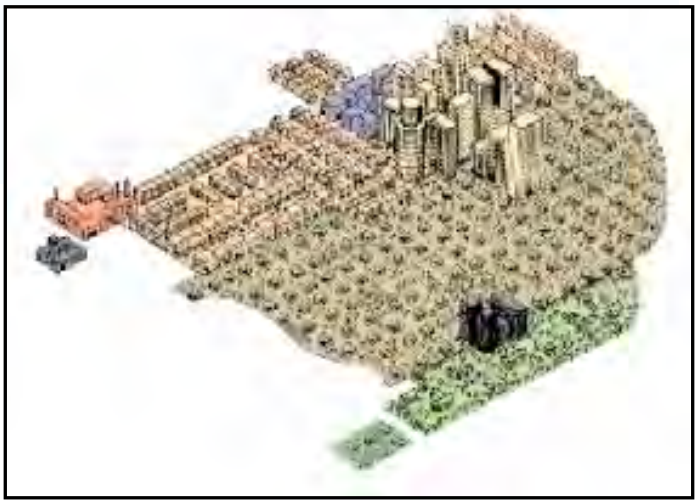


Figure 2.4 Multiple nuclei model

Source: Campbell (1998)

Although the validity of these models are limited, as all simple models of complex phenomena are, these models are still of value. The importance of accessibility, transportation and mobility are all evident. These models can provide a very useful framework for interpreting spatial developments and projecting the path of urban growth.

2.3 Elements of urban spatial structure

The urban spatial structure refers to the location of various land uses within an urban area and the spatial interactions between them. The spatial structure of a city is primarily determined by a number of structural elements, the most important being nodes and movement systems or linkages (See Figure 2.5). Nodes and linkages provide for a functional connectivity and give structure to a settlement. The areas between the nodes and movement systems are composed of zones of varying intensity and open space.

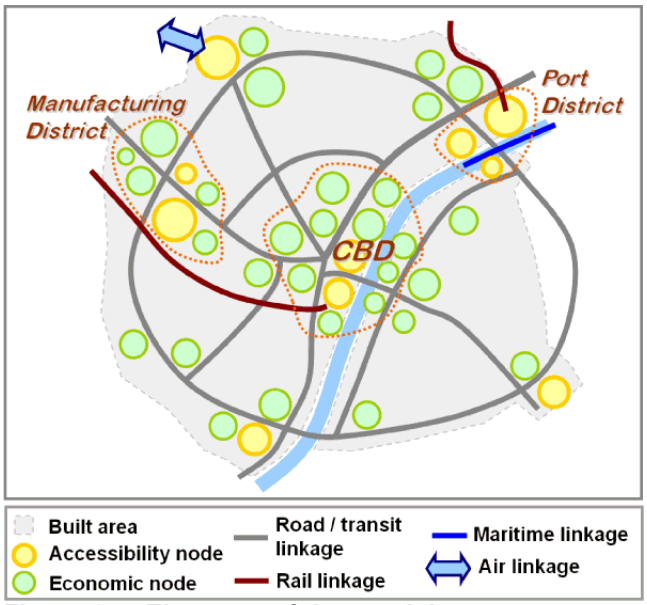


Figure 2.5: Elements of the spatial structure

Source: Rodrigue *et al* (2009)

2.3.1 Nodes

There are predominantly two forms of interdependent nodes, namely accessibility nodes and economic nodes. Accessibility nodes refer to the location of transport nodes that provides accessibility to the movement system (i.e. airports, railway stations, taxi ranks). Economic nodes refer to the conglomeration of economic activities and are dependent on accessibility. In this study, the reference to nodes primarily relates to economic nodes, although a number of nodes in the study area function as both accessibility and economic nodes.

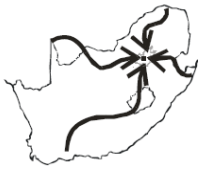
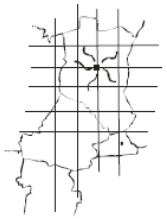
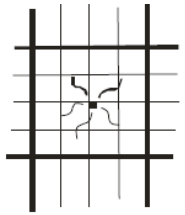
N. Mammon and K. Ewing (2006:6) identify urban or activity nodes as “the pulse points, stopping areas or nodes of development activated by clusters of economic activity and institutional facilities with associated and intensified land uses”.

The City of Johannesburg Metropolitan Municipality defines a node as “a well-defined and legible urban environment where highly accessible, mixed and compatible land uses are concentrated and serviced” (CoJMM, 2008a:79).

It is evident from the various definitions of nodes, that nodes are points characterized by intense development, varied land uses and high accessibility.

Nodes have a hierarchy related to their importance and contribution to urban functions. There is not one single nodal hierarchy that is applied nationally. However, the Nodal Hierarchy, as identified by the City of Johannesburg Metropolitan Municipality (CoJMM) is applicable in this study, since the demarcated study area falls within the CoJMM"s jurisdiction. The City identified a nodal hierarchy based on Neighbourhood, District, Regional, Metropolitan and Central Business District (CBD) definitions. Table 2.1 reflects this hierarchy and the associated attributes and characteristics of each.

Table 2.1 Nodal Hierarchy

	CBD	Metropolitan Node	Regional Node	District Node	Neighbourhood Node
					
Description	The core of the metropolitan city	Metropolitan significance	Regional significance (i.e. regions making up the metropolitan areas)	Serves one / more neighbourhoods (sub-areas)	Significant for specific neighbourhood
	Serves national and international communities	Attracts people from areas beyond the metropolitan boundaries of a city	Serves specific sub-regional areas / large districts		
Dynamics of the node	Situated in areas of highest accessibility (i.e. confluence of metro-routes & freeways)	Situated on mobility spines, supported by mobility roads & have access to urban freeways	Situated on mobility spines, supported by mobility roads	Predominantly located on mobility roads and/or activity streets	Pedestrian-preferred access
	Diversity of activities	Variety of goods, services & specialty products offered	Fulfill variety of functions with sufficient mix of uses	Activities are of local nature, providing for convenience, daily needs & social services	Activities serve the immediate neighbourhood / suburb & are convenience based (not office dominated)
	Established high-density residential component	Distinct profile	Not necessarily a distinct profile, with nodes strongly competing	Pedestrian activity is relatively easy	
Nodal development issues to address	Promote and acknowledge as core of the city	Intensity and pedestrian-friendliness in spite of being a large node	Oversupply of nodes causes business to easily move out and not committing to the upgrading & maintenance of the area	Easy & pedestrian movement	Integration in surrounding environment
	Symbiotic relationship with decentralized nodes				

Source: CoJMM (2008b:82)

2.3.1.1 Hierarchy of shopping centres

The classification of shopping centres is of significance in this study as there are several shopping centres that form part of identified nodes within the study area. There are numerous approaches to the classification of shopping centres and some shopping centres could fall within more than one category. Foreman et al. (2003:83) stated that "the exact point of distinction between the various types of centers is not absolute and often the difference is one of degree".

Foreman et al. (2003:83) noted that the majority of classifications use the function, locality and physical criteria to distinguish between centres. Ghyoot (1992:51) and Prinsloo (2003:87) noted that shopping centre classifications should include a number of factors, such as size, number of people in the catchment area, anchor tenants, number of stores, driving time to the centre and the layout.

Although a single standard classification of shopping centres is not available, Olivier (2007:33) noted that the shopping centre classification of Prinsloo (2003:87) for the city of Pretoria, South Africa is the most comprehensive and recent shopping centre classification applicable to the South African environment. Table 2.2 illustrates this classification system that uses fairly wide criteria for the classification of shopping centres.

Most of the nodes along Ontdekkers Road have shopping centres that anchor the nodes. The primary shopping centres located within the nodes along the route and the related classification of the shopping centres includes:

- Beacon Isle - between local convenience centre & neighbourhood centre
- Flora Centre - between neighbourhood centre and community centre
- Ontdekkers centre - local convenience centre
- Florida Junction - between local convenience and neighbourhood centre
- Westgate - super regional centre
- Princess Crossing - small regional centre
- Wilrogate - neighbourhood centre

These nodes will be discussed in detail in subsequent chapters.

Table 2.2 Shopping centre classification for Pretoria

Type of Centre	Size of Centre (m^2)	Trade Area	Access Requirements	No of Households	Population	Radius (km)	Travel Time (min)	Main Tenants
CORE CLASSIFICATION								
Filling Station	< 250	Filling station only	Together with filling station	-	-	-	-	Filling station operated store only
Spaza	< 50	Houses in suburb	Streets	-	-	-	-	Groceries / café products
Small free standing	500 - 1000	Part of suburbs	Suburban streets	< 2000	< 7000	1	< 2	Café / Superette and few convenience stores
Local Convenience stores / centres	1000 - 5000	One suburb or part of suburb(s)	Minor collector road	700 - 3600	2500 - 12500	1.5	3	Supermarket and few convenience stores
Neighbour-hood Centre	5000 - 12000	Suburb(s)	Major collector roads	2400 - 5700	8300 - 20000	2	4	Supermarket, convenience and small specialized stores
Community Centre	12000 - 25000	Group of suburbs	Main road	8500 - 17800	30000 - 62500	3	6	Large supermarket, convenience, small national clothing, restaurants, take away stores and services
Small Regional	25000 - 50000	Specific subregion in city	Main road	17800 – 35700	62500 - 125000	5	10	Large supermarket, 1 or 2 large clothing nationals, boutiques, restaurants, entertainment and services
Regional Centre	50000 - 100000	Large region in city / whole city	Main road or national road	28600 – 57150	100000 - 200000	8	16	Large supermarket / hyper, 2 or more large clothing, boutiques, entertainment, restaurants, services and convenience
Super Regional Centre	> 100000	Large region in city and surrounds	Main road or national road	57150 – 114300	200000 - 400000	10+	20	Same as regional with more emphasis on entertainment and variety

Source: Adapted from Foreman et al. (2003:87)

2.3.2 Movement systems

The movement system within an urban settlement refers to the linkages between various land uses. These linkages are the infrastructure that supports movement between nodes and may include the public transportation system, such as a rail network, pedestrian linkages as well as the road network. In this study, the road network is of particular importance.

Tate (1983:96) defines a linkage as a "physical or temporal relationship between two or more nodes of activity, usually implying a connecting structure".

2.3.2.1 Road Classification

The road network is considered a major structuring element in the urban structure with the purpose of establishing „a logical and integrated road transport system for the overall benefit of all segments of the population and industry of the country" (NDoT, 2002). Therefore it is essential to have a degree of classification of the road transport system to assign specific elements to a particular jurisdiction. The basis of road classification (i.e. administrative, design type, functional) is dependent on the purpose of the classification.

Functional classification (see Table 2.3) is the classification scheme that is predominantly used in South Africa and is the most relevant scheme in this study. This form of classification relates to the functions that the roads perform and the character of the services the roads provide. A sound functional classification of the separate elements of the network is important to promote an effective road network. The classification of the road network helps to determine administrative responsibility for the road facilities and the method of financing these roads. The government (NDoT, 2002), in the Road Infrastructure Strategic Network suggests an allocation of administrative responsibility for the seven proposed classes of roads in the South African road network. It should be noted that delivery and administration does not necessarily relate to ownership. While the national functional classification refers to seven road classes, the functional classification that is most applicable to this study refers to five road classes, as indicated in Table 2.3.

Table 2.3 Road Network Hierarchy in the City of Johannesburg

FUNCTIONAL CLASS	DESCRIPTION	LAND USE	FUNCTION & DESIGN
Highway		No direct access to land uses	Mainly national, regional & longer distance metropolitan trips
			Access restricted to the interchanges
Mobility Spines	An arterial along which through traffic flows with minimum interruption (optimum mobility)	Mixed land uses at identified intersection nodal points	Mainly inter-regional & metropolitan trips
	Development abutting the spine is in terms of specific policy criteria relating to the type of land use to be accommodated and to level of access	Predominantly higher density residential	No direct access; access from side/service roads
	Often connects major nodes	Non-residential uses to be determined l.t.o specific policy criteria	Consider pedestrian movement, NMT & public transport facilities
			Restrictions on frontage access to be controlled
			Ensure managed pedestrian access
Mobility Roads or Activity Spine	Carries mainly intra regional traffic (I.e. traffic of a local nature)	Predominantly higher density residential	Shorter distance distribution & mainly metropolitan trips
	The focus is on mobility along the route	Local nodal development	Limited direct access
	Often connects mobility spines / neighbourhood nodes	Non-residential uses to be determined l.t.o specific policy criteria	Performs a collector & distributor function, by collecting & distributing trips on the mobility spine network & to & from neighbourhood nodes
			Provide public transport facilities
			Ensure managed pedestrian access
Activity Street	Local street where access to the activity along the street is of paramount importance	Residential	Accommodate pedestrian intensive uses
	Mobility is compromised in favour of the activity	Business	High level of (direct) access
		Retail	Speed calming
		All uses to be of a local and fine grain nature	Provide public transport facilities
			Activity preferably one erf deep
Local Residential Street	A local road that serves primarily local traffic accessing the served area	Residential uses	Provides direct access to residential property
		Low intensity non-residential uses as per policies	Facilitates mixed traffic within neighbourhoods safely & at low speed
			Provision of pavements for pedestrians
			Feeds into arterial road

Source: Table adapted from CoJMM (2008b:31)

2.3.2.2 Concept of corridors

In their ideal-typical sequence model, Taaffe, Morrill and Gould (1963) acknowledged the importance of transportation networks as a structuring element in the urban structure. According to their model, the development of transportation networks leads to the creation of corridors.

Corridors are of particular importance in the transportation network, as they perform an integral function in the urban structure. There are two types of corridors, namely transportation corridors and development corridors. Geyer (1988:119) referred to Von Malchus‟ (1976) view that a distinction should be made between traffic and urban axes (traffic axes being communication axes and urban axes being development axes). However, it is artificial to distinguish between the two axes because both urban development and the traffic, which is generated by it, are essential elements of any fully-fledged development axes. Further, transportation corridors are integral components of the transportation network which form part of the development corridor

The transportation corridor concept is of particular importance in this study since mobility along a mobility spine is of greater importance than accessibility. It should be noted that mobility should be balanced with accessibility and activities, depending on the specific application and role of the corridor (See Figure 2.6).

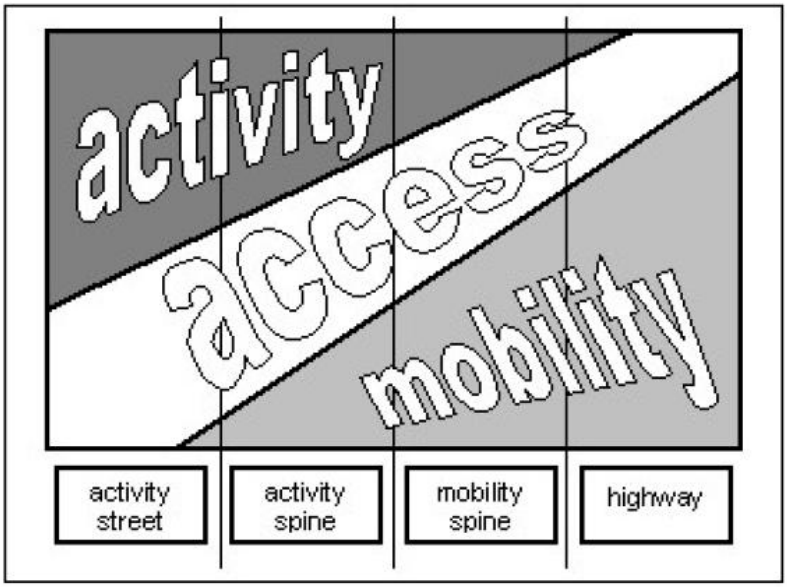


Figure 2.6 Access, mobility and activity

Source: Jordaan, G (2003:4)

Jordaan (2003:3) stated that the development of a street into a spine or development corridor is a natural progression which results from access, location and agglomeration.

Urban-Econ (1997) defined specific characteristics of corridors, namely:

- *Connectivity between major nodes*

  This entails the purposeful interaction between nodes and the connectivity of the outer limits of the proposed corridor.

- *Density and continuity*

  The corridor is reliant on a high population density and should generate a high density of economic activities

- *Occupation of significant land uses*

  Significant, wide-ranging and prominent land uses should be established along the corridor, so as to develop the „beads-on-a-string" configuration, with focal development points (See Figure 2.7 below)

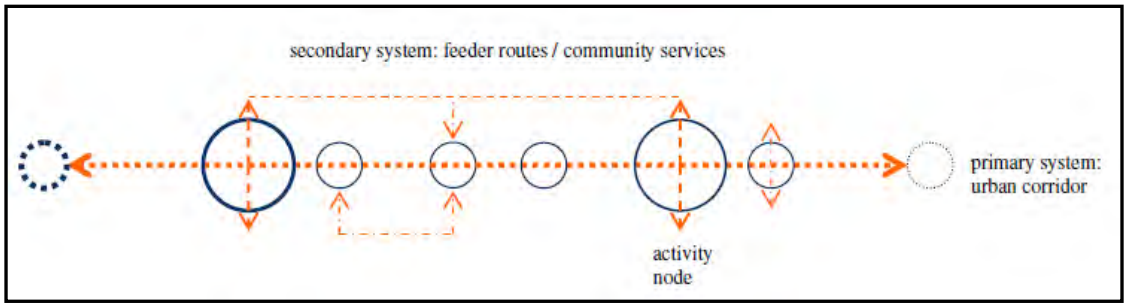


Figure 2.7 Beads-on-a-string configuration

Source: Mammong, N & Ewing, K. (2006:5)

- *Existence of multi-nodal transportation*

  A wide range of transportation modes must be provided along a corridor to stimulate public transportation utilisation and ensure accessibility for all citizens.

- *Propensity of development*

  The combination of a high degree of accessibility and the symbiotic relationship of the wide-ranging land uses should stimulate development along the corridor and result in a natural propensity for development along the corridor.

- *Absence of inhibitors*

  The development of a corridor can be hindered by economic and physical factors. Access management and land use management can also hinder corridor development if a balance between mobility, accessibility and activity is not managed.

- *High level of accessibility and mobility*

  There must be an ideal balance between accessibility and mobility so as to stimulate growth and activities.

Corridors can be classified according to a number of factors, including size/scale, types, etc. According to the study completed for the National Department of Transport, a number of characteristics of corridors can be used to identify the type of corridor, as indicated in Table 2.4 below.

Table 2.4 Summary of corridor typologies and types

TYPOLOGY	TYPES				
Dominant land use	Retail corridor	Office/Services corridor	Industrial corridor	Motorcar related corridor	Mixed land-use corridor
Dominant mode/s of transport	Private motorcar dominant corridor	Public transport dominant corridor	Mixed private/public transport corridor		
Shape/Physical form	Pearls / Beads on a string	Thick bracelets/strips/ribbon			
Function	Mobility / Movement/Transport corridor	Access/Activity corridor: • Development corridor • Activity spine • Activity strip/street • Activity spine			
Scale	Provincial	Metropolitan / City-wide	Local		
	Large	Medium	Small		
Underlying dynamics or "forces of attraction"	Single attractor	Dual attractor	Multiple attractors: • Multi-nodal attractor • Strip attractor	Total area attractor	
Linkages	"Township" to CBD, industrial area, retails node and/or suburbia	Suburbia to suburbia	Suburbia to CBD		
Level of corridor maturity	Mature activity corridors	Incipient activity corridors	Proposed activity corridors		
Socio-economic class of corridor inhabitants	Up-market high rise	Up-market low to medium density	Emerging low-middle class	High density low income	

Source: NDoT (2001:2-84)

The three most important characteristics are:

i) Scale

Scale refers to the physical area that a corridor covers (i.e. its length and width, the number of trips involved, the level of economic activity, the length of the trips, etc). It can also indicate how far a corridor has an impact beyond its boundaries.

There are a number of qualitative sets (NDoT, 2001:2-77), namely:

- *Provincial*

  This type of corridor covers more than one major metropolitan and/or urban area in a province. It usually provides an area of focus for development initiatives in a province. Foreign direct investment and national investment from outside the corridor could be drawn into the corridor.

- *Metropolitan / city-wide*

  The corridor extends over a major part of a metropolitan area or city. It often provides an area of focus for a network of corridors in such an area. Investment does not usually originate from beyond the borders of the metropolitan area, unless the corridor performs remarkably well.

- *Local*

  This type of corridor extends over one or two suburbs and often develops around a major street in a suburb. Investment usually comes from within a specific metropolitan area, with investment from outside being very unlikely.

ii) Function

- *Transportation corridor*

  The main reason for this type of corridor is to move large numbers of people and goods and services from one point to another in the corridor (NDoT, 2001:2-75). A transportation corridor consists of a strip of land with more than one transport facility. The emphasis is on movement or mobility, with accessibility of less importance. Thus, the number of access points or interchanges is less frequent and, even in urban areas, spaced further apart (TCC, 1998:14).

- *Activity corridor (Development corridor)*

  The key functions of such a corridor are land use and economic activity (NDoT, 2001:2-75). An activity corridor is defined as a linear strip, up to two kilometres wide, traversing urban or inter-urban areas, surrounding a major transport facility or facilities, providing a high level of accessibility to adjacent areas and containing a high density of population and job-opportunities (TCC, 1998:14).

iii) Dominant mode of transport

- *Private Motorcar Dominant Corridor*

  This type of corridor serves the middle to upper income areas of medium to low density suburbs. The corridor tends to be less than 20 km in length in its intra-metropolitan form and up to 60 km in length in its inter-metropolitan form. This type of corridor is inclined to lead to ribbon development and it has high public and private investments opportunities.

- *Public Transport Dominant Corridor*

  This type of corridor is focused on the low to middle income areas of high to medium density suburbs by linking the residents to economic opportunities in other areas. The corridor tends to be longer than 10 km and experiences limited private and public investment.

- *Mixed Private/Public Transport Corridor*

  This type of corridor mainly serves middle to low income medium-density suburban areas. The corridors length is between that of the previous two types of corridors. The corridor tends to have limited investment opportunities and could show signs of decay.

These characteristics do not necessarily result in the identification of a single corridor type; however it assists in the broad classification of a corridor.

It can be concluded that the approach of the National Department of Transport makes use of the properties of corridors to identify or classify a corridor. However, it is also evident that the classification of corridors should not be used as a tool to indicate a fixed product or name of a corridor; it should be rather be used as a process-element in the development of corridors.

The National Transport Master Plan (NATMAP) noted that the integration between land use and transportation is best obtained by a corridor development pattern, as will be discussed in the subsequent chapters. A corridor development pattern is shaped by a transportation spine (i.e. a major road or railway line) and development concentrations occur at major intersections or major transit stations as indicated in Figure 2.8.

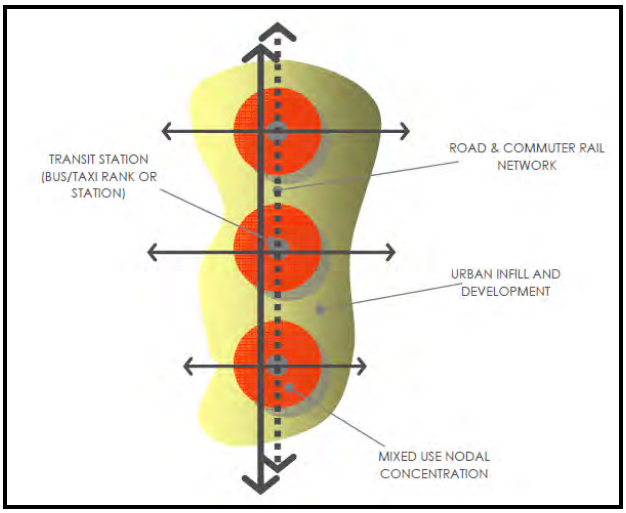


Figure 2.8 Development corridor configuration

Source: NDoT (2008b:60)

The DoT states that the development corridor configuration can achieve a number of spatial development and transportation objectives, including:

- **Increases mobility:** Mobility is increased as a result of high-volume, efficient movement between major developments.
- **Increases accessibility:** Development corridors enable the provision of a wide array of goods and services in concentrated areas; thereby ensuring shorter trip lengths.
- **Achieves spatial integration:** Corridors link and integrate former exclusion areas to areas of economic opportunity. This assists in the restructuring of segregated and fragmented urban areas.
- **Steers urban development:** New development is focused into specific areas, where existing transportation infrastructure exists, instead of locating it in areas where additional infrastructure must be constructed and maintained.

As acknowledged by the DoT, one single definition or classification of a corridor cannot be made. A distinction cannot necessarily be made between an activity corridor and a transportation corridor, although a corridor can have a dominant function, as is the case with the Ontdekkers Road arterial route, since the route performs a number of functions (i.e. transportation, economic and land use functions). However, the dominant function is that of transportation/movement and the protection of the mobility of the route is of utmost importance.

2.4. Conclusion

Transportation routes are important structuring elements in the urban form of a settlement, as is evident in the various models of urban form. Accessibility, mobility and transportation ultimately influence the path of urban growth. The key elements of urban spatial structure, namely nodes and linkages, play a significant role in the urban form. Ontdekkers Road is an important structuring element in the western part of the City of Johannesburg's urban form. It predominantly performs a movement / mobility function and can therefore be classified as a transportation corridor. When considered in terms of the broad classification characteristics identified by the Department of Transport, Ontdekkers Road can be labelled a mixed private/public transport metropolitan corridor linking suburbia to CBD with a mobility/movement/transport function and a pearls / beads on a string form. Although Ontdekkers Road is not a development corridor *per se,* it is an integral component of a development corridor (i.e. East-West Development Corridor). In terms of the various classifications discussed in this chapter, it can be deduced that Ontdekkers Road is a mobility spine, with a regional node and multiple neighbourhood nodes and shopping centres within the nodes (ranging from a neighbourhood centre to a super regional centre) located along the arterial route.

CHAPTER 3

SPATIAL PLANNING

3.1 Introduction

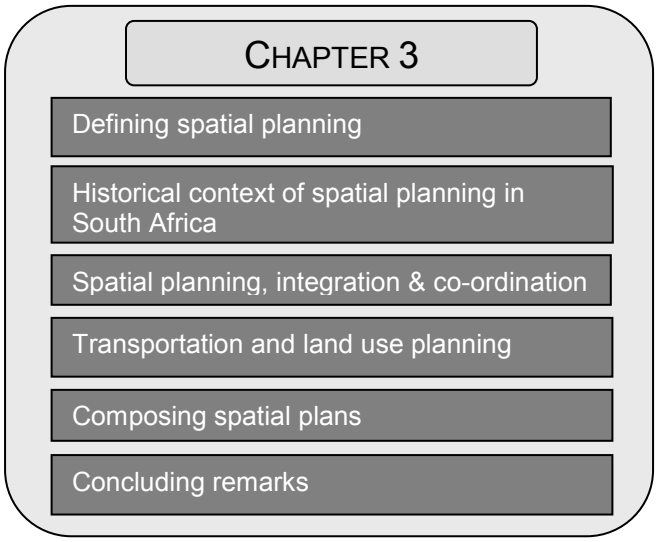


Figure 3.1 Components of Chapter 3

Spatial planning is an important aspect of the development process. Since there are a numerous understandings of the term „spatial planning", it is necessary to understand the use of the term in this study, since it forms a fundamental component of this study. The various elements of spatial plans and the need for integration, at all levels, are also discussed in this chapter. Figure 3.1 outlines the sub-sections to follow.

3.2 Defining spatial planning

There are numerous understandings of the term „spatial planning". The National Development and Planning Commission, in the Draft Green Paper on Development and Planning (SA, 1999:21), established that a substantial terminological confusion exists in the sphere of spatial planning. A number of interchangeable terms, such as „spatial planning", „land planning", „land use planning", „settlement planning" and „physical planning" are used. However, it was advised that the term „spatial planning" be used when referring to the broader spatial organization, since the afore-mentioned terms are too specific and the term „spatial planning" is most commonly used internationally.

In the Draft Green Paper, spatial planning is discussed as a public sector activity, consisting of two broad dimensions, namely proactive or forward/strategic planning and land development management, which deals with the regulating of land use change.

The government, in the White Paper on Spatial Planning and Land Use Management (SA, 2001) defines spatial planning as “planning of the way in which different activities, land uses and buildings are located in relation to each other, in terms of distance between them, proximity to each other and the way in which spatial considerations influence and are influenced by economic, social, political, infrastructural and environmental considerations”.

In Moving South Africa (MSA, 1995:63), the government states that spatial planning „deals fundamentally with long-term, difficult-to-change decisions about the use and tenure of land assets and the fixed investments that occupy it‟.

Barbir views spatial planning as a “tool for spatial integration and the creation of unique, attractive and cohesive urban environments” (Barbir, 2010)

The Office of the Deputy Prime (ODPM) in their planning policy statement describes spatial planning as an approach “*to ensure the most efficient use of land by balancing competing demands within the context of sustainable development. Spatial planning goes beyond traditional land use planning to bring together and integrate policies for the development and use of land with other policies and programmes which influence the nature of places and how they function. This will include policies which can impact on land use, for example by influencing the demands on or needs for development, but which are not capable of being delivered solely or mainly through the granting of planning permission and may be delivered through other means.”* (Planning Officers Society, 2005:14)

It can be concluded that the term „spatial planning‟, as used in this study refers to the proposed pattern of spatial development in an area. Its purpose is to encourage, guide and coordinate the spatial distribution of development, redevelopment and investment to deliver sustainable development.

3.3 Historical context of spatial planning and development in South Africa

Spatial planning and the planning systems in South Africa today are complex, multiple and contradictory as a result of the response of many different governments to the problems that they perceived as the most significant at their time.

Between 1910 and the 1930s, the British planning ideology and approaches spread throughout South Africa. The administrative and decision making powers rested with the provincial government and human settlement patterns were increasingly being shaped along racial and class lines.

During the 1930s, the Second World War and thereafter, the global economy had a massive downturn, which resulted in a shift in the focus of the South African government. The government"s approaches included „betterment planning" through the systematic separation of land uses in the rural areas, job reservation for poor whites and mass government housing. The planning approach included concepts of the modernist movement such as the separation of land uses, the inwardly-oriented neighbourhood unit and the dominance of the private motor car. This planning approach was control-oriented and fragmented.

The post-1948 era was characterised by the formulation and implementation of a racial planning system due to a number of factors such as shifting economic patterns and the effects of increased urbanisation. The planning system was deemed a repressive activity that was controlled by political ideology rather than people-centred and environmental ethnic. The number of informal settlements dramatically increased over the years due to the strengthened control-oriented planning system.

After 1985, apartheid transformations started taking place and the ineffectiveness of the municipal planning system in its fragmented and unrepresentative form was made evident.

These numerous influences resulted in a spatial planning system that was:

i) Fragmented

- At different levels (i.e. national, provincial and local)
- Across race groups
- Between ethnic groups
- Between sectoral uses (i.e. land use and transport planning)
- In terms of jurisdictional instruments (i.e. Title deeds and Town Planning schemes)

ii) Controlled

Through the town planning scheme system which was only implemented at a later stage at a simplified level in urban townships.

iii) Modernist influenced

Most norms and standards of the spatial system are based on the modernist approach, including the concept of the free-standing building within large private green space as the basic building block of settlements; the separation of land uses; the concept of the inwardly-oriented neighbourhood unit; focusing on embedded social facilities and the dominance of the private motor car.

The predominant belief of the spatial planning system was that it was possible and desirable to plan comprehensively and predetermine the use of all land parcels in settlements.

This necessitated changes in the spatial planning system, which started post 1994. The implementation of the Constitution of the Republic of South Africa, No. 108 of 1996; the Development Facilitation Act, No. 67 of 1995; various provincial planning laws and national sectoral legislation (i.e. Local Government Transition Act, No. 61 of 1995; the National Environmental and Management Act, No. 107 of 1998; the Housing Act, No. 107 of 1997; the Water Services Act, No. 108 of 1997; and the regulations passed in terms of the Environmental Conservation Act, No. 52 of 1994) had profound planning implications.

Spatial planning has become more normative-based than control-oriented and is more proactive, with the focus being on considered judgments and the discretion of decision makers, rather than the application of standardised rules and regulations. The nature and scale of decision-making agents" functions have been defined. Furthermore, a number of policy initiatives (such as the White Paper on Local Government, the Urban and Rural Development Frameworks, Spatial Development Initiatives, etc) have influenced the spatial planning system by promoting integrated development planning and a „developmental local government".

3.4 Spatial planning, integration and co-ordination

It is evident from the afore-mentioned definitions, that spatial planning consists of various components, including, but not limited to land use, transportation and engineering infrastructure.
Since spatial planning consists of so many elements, planners must ensure that spatial planning is a collaborative effort**.** Planning is a multi-disciplinary, multi-sectoral activity. Therefore, planning professionals must work more closely with a far wider range of key players and sectors than usual to ensure that spatial planning realises its potential.

The CSIR, in the *Guidelines for Human Settlement Planning and Design* encapsulates the core aspects of spatial planning in the following statement:

"The art of planning and design is to arrange the elements of structure into a system of references that supports the processes of living, and which establishes a spatial logic eliciting responses from the many actors who contribute to settlement-making. Settlement plans should therefore be able to accommodate uncertainty and change, rather than simply accommodate the initial development programme that necessitates the plan in the first place" (CSIR, 2000).

It is evident that spatial planning should take cognizance of the various role-players and the fact that there is a necessity for both forward and regulatory planning. The involvement of all the key role players and the integration of the various inputs are crucial in the planning and development process. A partnership-based planning process, which encourages each group of role players to make valuable contributions, is advocated by the Department of Housing (CSIR, 2000).

The main issue experienced by the various role players is related to the lack of integration, both between and within the groups of role players. The lack of integration is experienced at two main levels:

- There is a lack of *inter-sectoral and inter-disciplinary integration*, especially within a governmental context. The process of planning and development should encourage the inputs of all disciplines (i.e. urban planning, engineering, transportation, and environmental). Further, since there is often varying and conflicting approaches to development from the various sectors, the integration of sector policies is important to ensure sustainable development. The approach to the planning and development process should be inter-disciplinary, as opposed to multi-disciplinary[1].
- A lack of *intergovernmental co-ordination* is a major obstacle for development. Harrison, Todes and Watson (2008:92) acknowledged the issue of departments „working as silos", even though a system of government clusters has been established to improve co-ordination. The lack of understanding the functions of national, provincial and local government and the lack of clarity about decision-making responsibilities between spheres are often major obstacles. In the White Paper on Spatial Planning and Land Use Management (SA, 2001:27), the government encourages an integrated and coordinated effort from the different spheres of government to ensure co-operation.

[1] "Interdisciplinary approaches bring different sectoral knowledge to bear on a shared objective; multi disciplinary approaches pursue their own sectoral objectives" (SA, 1999)

The Presidency (The Presidency, 2004:4) promotes the process of alignment and harmonisation, which is approached as a „process entailing structured and systematic dialogue within government" so as to support „coordinated and integrated action among the spheres of government and between other organs of state to achieve common objectives and maximise development impact." Figure 3.2 below indicates the importance of greater consistency and synergy in the implementation of government policies in order to achieve common goals. Three major elements must be considered when considering the alignment of policies within the public sector. The processes must be:

i. Structured and systematic, not ad hoc;
ii. Sufficiently comprehensive to facilitate integrated and coordinated action; and
iii. Have a positive and decisive impact on the common goals and objectives of government.

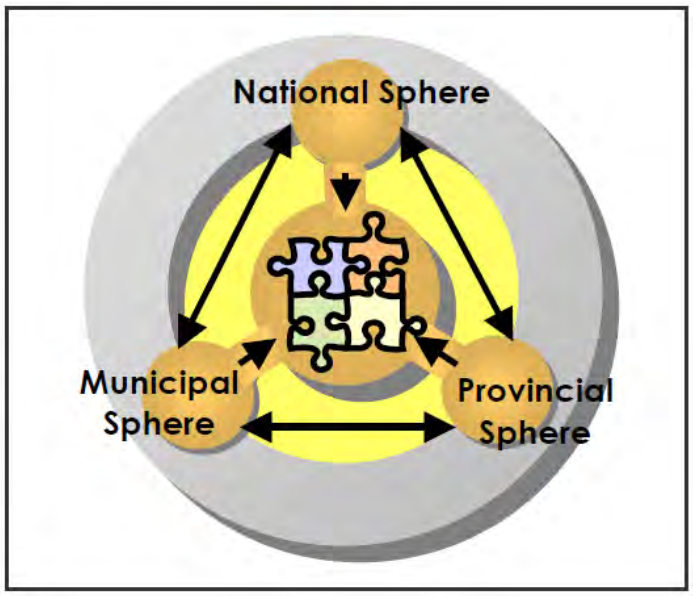


Figure 3.2 Co-operative governance

Source: The Presidency (2004)

It is evident that integration, on various levels, is necessary to ensure that the planning and development process is supported and to overcome the many obstacles related to development. Further, an intergovernmental system of planning should be practised to ensure co-operative decision making which will promote co-operative governance. The approach of alignment and harmonisation is necessary to ensure coordinated and integrated action of governmental departments.

Brugmann (1996:373) suggests that the success of strategy integration depends crucially on the success of maintaining strategic control over local development processes, co-ordination between the vertical levels of governance and the horizontal support systems associated with each level of the administrative structure.

The alignment of environmental, transport and economic plans is of utmost importance to ensure sustainable development.

3.5 Transportation and land use planning

The problematic relationship between land use planning and transportation planning can be dated back to the 1930s when the first planning legislation was enacted in South Africa. The legislation that was passed did not consider any joint planning between land use and transportation planning. While land use planning was considered in terms of provincial Ordinances, transportation planning was considered at a national level, in terms of national legislation. This made the dominance of roads over land uses evident.

The National Roads Act of 1935 and the Advertising on Roads and Ribbon Development Act of 1940 contributed to the conclusion that land use planning had a lower status than transportation planning. Further, land use planning and transportation planning were then considered separate entities (NDoT, 2001).

During the 1940s, the inequitable relationship of land use and transportation planning was strengthened by the implementation of the neighbourhood concept (Oranje, 1997).

In 1958, Solly Morris, an engineer-planner based in Cape Town (1958:88) acknowledged the prevailing thought that land use and transportation planning are separate entities by stating that, “In its new development Cape Town has succeeded in introducing the free-flowing highway with limited access, in place of the old corridor traffic street. The new arteries run between the units instead of through them, and ribbon development is thereby excluded by positive means”.
The concept of land use and transportation planning being separate entities was reinforced over the following several years through the development of the “white” suburban explosion and the out-of-town shopping centre (Oranje, 1997).

The realisation of the importance of the town planning profession and the establishment of the National Department of Planning in 1964 contributed to the acknowledgment of the importance of the integration of land use and transportation planning during the 1970s.

The Forum for Effective Planning and Development concluded that integrated development planning is considered a participatory approach that integrates economic, sector, spatial, social, institutional, environmental and fiscal strategies. This enables the optimal allocation of scarce resources between sectors and geographical areas in a manner that provides sustainable growth and equity (Schoeman, 2004).

The government, in the National Transport Master Plan (NATMAP), acknowledges that the current profile of land use and transport development in the country is not integrated. The NATMAP ascribes this to the structural fragmentation of responsibilities for the „administration, planning and regulation of the various aspects of land use, transport infrastructure, operations and regulations" (NDoT, 2008a:i).

It has been recognized that it is essential to take cognizance of how transport planning relates to land use, sectoral activity and settlement patterns. Today, the importance of the integration and co-ordination of land use and transport planning has been made evident through the numerous policies and strategies of national, provincial and local government, which will be discussed in the following chapter. Some legislation is discipline/substantively specific, while other legislation is more generic in nature and focuses on planning processes, alignment of planning processes and proposals and the legal requirements for the compilation of plans.

3.6 Composing spatial plans

The traditional land use planning approach focuses on the regulation and control of land. The spatial planning approach is wider, more inclusive and aims to ensure the best use of land by weighing up competing demands. It deals with the physical aspects of land use, but also considers economic, social and environmental matters. Spatial planning considers aspects that influence space as well as place, such as access and movement, employment, education, crime prevention, and numerous other elements.

Therefore, spatial plans should include *inter alia*:

- A land use framework (land use zones with the indication and description of desirable and undesirable land uses for each zone)
- public open space framework (categorisation of public open spaces with the description and design/development guidelines for each category)
- movement framework (movement routes and minimum spatial and design requirements needed to ensure functionality, amenity, convenience and safety)
- vehicular movement network
- pedestrian/non-motorised movement network
- public transport system
- service infrastructure provision framework (indication of types and reticulation of the infrastructure needed to service the development implied by the land use framework)
- development guidelines (design codes)
- site layout (position of the building on the site)
- access
- development controls (i.e. coverage, floor area ratios, height, parking ratios, building lines)
- architectural design guidelines
- interface with the adjoining public open space
- implementation framework
- capital investment framework
- urban management framework
- development facilitation framework

The key elements that should be set out before beginning to draft a spatial policy or plan are:

- A *spatial portrait* of the locality;
- The *issues* arising from the spatial portrait that need to be addressed;
- A *spatial vision* of the area in the future; and
- A set of *spatial objectives* that cover the identified issues and fit the vision.

This will enable the engagement of the decision makers in the local planning authority at all the critical points in the formulation of the policy, as illustrated in Figure 3.3.

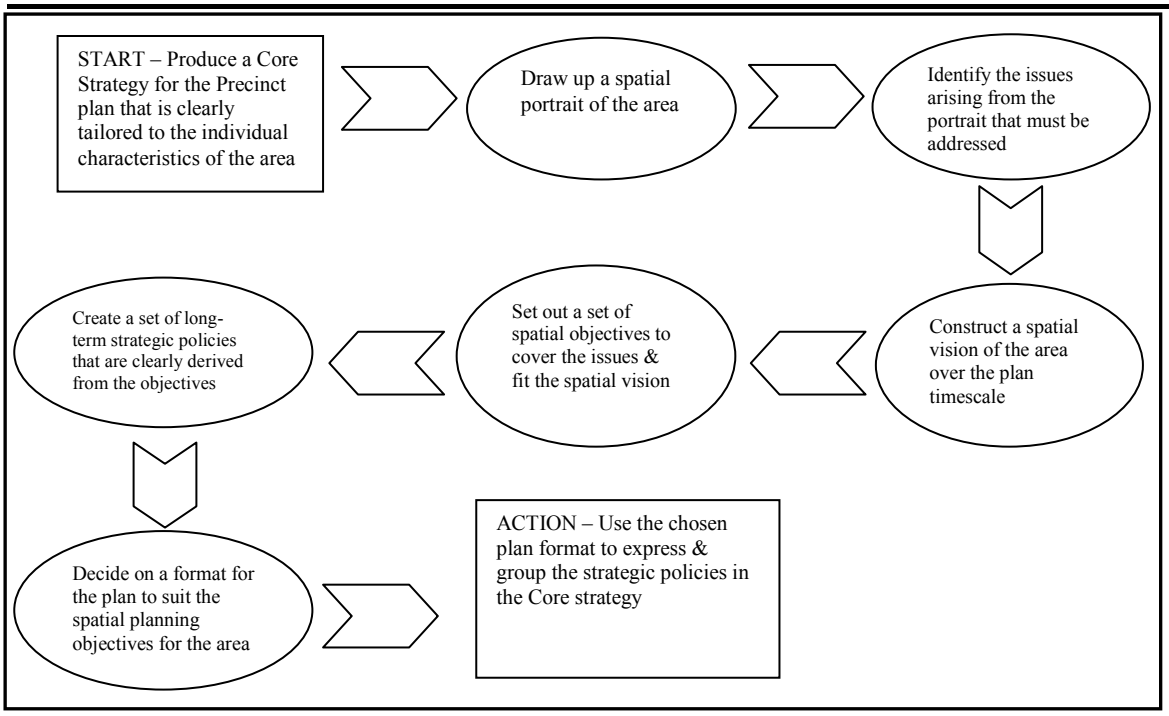


Figure 3.3 Process of spatial plan formulation

Source: Adapted from Planning Officers Society (2005:35)

The spatial planning process should be process driven and systematic in nature to ensure the inclusion of all inputs from the various role players. By following a systematic, problem-oriented approach, the relevant issues can be identified and addressed. Furthermore, valuable inputs can be incorporated into the spatial policy or plan; thereby achieving co-operation, harmonization, integration and coordination.

3.7 Conclusion

Spatial planning consists of numerous physical and institutional elements that must be considered. An effective element of effective planning is co-operative governance and integration between and within different levels of government. Where possible, plans should be aligned and legislation should be coordinated. Co-operative decision making and co-ordination between the levels of government is the most effective means of promoting co-operative governance. The integration of plans, policies and strategies dealing with transport and planning is an important focus of spatial planning, which, if successful, will contribute economically, socially and environmentally. Since spatial planning is an inter-disciplinary matter, spatial plans and policies must take cognizance of all sectors and should include various plans.

CHAPTER 4

LEGISLATION, POLICIES AND STRATEGIES

4.1 Introduction

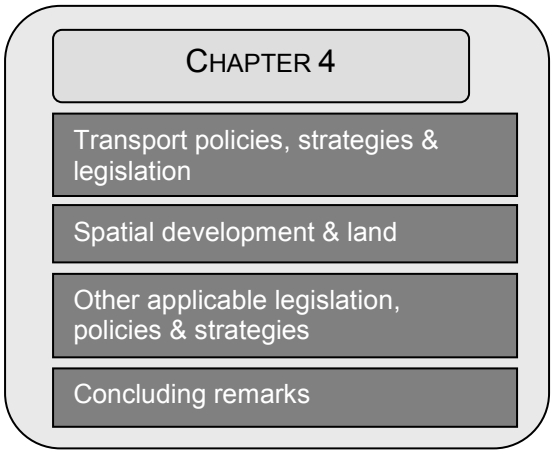


Figure 4.1 Components of Chapter 4

Legislation, policies and strategies play a vital role in spatial planning and development. As noted in the preceding chapter, spatial planning consists of multiple facets; therefore a number of multi-sectoral policies are discussed in this chapter. In this particular study, legislation, policies and strategies relating to land use planning and transportation planning and its components are the most relevant. Figure 4.1 is a representation of the main sections of this chapter.

4.2 Transport policies, strategies and legislation

4.2.1. The White Paper on National Transport Policy, 1996

The White Paper on National Transport Policy (SA, 1996:12) identified priorities for the provision and use of the transportation system, which are in line with those priorities set for the country as a whole. The elements of the Reconstruction and Development Programme, namely meeting basic needs, growing the economy, developing human resources, and democratising the state and society sum up these priorities.

The policy document is relevant in this study since it acknowledges the importance of a shared vision by all the key role players and encourages co-ordinated and integrated planning and decision making. The concepts of integration and intermodalism are important aspects contained in the policy document since it is recognised that modal, spatial, institutional and planning integration is critical to transportation policy.

Although the White Paper on National Transport Policy is a national policy document, it makes reference to various roles, functions, and activities of government and the concurrent responsibilities of the national, provincial and local levels of government. It acknowledges the importance of inter-governmental relationships and recognizes the commitment of Government to the principle of subsidiarity. The paper specifically notes that there should be closer co-operation between transport and land-use planning.

Another important point made by the paper is that public policy is dynamic in nature and should be reconsidered and if necessary revised on a continuing basis.

4.2.2 National Land Transport Act, 2009

The National Land Transport Act 5 of 2009 and Regulations was enacted during 2009 to further the process of transformation and restructuring of the national land transport system, as previously initiated by the National Land Transport Transition Act 2000 (Act No. 22 of 2000). The primary objective of the Act is to address the fragmentation of transport functions and to improve public transport in South Africa.

The Act identifies general principles for transport planning and its relationship with land use and development planning. The Act stipulates the following:

- Land transport planning must be integrated with land development and land use planning processes.
- The preparation of three plans (i.e. A National Land Transport Strategic Framework, Provincial Land Transport Framework, Integrated Transport Plans)
- The Integrated Transport Plans must give structure to the function of municipal planning
- Integrated Transport Plans must be accommodated in and form an essential part of Integrated Development Plans

(NDoT, 2009:44)

The Act is of importance in this study since it focuses on the integration of transport planning and land development; promotes an efficient, cost-effective public transportation system that serves the needs of its users; strives to ensure the integration between public transport modes is pursued and strives to ensure the involvement of all stakeholders in transport planning initiatives.

4.2.3 National Land Transport Strategic Framework

The National Land Transport Strategic Framework (NLTSF) is a legal requirement in terms of the National Land Transport Act (No. 5 of 2009). It embodies the overarching, national five-year (2006 to 2011) land transport strategy, which gives guidance on transport planning and land transport delivery by national government, provinces and municipalities for this five-year period (NDoT, 2006:1).

The White Paper on National Transport Policy, 1996 is still valid, however more detail is provided in the National Land Transport Strategic Framework (NLTSF). The policy promotes the integration of land transport functions, land use and economic planning. It maintains that transport planning must guide land use and development planning, and vice versa. (NDoT, 2006:6)

The NLTSF identifies general strategies on land transport, which include inter alia:

- *Urban-land use restructuring*, which promotes the initiation of effective, co-ordinated land use and transport interventions. An urban-land use restructuring programme, as part of the Urban Renewal Strategy must be promoted by the transport sector in government. This will strengthen the capacity to develop and implement co-ordinated IDPs and transport plans.
- *Integration of transport planning* across all three spheres of government. A National Transport Masterplan (2005-2050), dealing with land, air and maritime transport, will be developed by the Department of Transport, in conjunction with provinces and municipalities.

4.2.4 Moving South Africa – The Action Agenda

- **Introduction**

  The Moving South Africa (MSA) project is an initiative of the National Department of Transport which aims to develop a strategy to meet the current transport challenges of South Africa. It is a 20-year strategic framework for the transport sector which will deliver sustainability against the needs of the nation.

  Transport is often considered a thrust for economic growth and a supporter of national integration (internally and with the external global economy). The NDoT, in the MSA

document, regards transport as an enabling industry which strives to meet transportation goals, as well as other important national and social objectives. Examples of such objectives include:

- economic growth
- increased trade
- improved access to employment opportunities
- increased social integration

(MSA, 1997:6)

Thus, transport is an essential input for other industries and social objectives set outside of the transport context.

➢ **Strategic challenges**

A number of key strategic challenges related to urban transportation, were identified in the MSA Action Agenda (MSA, 1997:7). These include:

- Lack of affordable basic access
- Ineffective public transport system
- Increasing car dependence
- Sub-optimal spatial planning

These strategic challenges are driven by a number of factors. However, it is of particular interest that spatial planning contributes as a cause to all of the key strategic challenges. Throughout the MSA document, the DoT acknowledges that integrated spatial planning is a key strategic challenge and an underlying driver of cost and performance of the transportation system (MSA, 1997:40). Sub-optimal spatial planning mostly occurs due to a lack of co-ordination or integration at the institutional level. The need for a co-ordinated framework in which to consider spatial decisions is identified, since each individual institution plans the location of its fixed assets in a relative vacuum, according individual departmental constraints or missions.

- **Strategic actions**

The *Moving South Africa* vision for urban transport is designed to enact the overall transport vision contained in the White Paper in the urban context.

The vision states:

"Provide an effective and sustainable urban transport system, planned and regulated through the lowest possible level of government, based on competition and largely private sector operation, which reduces system costs and improves customer service in order to meet customer and national objectives for user cost, travel times, choice, and safety"

(MSA, 1997:131)

Three strategic actions were identified to achieve the urban vision, namely:

- Densification of transport corridors to achieve economies of scope
- Optimising modal economics (through economies of scale) and service mix to meet customer needs.
- Improving firm-level performance and productivity

(MSA, 1997:135)

The *densification of transportation corridors* is of particular relevance in this study, as it relates to the urban form, land use and transportation decisions.

The Moving South Africa strategy acknowledges that the „compact city" is achievable in some areas; however the predominant pattern should be the corridor city, as indicated in Figure 4.2.

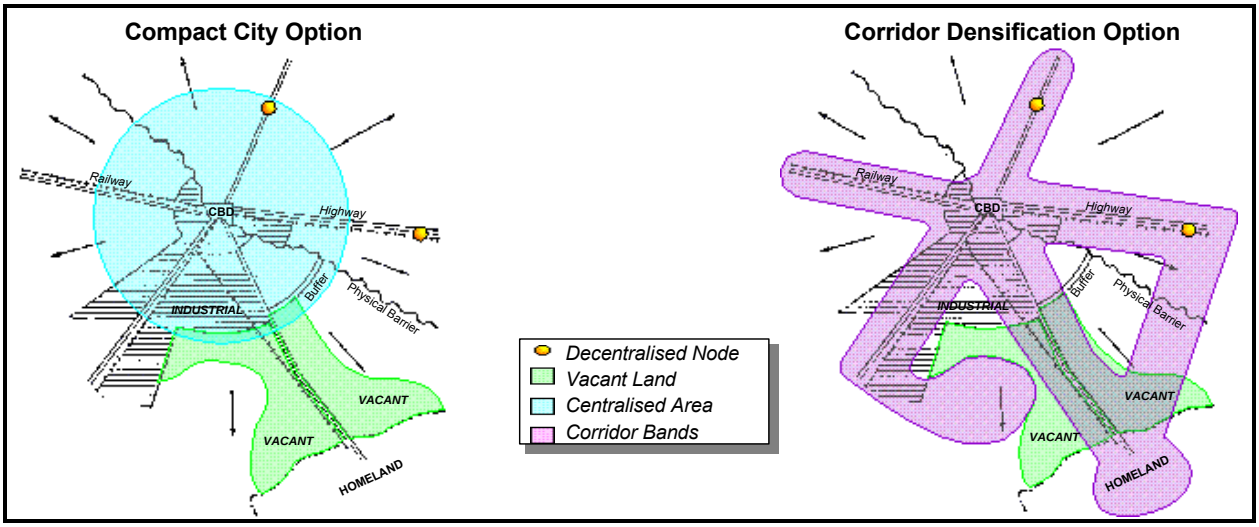


Figure 4.2: Compact city and corridor densification options

Source: MSA (1997: 137)

The South African land tenure pattern is characterized by a decline in CBD vitality, dispersion of development to satellite nodes, decentralized distant townships, low density inner-ring suburbs, large tracts of vacant land between most townships and suburban areas and existing flows along corridors. Therefore, the corridor approach fits more easily with the existing South African land tenure patterns than the compact city option.

The strategic action focuses on densification of existing corridors and the creation of new corridors for major new developments. The focus is the prevention of further dispersion of development and the restriction of centrifugal tendencies of location decisions.

4.2.5 National Transport Master Plan 2005 - 2050

The National Transport Master Plan 2005 – 2050 (NATMAP) is a dynamic plan that acknowledges the importance of transportation in the economy and socio-economic development. It is a comprehensive plan that covers all modes of transport and recognizes the necessity of integration and co-ordination with land use planning and development.

The main objective of NATMAP 2005 - 2050 is:

"To examine, determine, and crystallise the relationships between various land uses and the consequential transportation requirements and needs; as well as the interaction between various land uses and the transport system, so as to evolve an integrated transportation plan and investment strategy which is ultimately aimed at the development of the entire country"
(NDoT, 2008a:1-2)

- **Goals and objectives**

The NATMAP identified a number of transportation goals and objectives, which form the basis upon which the plan will be developed. Two of the ten goals relate to land use planning, namely:

- ***Land Use and Economic Development***

  A need to identify and review the advantages and disadvantages of various land use spatial arrangements or concepts was identified, since transportation requirements are intrinsically related to land use. Further, with regard to economic development, transport was identified as a prerequisite, although not a guarantee, of socio-economic development. Transportation is considered a major factor in the production and distribution of goods and services.

  (NDoT, 2008a:1-5)

- ***Development of a central land use / transportation databank***

  The need to establish a central databank with up-to-date and accurate land use and transportation data, which is basic and dynamic, was identified. This is integral to achieve meaningful integrated land use / transport planning.

  (NDoT, 2008a:3-1)

- ***Land use***

The NATMAP recognized the importance of co-ordinating land use plans with infrastructure and transport plans in an iterative process, since the effectiveness of a transportation system is directly dependent on the land use and travel patterns in the spatial area it serves.

The NATMAP includes a land use profile for each metropolitan and district municipal area, as well as an overview of the transportation network that is provided. This enables the articulation/identification of the most appropriate land use patterns that will promote comprehensive/integrated planning and development.

The policy identifies transportation corridors, the transportation infrastructure serving these corridors and the main land uses found within these corridors. Smaller intra-urban corridors are not taken into account, since they are not of national and/or provincial significance. These smaller, intra-urban municipal corridors are dealt with as part of municipal Integrated Transport Plans (ITPs) at a micro scale.

Although smaller intra-urban corridors are not taken into account in the NATMAP, the plan is still relevant, since intra-urban corridors are still part of the road network and are affected by the land use-transportation debate. Since the most appropriate transportation requirements in South Africa are intrinsically related to land use.

- **Provincial Master Plan**

A Provincial Master Plan 2005 – 2050 for each province will be developed simultaneously with the National Master Plan to ensure maximum interaction between the provincial departments of transport and the national department in future planning and implementation of land use/transportation projects.

The Gauteng Provincial Master Plan (GPMP) noted the transportation and development corridors within the province that contribute to the urban structure of Gauteng (i.e. cross-shaped). The north-south axis is served by the N1 freeway and the Vanderbijlpark to Johannesburg and Johannesburg to Pretoria railway lines. The east-west axis is served by roads such as Ontdekkers Road (west) and the N12 freeway (easy). The Randfontein to Johannesburg and Johannesburg to Springs railway lines also form part of the east-west axis (NDoT, 2008b:56)

The GPMP acknowledged the importance of land use and transportation integration. It concluded that such integration is best obtained by a corridor development pattern. In order to address the matter of integration within the Gauteng Province, the plan identified the need to ensure linkages between the nodes and corridors identified within the NATMAP inventory report.

The plan recommends the development of:

- A transportation network that promotes urban consolidation and densification.
- Spatial development policies that force development within transportation corridors that allows densification and within infill areas that allow urban consolidation.

(NDoT, 2008b:282)

4.2.6 Gauteng Transport Framework Revision Act, 2002

The Gauteng Transport Framework Revision Act, 2002 (Act No. 8 of 2002) repeals the Gauteng Transport Framework Act, 1998 (Act No. 8 of. 1998). It deals with the transport planning systems, processes, preparation of transportation plans and institutional arrangements in Gauteng.

The Act promotes the concept of integrated planning through its principles for transport planning and its relationship with land development. It states that land transport planning must be integrated with the land development process and the integrated transport plans must be aligned with and form an essential part of integrated development plans.

4.3 Spatial development and land

4.3.1 Development Facilitation Act, 1995 (DFA)

The DFA is the first post-1994 act dealing with development planning. The DFA:

- put in place a normative framework in which all development of land had to be done;
- provided for the formulation of Land Development Objectives (LDO); and
- established a set of unique mechanisms to facilitate and speed up reconstruction and development projects.

(SA, 1995)

The DFA is relevant in this study in that it lays down general principles governing land development throughout the country. The Act promotes the co-ordination of land development in consultation with other authorities and advocates integration on all levels, be it physical, institutional, social or economic.

4.3.2 Land Use Management Bill, 2001

The Land Use Management Bill will repeal the Development Facilitation Act and replace the existing and proposed provincial legislation. It provides for the establishment of a single land use management system within the country that is intended to be facilitative and developmentally, rather than control, oriented (SA, 2001).

Section 18 of the Bill provides for the alignment of district and local municipalities‟ spatial development frameworks and land use schemes with the framework for integrated development planning. It also provides for municipal land use schemes to take instruments such as the National Spatial Development Perspective (NSDP), Provincial Growth and Development Strategies (PGDS), Provincial Spatial Development Frameworks (PSDF) into account.

4.3.3 Urban Development Framework, 1997

The Urban Development Framework contains Government‟s vision for sustainable urban settlements. A number of guidelines and programmes were identified to achieve this vision and include inter alia, the integration of the city, the promotion of urban economic development, clarifying roles and institutional transformation.

This policy framework promotes effective urban reconstruction and development. Its main aims are to establish environments that are:

- integrated;
- free of racial and gender discrimination;
- economically accessible; and
- environmentally sustainable

(SA, 1997)

Spatial integration, through sound urban planning, land, transport and environmental management is advocated in the document so as to facilitate the integration of the city at all levels.

4.3.4 White Paper on Spatial Planning and Land Use Management, 2001

The intention of the White Paper on Spatial Planning and Land Use Management is to consolidate the existing multitude of planning laws into one national system, in order to achieve the national objective of wise land use. This will result in a uniform, effective and efficient framework for spatial planning and land use management in both urban and rural contexts.

The White Paper builds on the concept of the municipal integrated development plan (IDP), as provided in the Municipal Systems Act, 23 of 2000.

The key elements of the new system proposed in the White Paper include:

- *Principles* – All decisions made by planning authorities must be consistent with principles and norms, which are aimed at achieving sustainability, equality, efficiency, fairness and good governance in spatial planning and land use management.
- *Land use regulators* – A category of authorities responsible for spatial planning and land use management was identified in the White Paper (i.e. land use regulators). These predominantly refer to municipalities, and provincial land use tribunals in certain cases.
- *IDP-based local spatial planning* – The White Paper specifies the elements that must be included in a municipality"s Spatial Development Framework (SDF). It also proposes that the SDF, which must form part of the municipality"s IDP, as required by the Municipal Systems Act, is used as an indicative plan. The Land Use Management Scheme must be utilized to deal with the administration of land development and land use changes.
- *A uniform set of procedures for land development approvals* – The White Paper proposes a single set of procedures that can be applied nationally so as to encourage performance management of the system.
- *National Spatial planning frameworks* –The White Paper proposes a national spatial planning framework, which will be a policy framework for sustainable and equitable spatial planning around national priorities.

The new system is based on the concept of cooperative governance, as established in the Constitution. It will form “a solid foundation on which to establish integrated intergovernmental and interdepartmental development planning, programmes and projects” (SA, 2001:27).

4.3.5 Draft Green Paper on Development and Planning, 1999

The Draft Green Paper focuses on the spatial planning system, the roles of different planning agencies and the relationships between them. It acknowledges that developmental spatial planning decisions cannot be made without reference to social, cultural, economic, political, environmental and technological issues which affect, and are affected, by those decisions.

The Draft Green Paper recognizes the need for the simplification of legal and procedural complexity. It promotes the concept of co-operative governance and integration between and within spheres of government. Furthermore, it stresses the need for inter-sectoral integration.

This document is of relevance in this study in that it supports the notion of integration, which is important in this study, since the inputs of a number of sectors are required along arterial routes (SA, 1999).

4.4 Other applicable legislation, strategies and policies

4.4.1 The Municipal Systems Act, 2000

The Municipal Systems Act, 32 of 2000 is part of a series of legislation which intends to empower local government to fulfil its Constitutional functions. The Act defines the legal nature of municipalities as part of a system of co-operative government and clarifies the rights and duties of municipalities (SA, 2000).

The Municipal Systems Act is the basis for spatial plans. The Act prescribes the preparation of Integrated Development Plans (IDPs) by each municipality and describes the core components of these IDPs. The spatial development framework of a municipality is an integral component of a city"s IDP. The IDPs for municipalities combines a strategic plan and components of a meta-plan, which connects with a series of sector plans (e.g. transportation plans) and planning processes. The hierarchy of spatial plans, as implemented by the City of Johannesburg Metropolitan Municipality (CoJMM) is illustrated in Figure 4.3.

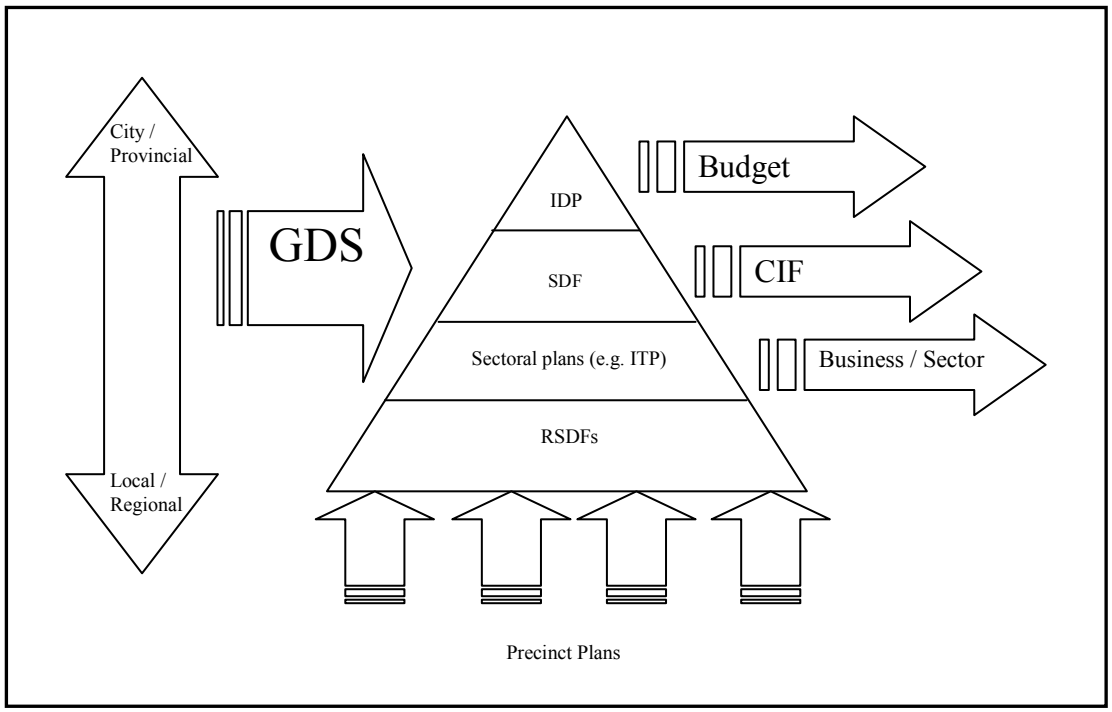


Figure 4.3 Hierarchy of Spatial Plans

Source: CoJMM (2007a:3)

The three development principles of the Spatial Development Framework (Sustainability, accessibility and efficiency and the underpinning development paradigms of the Growth and Development Strategy (GDS) are dependent on the implementation of four inter-related components:

- Plans at a local level (i.e. RSDFs and the related precinct plans)
- A Capital Investment Framework linking the capital budget planning process and a prioritisation model to support the spatial development strategies
- Relevant citywide spatial development strategies contributing to a long-term desired spatial form
- Regulatory frameworks and instruments to support the other three components (i.e. a Land Management System reflecting a single Town Planning Scheme and a range of spatial and non-spatial incentives / disincentives administered by a Planning Committee and Appeal Tribunals).

(CoJMM, 2007a:33)

4.4.2 CoJMM Growth and Development Strategy

The most significant influencing factor on the SDF is the City"s established Growth and Development Strategy (GDS) adopted in 2006. The GDS has identified six core principles to guide the City"s medium/long term strategic development direction, namely:

- The pro-active absorption of the poor;
- Balanced and shared growth;
- Facilitated social mobility;
- Settlement restructuring;
- Sustainability and environmental justice; and
- Innovative governance solutions

The City has identified twelve sector areas that are analysed so as to inform the future vision and in turn the long-term goals and strategic interventions in an integrated manner. The six development paradigm principles, noted above, inform the rest of the strategy. The approach to the GDS is illustrated in Figure 4.4.

This GDS has been harmonised and aligned with the principles and strategic imperatives of national and provincial strategies, including the National Spatial Development Perspective, the Accelerated and Shared Growth Initiative of South Africa (ASGISA), the Gauteng Growth and Development Strategy, the Gauteng Global City Region Strategic Perspective and other Gauteng strategic documents and strategies.

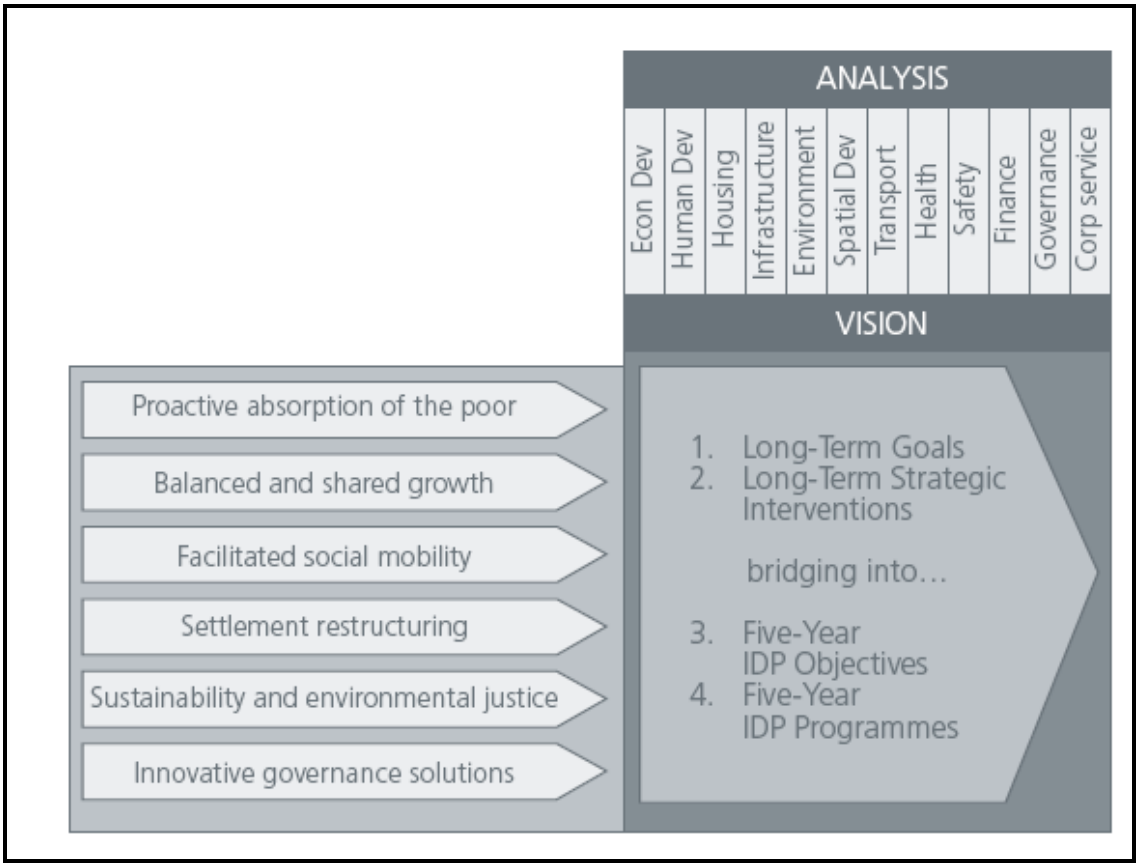


Figure 4.4 Approach to the GDS

Source: CoJMM (2006:14)

4.4.3 CoJMM Growth Management Strategy

The Growth Management Strategy (GMS) was developed to compliment the seven strategies of the Spatial Development Framework of the City of Johannesburg. The GMS specifies where growth can be accommodated within the city and under what conditions it can be promoted. It classifies areas according to the priority levels (i.e. high, medium and low) and expresses specific interventions. The strategy aims to ensure that economic and population growth is achieved while ensuring that spatial and socio-economic objectives are attained.

Figure 4.5 illustrates the three priority levels of the Growth Management Strategy (GMS) and the associated areas (e.g. consolidation areas, expansion areas).

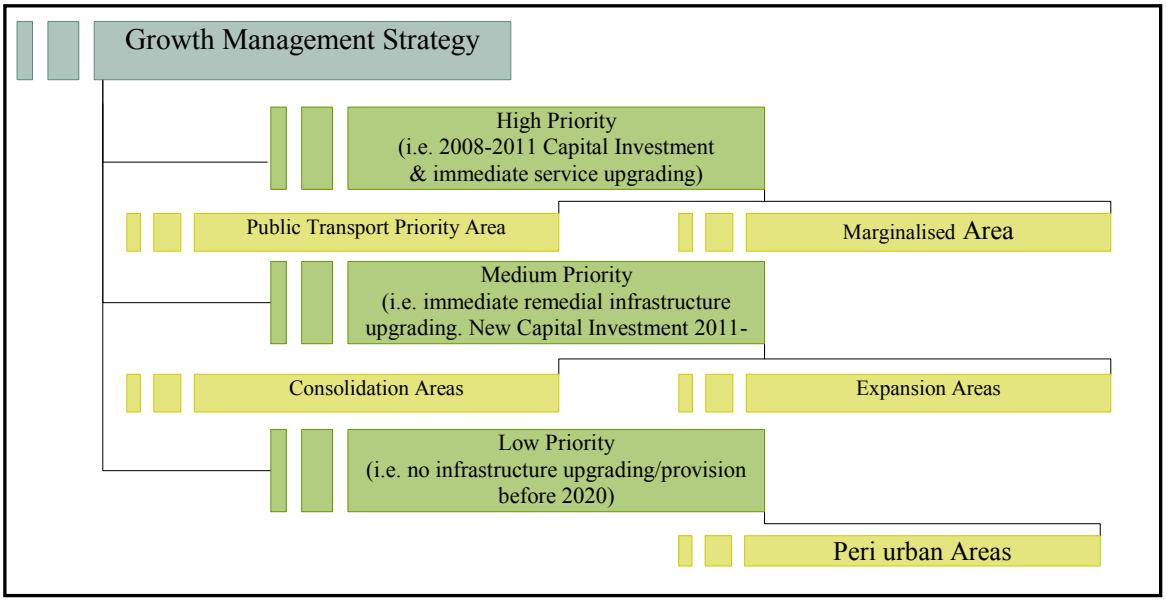


Figure 4.5: Growth Management Strategy

(CoJMM, 2009:27)

The majority of the areas that fall within the study area are considered consolidation areas. The primary objective of the consolidation areas is to prevent the compounding of the infrastructure constraints. Although these restraints mostly relate to energy and traffic, the significant impact of large-scale and incremental developments on water and sanitation, stormwater management and social amenities must also be considered.

A number of Passenger Rail Agency of South Africa (PRASA) Rail Stations were identified as Public Transport Priority Areas in terms of the Growth Management Strategy. The station precincts identified as Public Transport Priority Areas, which fall within the sphere of influence of the Ontdekkers Road arterial route, include the Princess, Roodepoort and Florida station precincts (see Figure 4.6). Although emphasis has been placed on these three stations, suitable intensification and development interventions around other stations (such as Westgate, Unified, Georgina and Horison stations) will also be favourably considered. These four stations also fall within the sphere of influence of the Ontdekkers Road Arterial Route, as indicated in Figure 4.6.

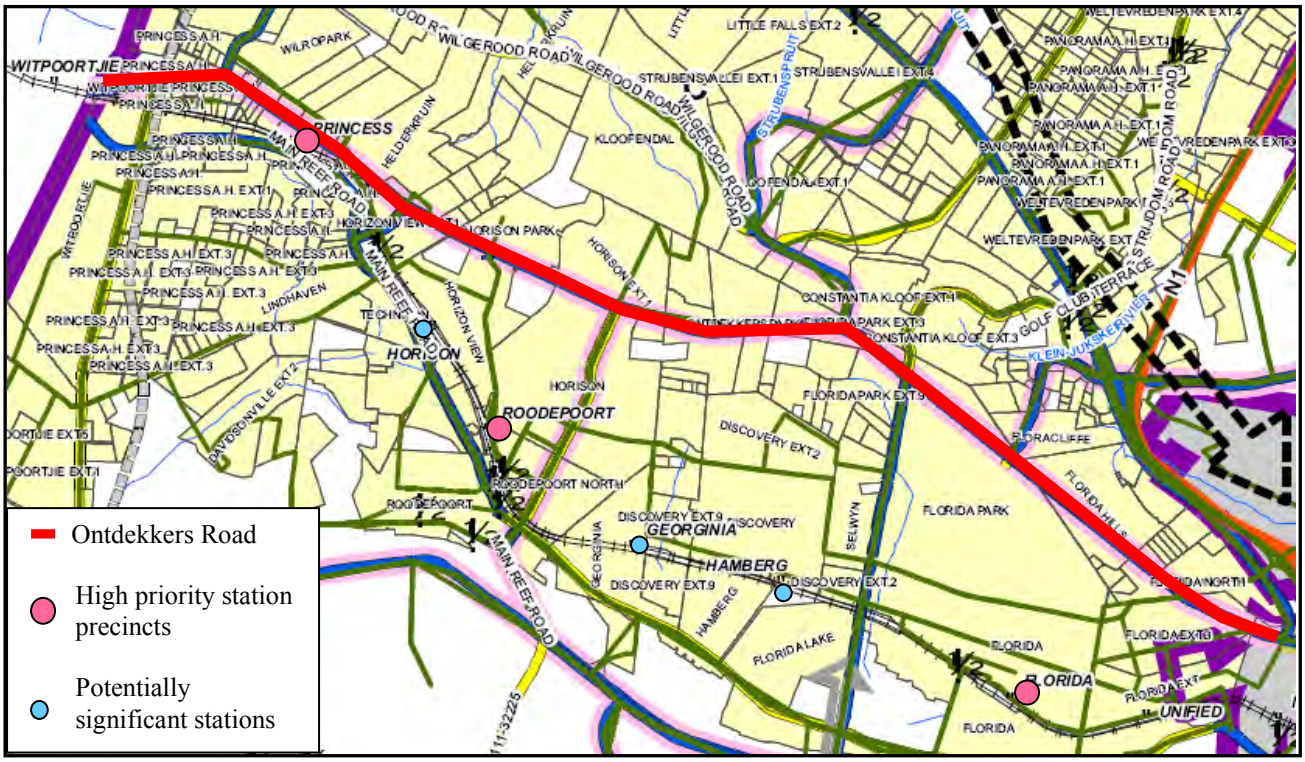


Figure 4.6 Public Transport Priority Areas

Source: Author"s own representation

Other areas that have been identified as areas meriting planning emphasis, which are of interest in this study, include the Roodepoort CBD, the Princess Area and the Florida Node. The formulation of Development Frameworks for these areas was particularly emphasized and the Development Frameworks for the Roodepoort CBD and Princess Areas were adopted by Council in 2008. The emphasis is on the promotion of public transport (i.e. Bus Rapid Transit), intensification of land uses and urban design elements relating to safety and security.

4.4.4 CoJMM Spatial Development Framework

The Spatial Development Framework of the City of Johannesburg Metropolitan Municipality is a key component of its Integrated Development Plan (IDP), as required in terms of the Municipal Systems Act.

In order to achieve the principles of the SDF (i.e. sustainability, accessibility and efficiency), seven spatial development strategies were identified in the SDF, namely:

- Supporting an efficient movement system
- Ensuring strong viable nodes
- Strategic densification
- Initiating and implementing corridor development
- Supporting sustainable environmental management
- Facilitating sustainable housing environments in appropriate locations
- Managing urban growth and delineating and urban development boundary

The strategies related to the promotion of an efficient movement system, strong viable nodes and corridor development are of particular significance in this study, since the Ontdekkers Road arterial route is influenced by these three elements. Ontdekkers Road consists of five nodes, which will be detailed in the next chapter and is classified as a major arterial route according to the road hierarchy. Further, the Ontdekkers Road arterial route is an integral component of the East-West Development Corridor, as it forms the northern border of this corridor.

Therefore, the following objectives are the most relevant:

1. Protecting the mobility function of major arterials
2. Ensuring that the movement system links with and supports high intensity nodes
3. Ensuring clustering of various activities at appropriate locations
4. Supporting viable public transport
5. Maximising opportunities and diversity at accessible points
6. Facilitating linkages

(CoJMM, 2009:29)

4.4.5 Regional Spatial Development Frameworks

As alluded to in the previous chapter, the Regional Spatial Development Framework (RSDF) is a component of the Spatial Development Framework of the City of Johannesburg, which in turn is a component of the Integrated Development Plan (IDP). It represents one of the prevailing spatial planning policies within the City of Johannesburg.

The greater Johannesburg area is divided into seven administrative Regions, each with its own applicable RSDF. The Ontdekkers Road arterial route predominantly falls within the ambit of administrative Region C of the City of Johannesburg Metropolitan Municipality (CoJMM). The predominant development objective applicable to the study area is the implementation of the Ontdekkers Road Development Policy.

The eastern extension of Ontdekkers Road (i.e. Main / Portland Road), which falls within administrative Region B of the RSDF of the CoJMM, is guided by the following development objectives:

- Improve existing economic and infrastructure (public and private) investments
- Implement the Ontdekkers Road Development Policy to ensure economic growth through access and traffic flow management in Delarey
- Retain and enhance the residential character and public environment

(CoJMM, 2010b:79)

4.4.6 Mogale City Spatial Development Framework

The extension of Ontdekkers Road to the west (i.e. Voortrekker Road) falls within the jurisdiction of the Mogale City Local Municipality (MCLM) and is guided by the Mogale City Spatial Development Framework.

The spatial development concept "provides strategic guidance for the spatial restructuring of the municipal area" (MCLM IDP, 2009:91). According to the *spatial development* concept, three main spatial elements (i.e. nodes, networks and surfaces) are interrelated and integrated to make up the desired spatial development form of the municipal area.

The MCLM Spatial Development Framework identifies Voortrekker / Ontdekkers Road as one of the activity spines within the municipal area that is connected to the network of activity nodes. The characteristics that the activity spines should display include:

- High intensity, mixed land uses that are oriented towards the street space.
- High density residential development, either directly adjacent to the street or within a distance of 500m from the activity spines.
- The activity spines can be developed as continuous linear development areas or in the "beads-on-a-string" form. The nature of public transport and the length of the route should

determine the development pattern. The longer the street and the less frequent stops are made by public transport, the more the development pattern should focus on the beads-on-a-string form. Shorter distances or where frequent stops are made by public transport are more conducive to continuous linear development.

- Activity spines should show a large degree of public investment in infrastructure and the public domain.
- Large parking lots adjacent to streets should not be permitted. Buildings should be placed as close to street boundaries as possible to facilitate pedestrian movement and to define and shape the public space. Land uses on the ground floor of buildings must have an extroverted public facade (e.g. shops, restaurants etc.)
- Site layouts and building designs of individual developments must take cognisance of and support public transport and pedestrian movement.
- Activity spines must achieve a balance between promoting access, creating pedestrian friendly environments, and accommodating mobility.

(MCLM, 2009:100)

4.5 Conclusion

Policy and legislative frameworks are the support systems that allow the administrative structure to function, directing land-use, spatial and transport planning and other sectoral functions. The policies, legislation and strategies discussed in this chapter have one common thread – the importance of land use and transportation planning integration and co-ordination.

When considered in terms of the hierarchy of plans, as applied in the City of Johannesburg Metropolitan Municipality, the Ontdekkers Road Development Policy is applicable on a local level. The basis and components of the Ontdekkers Road Development Policy will be discussed in subsequent chapters.

CHAPTER 5

A COMPARATIVE ANALYSIS: VOORTREKKER, ONTDEKKERS AND MAIN ROAD

5.1 Introduction

Ontdekkers Road is an important arterial route between Krugersdorp and Johannesburg, which is made evident by the traffic volumes and development along the route. A number of area-specific policies will be detailed and compared and the historical, current and potential development along the route will be investigated. Figure 5.1 illustrates the key components of this chapter.

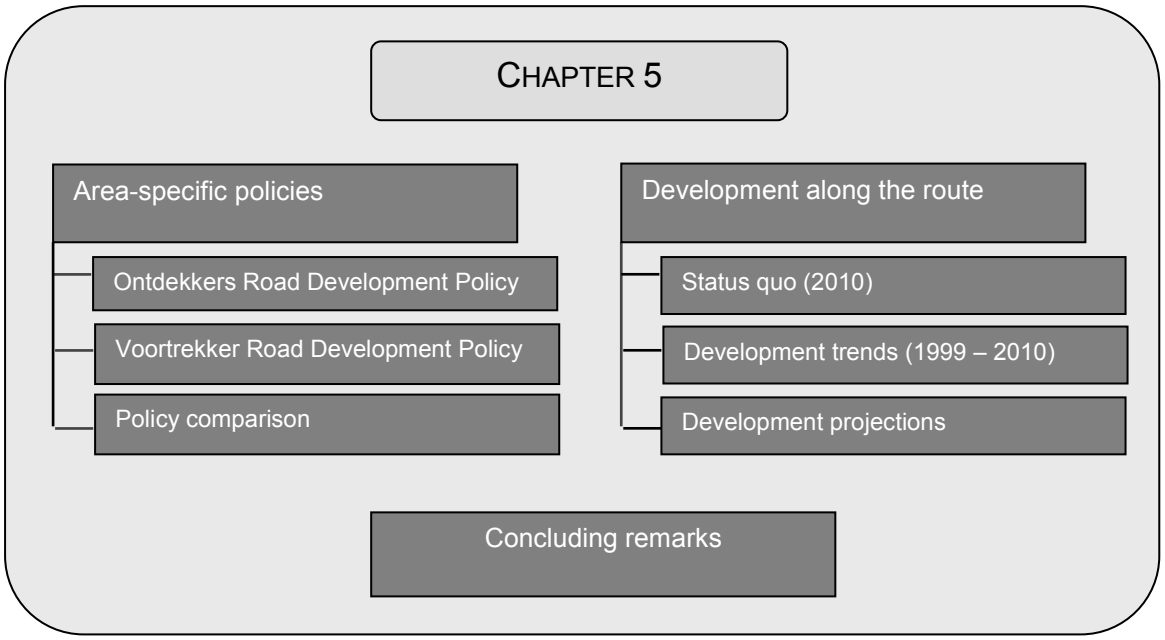


Figure 5.1 Structuring components of Chapter 5

5.2 Area-specific policies

Development along Ontdekkers Road and its extension to the west is predominantly affected by two area-specific policies, namely the Ontdekkers Road Development Policy and the Voortrekker Development Policy. The extension of Ontdekkers Road to the east (i.e. Main Road) does not have a specific policy applicable to it; however the sub-area development objectives, guidelines and interventions contained in the Regional Spatial Development Framework (RSDF) and the principles of the Spatial Development Framework (SDF) should be applied.

5.2.1 Ontdekkers Road Development Policy, 1997

The Ontdekkers Road Development Policy was formulated during 1997, when an urgent need to review the existing policy (i.e. the Home-office policy, 1994) was identified. The purpose of the policy was to facilitate the stabilization of the demand for development along the arterial route through „the combined application of town planning principles and market forces" (WMLC, 1997:64-12). The policy was formulated and nodal areas were identified by applying five basic principles:

- Access and flow of traffic
- Management of development
- Promotion of the residential component
- Implementation of principles to obtain a mixed land-use activity spine
- Integrated development.

Five nodes were identified along the total length of Ontdekkers Road (approximately 12,5 km), as depicted in Figure 5.2. Development of erven abutting the arterial route is regulated by the enforcement of the policy and the implementation of stringent development controls and access restrictions.

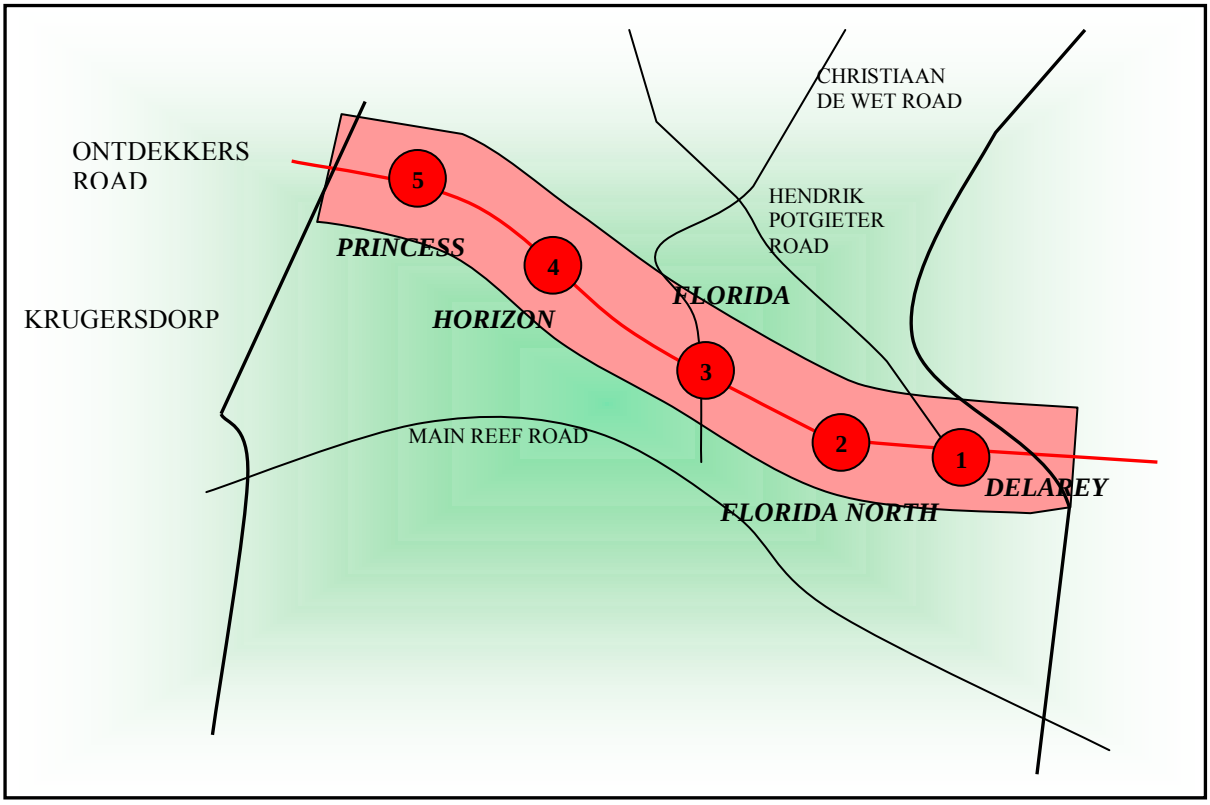


Figure 5.2 Ontdekkers Road Development Policy area

Source: WMLC (1997: 64.36)

The policy permits a range of land uses at higher intensities and densities within the nodes, as detailed in Table 5.1. The scale of the development (small-scale versus integrated) determines the coverage and Floor Area Ratio (FAR) that is permitted. The majority of properties between the identified nodes have been earmarked for small scale offices with a low coverage and Floor Area Ratio (a maximum of 20% and 0,2 respectively, which is approximately the size of the existing dwelling house structures). In general, the existing structures of the dwelling houses are retained and converted into offices.

Since the properties located along Ontdekkers Road are adjacent to other residential developments, the land uses that are permitted along the route must be of such a nature that it is reconcilable with the adjoining residential component. A number of requirements in terms of aesthetics (i.e. advertising, landscaping, etcetera) are specified in the policy to ensure that the visual impact is minimised. The policy strives to create a pleasant and attractive environment where businesses can be established and the development along the route can be to the benefit of the entire community.

The areas considered more desirable for development were identified as development nodes. Since each node is different in character, the extent of intensification/densification and the permitted land uses differ for each node, as indicated in Table 5.1 below.

Table 5.1: Development guidelines within the identified nodes

Nodes	1	2	3	4	5
Uses permitted	Any uses not stipulated under *uses not permitted*	Small & large scale offices			
	High density residential units	Consulting rooms			
	Motor Showrooms	Any development related to the office or medical function			
	- Contained in aesthetically acceptable designed buildings	Restaurant & Coffee shop (min. 2 erven)			
	- Not incl. Repairs, maintenance & workshops	Entertainment related to the office function only			
	- Minimum of 2 properties	Hairdresser			
	Retail	Art related uses			
	- No display windows on side of buildings	Cultural use			
		Educational activities			
		Government			
		Financial institutions			
		Stationery shop			
		High density residential units			
		Restricted storage related to the office use			
Uses not permitted	Industrial uses;				
	Commercial uses (distribution centres, wholesale trade, warehouses, cartage, transport services)				
	Storage				
	Warehousing				
	Motor show lots (open air display);				
	Service industries				
	Showrooms or display of goods				
	Repairs, maintenance & workshops				
	Noxious industries				
	Drive in restaurants				
		Entertainment not related to office function			
		Retail			
		Motor sales lots			
		Motor showrooms			

Source: Adapted from WMLC, 1997

5.2.2 Voortrekker Road Development Policy, 1998

The Voortrekker Road Development Policy was formulated in 1998 in order to promote orderly development along Carol/Voortrekker Road up to the Krugersdorp/Roodepoort boundary. It is evident from the summary of information of the questionnaires incorporated in the policy that the main aspects considered when compiling the policy document include:

- Market pressure with regards to economic opportunities along the route
- Limiting the impact of development on adjoining residential uses
- Possible solutions to traffic flow problems

The policy divides the area along Carol/Voortrekker Road into three main development areas with a total of seven land use zones, each with specific development control measures. The land uses permitted differs for each land use zone, as indicated in Table 5.2 below.

Table 5.2: VRDP Land use table

Land Use Zone	Land uses permitted
1	Office/Retail & related workshop (±10% of erf)
2	High density residential developments
	Single stands - Dwelling house offices
	Multiple stands – Office complexes
3	Same as Zone 1, only once erven in Zone 1 are 70% developed
4	Office Development or car sales area
5	Industrial activities as per Krugersdorp Town Planning Scheme, 1980
6	High density residential complexes & residential developments
7	Retail activities

Source: Adapted from MCLM, 1998

Since heavy traffic volumes and congestion experienced on Voortrekker Road demonstrated the important link the route forms between Krugersdorp and the Roodepoort and Johannesburg areas, a number of improvements and upgrading of the road system were proposed in the policy. However, not many of these proposals were realized, mostly due to financial constraints.

5.2.3 Policy comparison

The compilation of the *Ontdekkers Road Development Policy (ORDP)* in 1997 entailed a process that spanned approximately two years. The process started with the examination of the existing Roodepoort Home Office Policy, 1994 and the investigation of the pressure experienced for non-residential development along Ontdekkers Road. An investigation process, which included a public participation process, was initiated and included the following aspects:

- Land uses and patterns
- Land/property values
- Zoning information and illegal land uses
- Traffic patterns
- Access roads and accessibility (in terms of individual erven & metropolitan accessibility)
- Noise impact
- Urban design
- Consultation with traffic engineers, architects, noise engineer, urban developers, landscape architects, valuers and town planners
- Estimation of the needs & market forces (through public participation process)

(WMLC, 1997:64.13)

The information from the investigation and public participation were used in the formulation of preliminary proposals for the policy and presented to the public as a preliminary policy document for further comments. Once the comments were incorporated in the policy, the interested and affected parties could comment on the policy document. The final Ontdekkers Road Development Policy was approved and implemented on 27 May 1997.

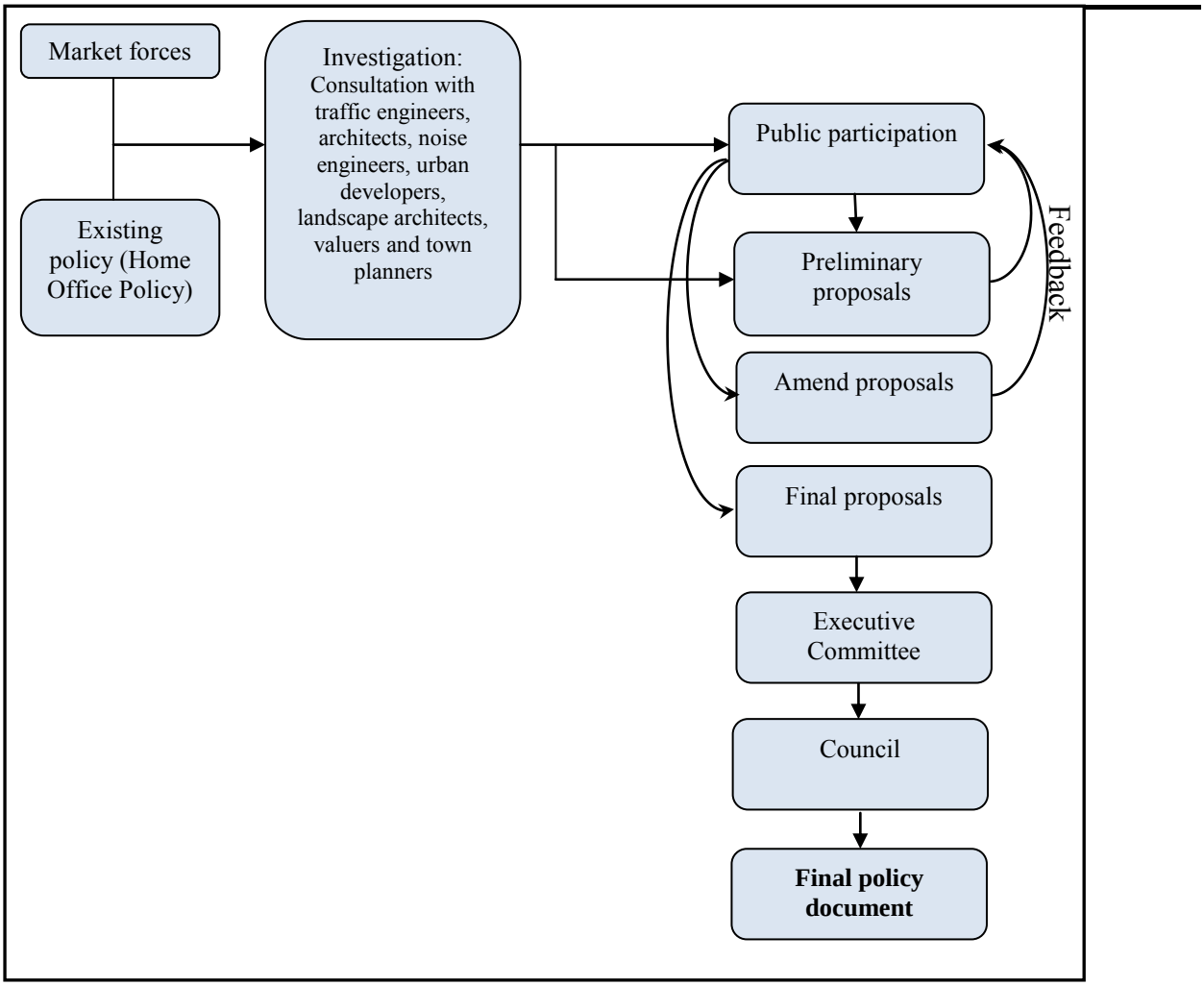


Figure 5.3 Formulation process of the Ontdekkers Road Development Policy (ORDP)

Source: Author"s own representation

The process to formulate the *Voortrekker Road Development Policy* was initiated during November 2007 when a Council Resolution required an investigation and report back on „the formulation of a policy for the development of business and office premises along Carol Road and Voortrekker Road" … „in order to promote orderly development" (MCLM, 1998:1).

Unlike the process followed for the compilation of the ORDP, the process for the compilation of the Voortrekker Road Development Policy was of a much shorter duration (approximately three months). Mr van Wyk (2010) stated that the formulation process was initiated due to a number of factors, including:

- The pressure experienced within the municipal boundaries of Mogale City as a result of the approved ORDP and the overflow of development pressure across the municipal boundaries;

- The need to update the existing policy applicable further west along Voortrekker Road in order to ensure business retention within the Mogale City municipal boundaries
- The migration of businesses and offices from the CBD

The process started with a general public meeting, where a task team was identified to ensure feedback and to raise any further concerns (MCLM, 1998:2). Questionnaires were distributed to the public to obtain input regarding development along the route. Civil and building engineers investigated proposals regarding the road network and made cost estimated accordingly. The town planning consultants conducted a land use survey and made proposals regarding future land uses in the study area. A draft development policy was compiled (which included information from the questionnaires, a report from the engineers and the proposals from the town planning consultants) and presented to the task team and public at a general meeting. Amendments were made to the policy document and the final Voortrekker Road Development Policy was approved during February 1998.

From the above comparison of the formulation of the policies, it is evident that a more detailed approach was used during the formulation of the Ontdekkers Road Development Policy (ORDP). The ORDP considered all aspects, including issues related to the mobility of the arterial route, market forces, the impact on the residential component, as well as aesthetics. The Voortrekker Road development policy was limited to issues related to the protection of the residential component, traffic flow solutions and the market forces present along the route.

The process followed for the formulation of the Ontdekkers Road Development Policy (ORDP) surpasses the formulation process of the Voortrekker Road Development Policy (VRDP), as it entailed continuous feedback loops, which considered aspects of all the relevant disciplines, as depicted in Figure 5.3. Although the formulation process of the VRDP did incorporate public participation in the process, it did not consider the multitude of approaches to development along such a route and did not ensure continuous feedback loops. The various approaches to development along the Ontdekkers Road arterial route will be detailed in the following chapter.

The comparison of the development controls applicable along the two roads (Voortrekker and Ontdekkers Roads) provides valuable insight with regards to the stringency of the policies. Table 5.3 details the development controls that are enforced within the policy areas. It is evident that the Ontdekkers Road Development policy focuses more on a nodal character of development in comparison with the Voortrekker Road Development Policy, which focuses on identified land use zones. Access considerations were vital in the identification of nodal points

along Ontdekkers Road; while the division of Voortrekker Road into land use zones was predominantly determined by existing land uses and market pressures.

Table 5.3: Comparison of the development controls applicable for each policy

Development Controls	Ontdekkers Road Development Policy		Voortrekker Road Policy						
			Land Use zone						
	Inside Nodes	**Outside Nodes**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Coverage (%)	Not specified	20 %	40%	25%	25%	Controlled i.t.o Krugersdorp TPS, 1980 & SDP submission			60
FAR	Small scale development - 0,2 Integrated development (2 – 4 erven) - 0,4 Block development (4 – 6 erven) - 0,6	0,2	0,6	0,4	0,4				0,8
Height (storeys)	Small scale & integrated (2 -4 erven) development: 2 storeys Block development (4 – 6 erven): 3 storeys	2 storeys	2	2	2				2
Parking requirements					Controlled i.t.o Krugersdorp TPS, 1980 & SDP submission				
Offices	4 bays/100 m² Integrated development – to the satisfaction of Council	4 bays per 100 m²	4 bays / 100 m²	6 bays / 100 m²					6 bays / 100 m² retail or office floor area
Medical Consulting Rooms & related uses	8 bays/100 m²	8 bays per 100 m²	6 bays / 100 m²						
Other uses	I.t.o Roodepoort TPS, 1987								

Source: Author's own representation

Nodes are clearly defined in the ORDP and development controls within the nodes are more intense than between the nodes. The ORDP takes the scale of the development into consideration (small scale versus integrated developments), whereas the land use zone determines the VRDP's stipulation of development controls.

The premise of the ORDP is that the Floor Area will affect the trip generation rates along Ontdekkers Road. Therefore, the Floor Area Ratio (FAR) plays the greatest role in the determination of the support of any development along the route. The policy proposes the improvement and upgrading of certain intersections, which would be funded by development

contributions based on the proposed floor area. A development levy/contribution is payable in terms of the policy so that the cost of road upgrades can be recovered.

According to Mr P. Conchar (2010), a major setback is that the development contributions that have been or are made have not been ringfenced and limited road upgrades have taken place, as stipulated in terms of the policy.

Additional conditions (such as access restrictions, aesthetics/landscaping and noise considerations) stipulated in the ORDP contribute to the relative success of the route. Furthermore, the development of park erven abutting Ontdekkers Road is not permitted according to the policy document. A report to the Council, and consequent resolution with regards to the possible review of the policy document in 2000 ensured that the development of these park erven would not be permitted (WMLC, 2000).

It is evident from the above comparisons, that there is no clear link between the two policies (i.e. Ontdekkers Road Development Policy and Voortrekker Road Development Policy). There is a lack of co-ordination between the two municipal areas (i.e. City of Johannesburg and Mogale City Local Municipality) and a number of cross-border issues are either present or could be experienced in the future.

5.3 Development along the route

Development along the Ontdekkers Road arterial route is characterised by land uses ranging from single dwelling houses to home offices and fully fledged office developments, as well as retail components within the nodes. Small-scale offices and businesses in designated areas define Ontdekkers Road.

The extension of Ontdekkers Road to the west (i.e. Voortrekker Road) is similarly developed; however the developments along this route do not necessarily retain the residential character, as is the case with developments along Ontdekkers Road. It is also evident from the development along Voortrekker Road, that nodal areas are not clearly demarcated along the route. Furthermore, it is evident that display showrooms, although related to the office components, are permitted along Voortrekker Road.

Figure 5.4 Development along Voortrekker Road

The change in the nature of development along the eastern extension of Ontdekkers Road (i.e. Main Road) is immediately noticeable; as the area is characterised by retail developments, motor sales lots and service industries, which are not set back from the street. Access to these erven is directly off Main Road, unlike the erven along Ontdekkers Road, where direct access from Ontdekkers Road is not permitted; rather access is obtained from the service lanes.

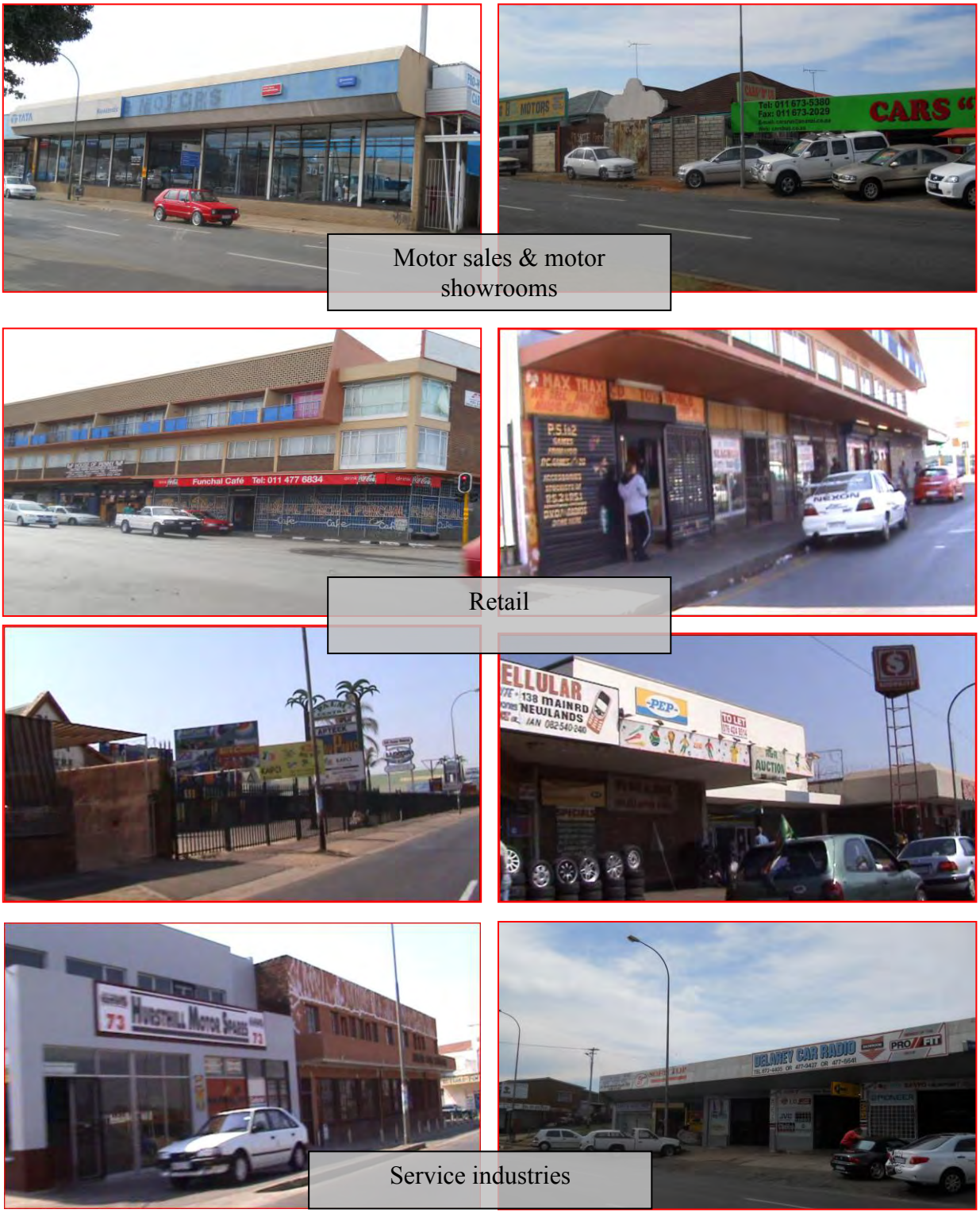
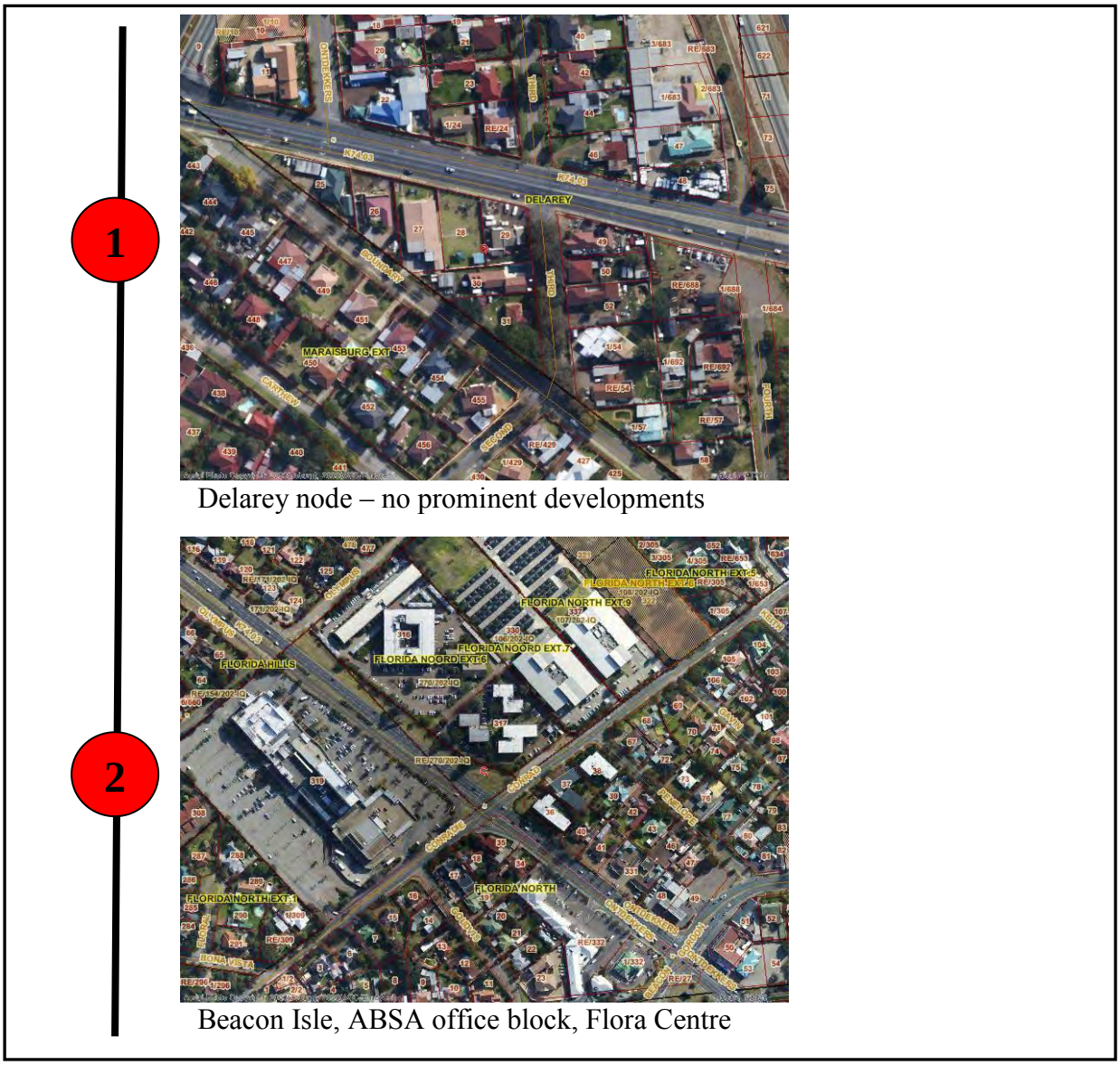


Figure 5.5 Development along Main Road

It is clear from the development along Ontdekkers Road that the policy aims to promote and develop a multi-functional activity spine-development that is characterised by mixed use development, whilst retaining the open character of the route, unlike the development along Main Road, which is encumbered by historical and unruly development.

5.3.1 Status quo along Ontdekkers Road (2010)

An intensive land use survey was conducted to reflect the actual situation regarding developments in the areas that fall within the ambit of the Ontdekkers Road Development Policy. Figure 5.6 reflects the primary developments within the nodes along Ontdekkers Road.



Delarey node – no prominent developments

Beacon Isle, ABSA office block, Flora Centre

Figure 5.6 Key developments within nodes 1 and 2

Source: Author"s own representation

3

Florida Junction, Constantia clinic & integrated office development

4

ABSA Training Centre & integrated office development

5

Princess Crossing shopping centre

Westgate Shopping centre

Figure 5.7 Key developments within nodes 3, 4 and 5

Source: Author"s own representation

The following findings were made with regards to the status quo within the nodes (see Table 5.4).

Table 5.4: Status quo within nodes

NODE	NUMBER OF ERVEN	NON-RESIDENTIAL USES	%	APPLICATIONS RECEIVED & APPROVED	%	TOTAL ILLEGAL LAND USES	POTENTIAL FAR (± m²)[2]	ACTUAL FAR (± m²)
1	28	11	39%	8	21%	3	5600	2200
2	147	39	27%	32	22%	0	35280	9360
3	84	42	50%	32	38%	4	25200	12600
4	49	31	63%	28	57%	3	10290	6510
5	99	80	73%	55	50%	7	25740	19500
	10						65000	32500
TOTAL	417	203		155		17	167110	82670

Source: Author"s own representation

- **NODE 1: DELAREY NODE**

This node is characterised by offices and motor related uses. The node is not clearly distinguishable from the rest of the urban fabric. The area comprises 28 erven with a potential of 5 600 m² (28 x 1 000m² x 0.2 FAR) office and related floor area. A total of eleven non-residential land uses were surveyed, which equates to 2 200 m² (11 x 1 000 x 0.2 FAR) office and related floor area currently developed. Three of the eleven non-residential uses are illegal. The node is developed at 39% of its capacity.

The erven within the Delarey Node abut directly on Ontdekkers Road, as there are no service lanes along this section of the road.

- **NODE 2: FLORIDA NORTH NODE**

This node is characterised by the following land uses and developments:

- Flora Centre
- ABSA office block and call-centre
- Offices and related uses
- Filling stations
- Existing retail uses

[2]Average erf sizes were used in the calculation of the existing and potential Floor Area Ratio (FAR)

This area comprises 144 erven with a potential of 35 280 m² (144x 1 200m² x 0.2 FAR) office and related floor area. A total of 39 non-residential land uses were surveyed, which equates to approximately 9 360 m² (39 x 1 200 m² x 0.2 FAR) office and related floor area that is currently developed. Land use rights are in place for all the non-residential land uses. The node is developed at 27% of its capacity.

The erven within this node abut directly on Ontdekkers Road, as there are no service lanes along this section of the road.

- **NODE 3: FLORIDA PARK NODE**

This node comprises the following prominent land uses and developments:

- Florida Junction Shopping Centre (Retail)
- The Office block on the north-eastern corner of the Ontdekkers Road and Christiaan de Wet intersection
- Medical Clinic on the south-western corner of the Ontdekkers Road and Christian de Wet intersection. (clinic and medical consulting rooms)
- The Dance Palace (place of Instruction)
- Ontdekkers Centre (existing retail)
- A Filling Station

This area comprises 84 erven with a potential of 25 200 m² (95 x 1 500m² x 0.2 FAR) office and related floor area. A total of 42 non-residential land uses were surveyed, which equates to 12 600 m² (42 x 1 500 m² x 0.2 FAR) office and related floor area that is developed. Four of the 42 non-residential land uses do not have the correct land use rights in place. The node is developed at 50% of its capacity.

Service lanes are present along the northern and southern sides of Ontdekkers Road; therefore accessibility and visibility of the erven abutting Ontdekkers Road is excellent.

- **NODE 4: HORISON VIEW NODE**

This node comprises mainly offices with three prominent integrated developments:

- ABSA Bank Training centre
- Offices of Telkom and its subsidiaries
- The integrated development on the north-western corner of the Ontdekkers Road and Crane Street intersection (Boston Business college, restaurant and offices)

This area comprises of 49 erven with a potential of 10 290m² (49 x 1050m² x 0.2 FAR) office and related floor area. A total of 31 non-residential land uses were surveyed, of which three do not have the required land use rights. This equates to 6510m² (31 x 1050m² x 0.2 FAR) office and related floor area that is developed. The node is developed at 60% of its capacity.

A service lane is present along the north of Ontdekkers Road. This node is deemed to be the most sought after area for integrated development due to locality and access considerations. The Village at Horizon Shopping Centre located to the south of the node is not included in the nodal boundary as it does not abut directly on Ontdekkers Road (CONCHAR, P & NIEMAN, J.L., 2010).

- **NODE 5: PRINCESS NODE**

This node comprises mainly retail and commercial activities, including:

- Westgate Mall
- Wilrogate Shopping centre
- Princess Crossing Shopping Centre

This area comprises 99 erven and ten agricultural holdings and farm portions with a potential of 25 740 m² (99 x 1 300m² x 0.2 FAR) office and related floor area plus 65 000 m² (10 x 13 000m² x 0.5 FAR) business/retail/office and commercial floor area. A total of 80 non-residential land uses were surveyed, seven of which do not have the land use rights in place. Since a floor area of approximately 52 000 m² is currently developed with non-residential uses, the node is developed at 73% of its capacity.

A service lane to the west of Corlett Drive is located along Ontdekkers Road. Provision is made for the widening of Ontdekkers Road and access points at various intervals can be accommodated.

The following findings were made with regards to the status quo between the nodes (see Table 5.5. below).

Table 5.5 Status quo between nodes

NODE	NUMBER OF ERVEN	NON-RESIDENTIAL USES	%	APPLICATIONS RECEIVED & APPROVED	%	TOTAL ILLEGAL LAND USES	POTENTIAL FAR (± m²)	ACTUAL FAR (± m²)
1 > 2	19	10	53%	6	32%	3	5320	2800
2 > 3	131	46	35%	20	15%	16	43230	15180
3 > 4	149	86	58%	55	37%	25	38740	22360
4 > 5	0	0	0%	0	0%	0	-	-
TOTAL	299	142		81		44	87290	40340

Source: Author"s own representation

- **BETWEEN NODES 1 AND 2**

This area comprises of 19 erven with a potential of 5 320 m² (19 x 1 400m² x 0.2 FAR) office and related floor area. A total of ten non-residential land uses were surveyed, of which three do not have the land use rights in place. These non-residential developments relates to 2 800 m² (10 x 1 400m² x 0.2 FAR) office and related floor area and translates to the area being developed at 53% of its capacity.

- **BETWEEN NODES 2 AND 3**

The land uses, developments and illegal activities in this area comprises of mainly offices.

This area comprises of 131 erven with a potential of 43 230 m² (131 x 1 650m² X 0.2 FAR) office and related floor area. A total of 46 non-residential land uses were surveyed, of which only 55 have the land use rights in place. The non-residential uses amounts to approximately 15 180 m² office and related floor area. This area is developed at 35% of its potential.

- **BETWEEN NODES 3 AND 4**

The land uses, developments and illegal activities in this area comprises of:

- Offices
- Medical suites
- Uses related to the medical and office function

This area comprises of 149 erven with a potential of 38 740m² (149 x 1 300m² X 0.2 FAR) office and related floor area. A total of 86 non-residential land uses were surveyed, of which 25 are illegal land uses. This relates to 22 360 m² (86 x 1 300m² X 0.2 FAR) office and related floor area. This area is developed at 37% of its capacity.

- **BETWEEN NODES 1 AND 2**

There are no erven between nodes 1 and 2.

5.3.2 Development trends along Ontdekkers Road (between 1999 and 2010)

The Ontdekkers Road Development Policy (ORDP) was formulated as a result of the pressure experienced by the council from the developers and public, made evident by the number of illegal land uses along the route and the related drastic increase in property values due to speculation of the potential of properties.

The economic development along the Ontdekkers Road arterial route has unmistakeably increased over the years. A desktop study (aerial photographs) and detailed land use surveys revealed that the number of non-residential uses has increased over the years.

A report submitted to Council in 2000 for the possible amendment of the Ontdekkers Road Development Policy (WMLC, 2000) used the data collected from a detailed land use survey conducted in 1999 to determine the status quo within and between the nodes. The report concluded that a revision of the policy was not necessary due to the fact that the nodes had not reached their capacity and the pressure experienced for the amendment of the policy was due to specific developments.

A comparison of the study conducted in 1999/2000 and present day (2010) reveals the following development trends along Ontdekkers Road (see Figure 5.8 and Figure 5.9):

- The number of non-residential uses along Ontdekkers Road has steadily increased
- The number of illegal land uses along the route has decreased
- The capacity utilisation of the nodes has generally increased, except for a slight decrease in Node 2 (Florida North Node)
- There has been a considerable increase in non-residential uses between the nodes (ranging from 10% to 35%).

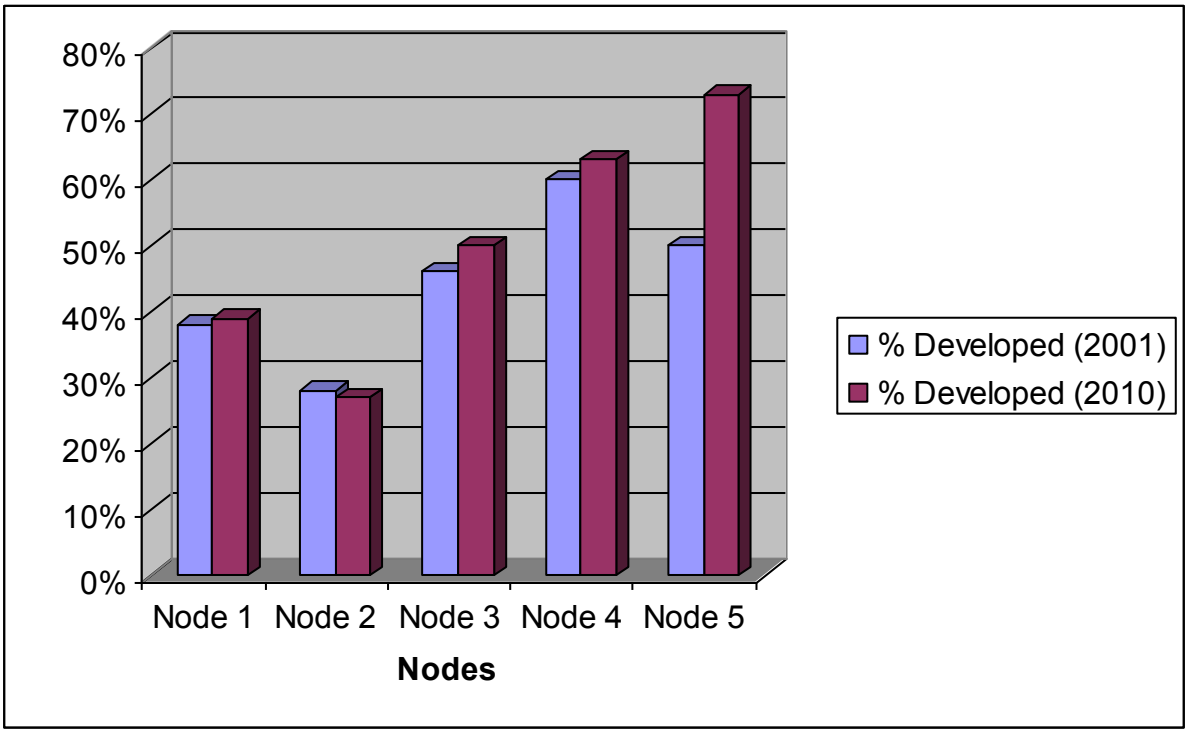


Figure 5.8 Development Trends within the nodes

Source: Author"s own representation

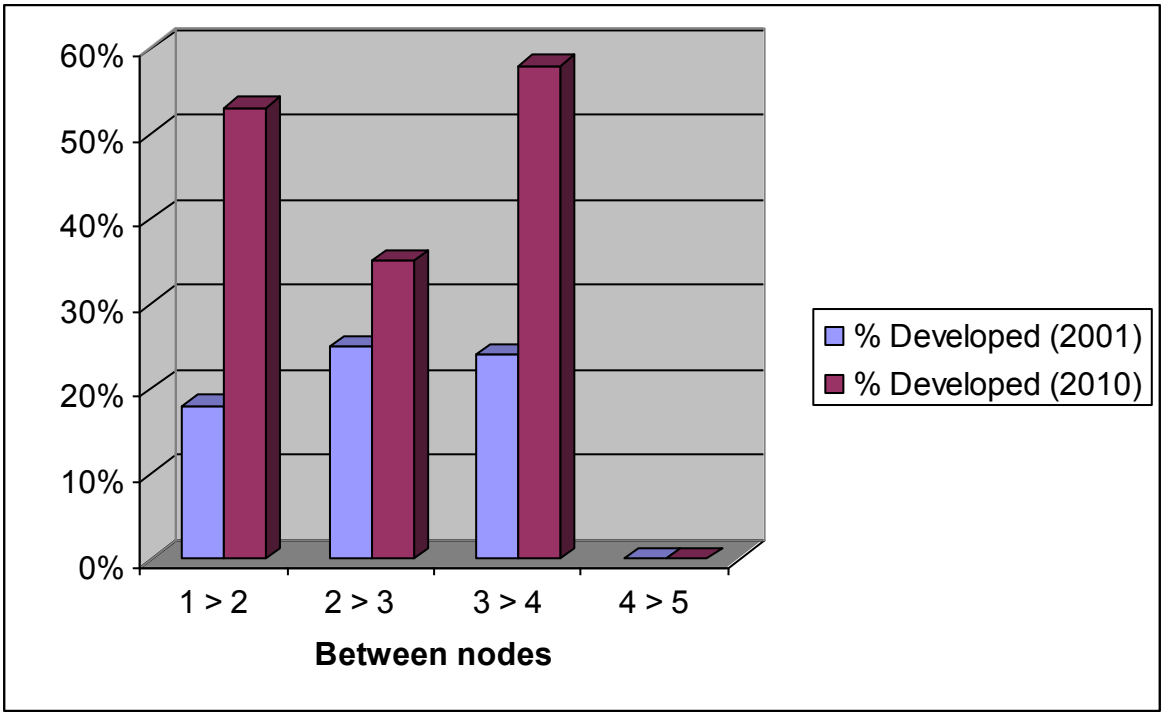


Figure 5.9 Development Trends between nodes

Source: Author"s own representation

5.3.3 Development projections

Based on the available data obtained from a detailed land use survey conducted in 1999, a report submitted to Council during 2000 for the possible amendment of the ORDP and a detailed land use survey conducted in 2010, it can be deduced that the number of non-residential uses along Ontdekkers Road will increase in the future. Over the past ten years, the number of non-residential uses along Ontdekkers Road has dramatically increased. There has been an average increase of non-residential uses of 6% within the nodes and an average increase of 25% between the nodes (1999 – 2010).

The ultimate objective is to ensure optimal development of the identified nodes within their demarcated boundaries. Incentives of the CoJMM (based on the ORDP) that encourage developers to establish within the nodes along Ontdekkers Road include:

- An increased development potential within nodes, based on the permitted development controls (i.e. coverage, FAR, height)
- A reduced development contribution payable for developments within nodes

(Conchar, P, 2010)

Mr Conchar (2010) is of the view that should effective public transportation be instituted along the route, the scale and variety of developments along the route can be intensified. However, the intensification of non-residential land uses along Ontdekkers Road is dependent on *whether* an efficient public transport system can be instituted along the route. Since the most important function of Ontdekkers Road is to act as an important feeder route between the west and east, the implementation of an effective public transportation route could reduce the traffic volumes along the route, thereby altering the function as a motor-car dominated mobility spine to that of a key public transportation route. The focus can then shift from the mobility function of the route to the actual land uses permitted along the route.

Based on the number of land use applications submitted to the City of Johannesburg (CoJMM) for developments that fall within the ambit of the ORDP over the past few years (TAS & GIS, 2010), it is evident that there is pressure to amend the policy. The review of the 2009/2010 RSDF revealed that applicants are pressuring the council to amend the ORDP by permitting an increased coverage and Floor Area Ratio (FAR) from 20% to 30% and 0.2 to 0.3 respectively (CoJMM, 2010). However, amendments to the ORDP have not been made, as is evident in the final RSDF of 2010/2011. A number of council officials at the CoJMM (CONCHAR, P, & NIEMAN, J.L, 2010) agreed that the increased FAR and coverage must be motivated; a traffic

impact study will have to be conducted and intersections will have to be upgraded before the amendment of the policy can be considered.

5.4 Conclusion

There is immense pressure along arterial routes for development, especially the development of non-residential land uses. Pressure for development along these arterial routes can be controlled by enforcing the development policies. The formulation-process of development policies along arterial routes such as Voortrekker/Ontdekkers Road is a complex process that should involves all relevant disciplines and appropriate public participation at all levels. It is evident from the policy comparison that development policies enforced within municipal areas affect the neighbouring municipal areas. There is a misalignment of development policies and visions and development policies differ with regards to prescribing general conditions versus specific requirements and conditions and the rigidity of these policies. The investigation of the development trends revealed that it is necessary to review development policies regularly to keep up with development trends and conditions.

CHAPTER 6

POLICY FORMULATION AND IMPLEMENTATION CONSIDERATIONS: ONTDEKKERS ROAD DEVELOPMENT POLICY

6.1 Introduction

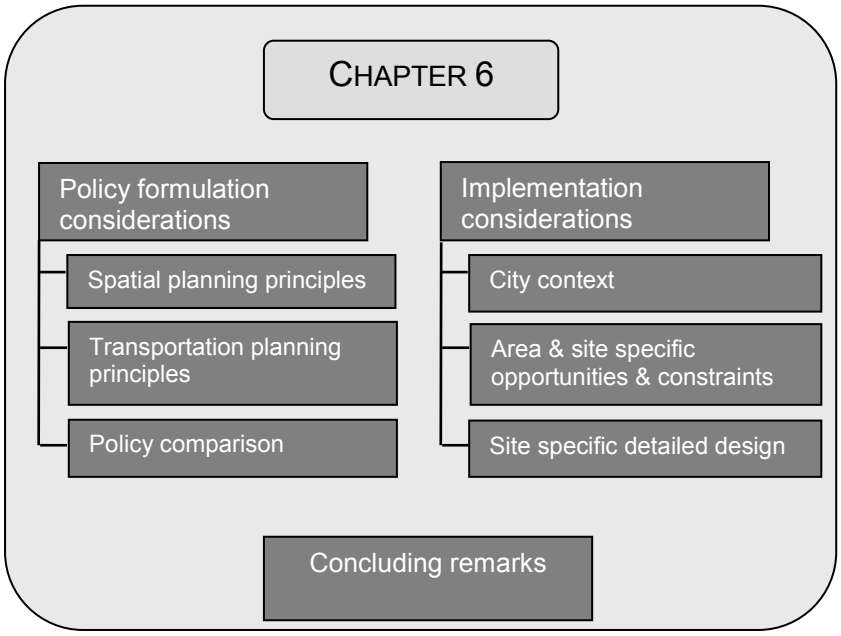


Figure 6.1 Structuring components of Chapter 6

A multitude of factors are considered and varied approaches are evident in the process of development-policy formulation. The approaches differ according to disciplines and various controlling authorities. The various planning perspectives and considerations during the investigation process for the formulation of the Ontdekkers Road Development Policy (ORDP) and the implementation of the policy will be detailed in this chapter.

6.2 Policy formulation considerations

As mentioned in Chapter 5, a key component of the policy-formulation process was public participation. Comprehensive public participation ensured that inputs from all affected role players, sectors (e.g. transportation planning) and disciplines were considered. The ORDP

incorporated a multitude of factors (i.e. physical, social, economic and environmental matters). Figure 6.2 illustrates the stakeholders involved during the public participation process.

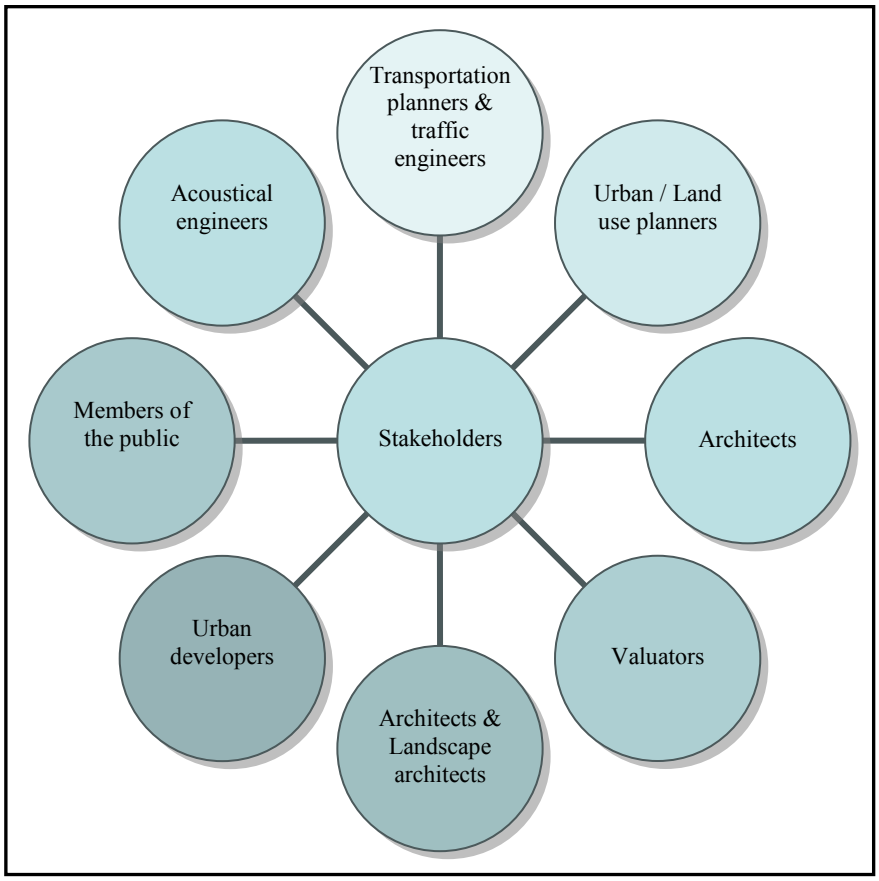


Figure 6.2 Stakeholders involved in the public participation process

Source: Author"s own construction

6.2.1 Spatial planning principles

The content and success of existing policies, such as the Residential Density Policy were major considerations during the formulation of the Ontdekkers Road Development Policy (ORDP). The Residential Density Policy specified the role of the activity spine „as a catalyst and to facilitate and sustain higher density residential development" (WMLC, 1997:64.4). The Residential Density Policy also promoted increased densities within nodes and demarcated non-residential areas. This premise relates to the concept of integrated development, as increased densities along major routes, such as Ontdekkers Road, promotes integrated development by ensuring the provision of residential opportunities in proximity to the employment opportunities located along the route or accessible as a result of the public transportation systems often associated with such routes.

Other key considerations during the formulation of the Ontdekkers Road Development Policy (ORDP) were the general principles of the Development Facilitation Act (DFA), 1995 (Act 67 of 1995). The principle of integrated development, in particular, is highlighted in the policy, in that one of the objectives of the ORDP is to develop a multi-functional dynamic environment (WMLC, 1997:64.94). The underlying principles of the ORDP include the promotion of efficient, integrated and sustainable development, all of which are key principles of the DFA.

In order to achieve integrated development within the city, the ORDP identified objectives, namely:

- Integration of urban land use mix to ensure social, economic and ecological sustainability
- Creation of economic opportunities at varying scales (i.e. individual entrepreneurs, small scale developers and large scale developers)
- Creation of a vibrant and dynamic business environment through the interaction of various disciplines
- Provision of guidelines ensuring aesthetically acceptable development along Ontdekkers Road

(CoJMM, 1997:64.91)

The Land Development Objectives (LDO) identified urban design and building control as major thrusts in the land-use management sector. The ORDP took cognizance of these thrusts by specifying a number of conditions applicable to developments along Ontdekkers Road. The general requirements are listed below:

- Enforcing specific development control measures (see Chapter 5)
- Architectural design guidelines:
    - Limiting the visual impact
    - Retaining the existing streetscape and “open street” character and limit the corridor effect by retaining a 3 metre street building line
    - Noise attenuation mitigation measures to protect the new development from traffic noise on Ontdekkers Road
    - No dramatic colours will be permitted on the exterior of buildings
    - Advertising will be restricted to a specified size (2 m²)
    - Adequate landscaping (10% of the erf)
    - No shade netting will be permitted on street frontages

(WMLC, 1997:64.33)

Other factors considered, and identified as major thrusts of the Economic Strategy, include:

- The attraction of investment
- The development of main road corridors
- The development of dispersed mixed-uses activity nodes.

6.2.2 Transportation planning principles

The approach of the transportation planners to development along Ontdekkers Road was biased in favour of the protection of the mobility function and safety of traffic operations along the route.

Since Ontdekkers Road is considered a major metropolitan arterial linking the West Rand to Central Johannesburg and subjected to large volumes of traffic, a number of conditions were imposed to protect the mobility of the route, including:

- Restricting the permitted Floor Area Ratio (FAR) to 0.2 ensures the limitation of the traffic generation in the service roads.
- Restricting the land use type with regards to excessive trip generation
- Discouraging any land use that could contribute to the distraction of motorists" attention or increase pedestrian activity across Ontdekkers Road
- Not permitting direct access from Ontdekkers Road
- Enforcing the provision of parking at the prescribed ratio on erven, so that service roads and pavements are not used to accommodate parking

Accessibility, the flow of traffic and traffic safety were key issues considered in the identification of the nodes along Ontdekkers Road. Access points that did not have the potential of handling large traffic volumes and were considered potentially dangerous were not identified as development nodes (WMLC, 1997:64-18). The identification of development nodes and the promotion of development within these nodes limits the traffic impact to certain intersections. This lessens the impact on the free flow of traffic on the route and contributes to the protection of the mobility function of Ontdekkers Road.

In order to ensure efficient and safe entry of vehicles onto Ontdekkers Road, a number of recommendations were made with regards to the geometric and access conditions along Ontdekkers Road, including:

- Relocation of identified service road intersections further from the main lanes of Ontdekkers Road

- Closure of service roads at identified cross streets
- Signalisation or closure of identified cross Streets at Ontdekkers Road
- Creation of new road links, access provisions and intersection upgrades
- Addition of lanes along Ontdekkers Rod

Development contributions, that are calculated according to the Floor Area and the location of developments (inside versus outside the nodes) are meant to be utilised to implement the proposed road changes, improvements and intersection upgrades in order to deal with the increased traffic generation as a result of the permitted non-residential uses.

Mr Conchar (2010) conceded that although road and intersection upgrade contributions have been charged for developments along Ontdekkers Road and the funds have been allocated to the responsible agents (i.e. Johannesburg Roads Agency), the funds have not been ringfenced and not all the proposed road upgrades have taken place.

6.3 Implementation considerations

In terms of the Spatial Development Framework (SDF) of the City of Johannesburg, the key principles of sustainability, efficiency and accessibility are significant factors in the consideration of any developments within the city. A broad assessment framework for all prospective developments aims to ensure the promotion of, and observance to these principles by providing a framework for the assessment of potential developments at various scales (i.e. citywide, neighbourhood, street and site - see Figure 6.3). This ensures the consideration of the impact that any development has on the city"s strategies and desired urban structure.

The implementation of the assessment framework for developments that fall within the ambit of the Ontdekkers Road Development Policy (ORDP) is invaluable in ensuring that such developments consider all factors that impact the City as a whole. The vital components of the metropolitan structure will be examined in the next chapter.

	Step 1	Step 2	Step 3	Step 4
				
	CITY CONTEXT ASSESSMENT	**SITE SPECIFIC ASSESSMENT**	**OPPORTUNITIES AND CONSTRAINTS**	**DETAILED DESIGN**
OBJECTIVE	Assessing implications and demonstrating impact of development on City's defined strategies and desired urban structure / form	Assessing implications and demonstrating impact on surrounding area	Recognising opportunities/mitigating against constraints	Optimising the development via the application of sound urban design guidelines
EXAMPLES OF ASPECTS TO CONSIDER	• Movement • Nodal development • Densities • Open space system • Sustainable neighbourhoods • Corridor development • Alignment with Urban Development Boundary	• Availability of infrastructure (social/physical) • Compatibility/Character of surrounding areas • Adequacy of access • Site topography • Natural features • Heritage Features	• Linkages with the public transport system • Opportunities for increased density • Provision of open space • Scale/mix of developments	• Arrangement of buildings/sites • Promote frontage development • Indicate pedestrian links/public space provision • Focus intensive development on major routes and spaces • Storm water treatment
RESOURCES AVAILABLE	• IDP / SDF	• SDF / RSDF • Input from respective MOEs	• RSDF Sub-Area Intervention Tables • Precinct Plans	• Urban Design Guidelines • Site Development Plan • Architectural drawings • Service agreements

Figure 6.3 Assessment Framework

Source: CoJMM (2009:53)

6.3.1 City-wide context

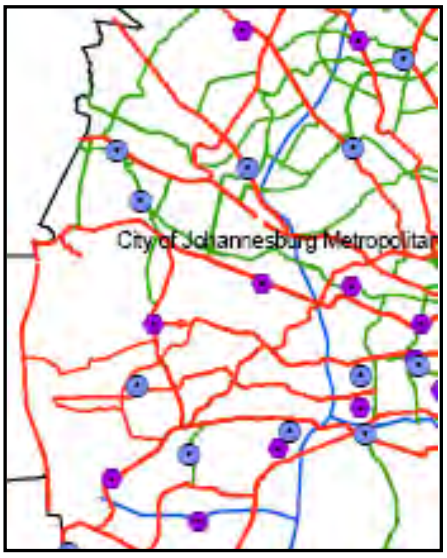


Figure 6.4 City-wide context

The assessment of potential developments at the City-level involves the consideration of the impact the development would have on the City"s strategies and desired urban form.

A key factor during the implementation of the Ontdekkers Road Development Policy (ORDP) is the application of the three basic principles of the Spatial Development Framework (SDF), namely:

- Sustainability - creating a *sustainable* urban environment;
- Efficiency - increasing the *efficiency* of the City"s various structuring components; and
- Accessibility - facilitating *access* to urban opportunities.

The Johannesburg Spatial Development Framework (SDF) maintains that the consideration of any developments within the City of Johannesburg, irrespective of scale and location, must examine the potential impact of each and every development in order to achieve a future city that is sustainable, efficient and accessible to all (CoJMM, 2007a:33). Figure 6.5 illustrates the three key principles that are applicable during the implementation of any policies and the outcomes of each principle.

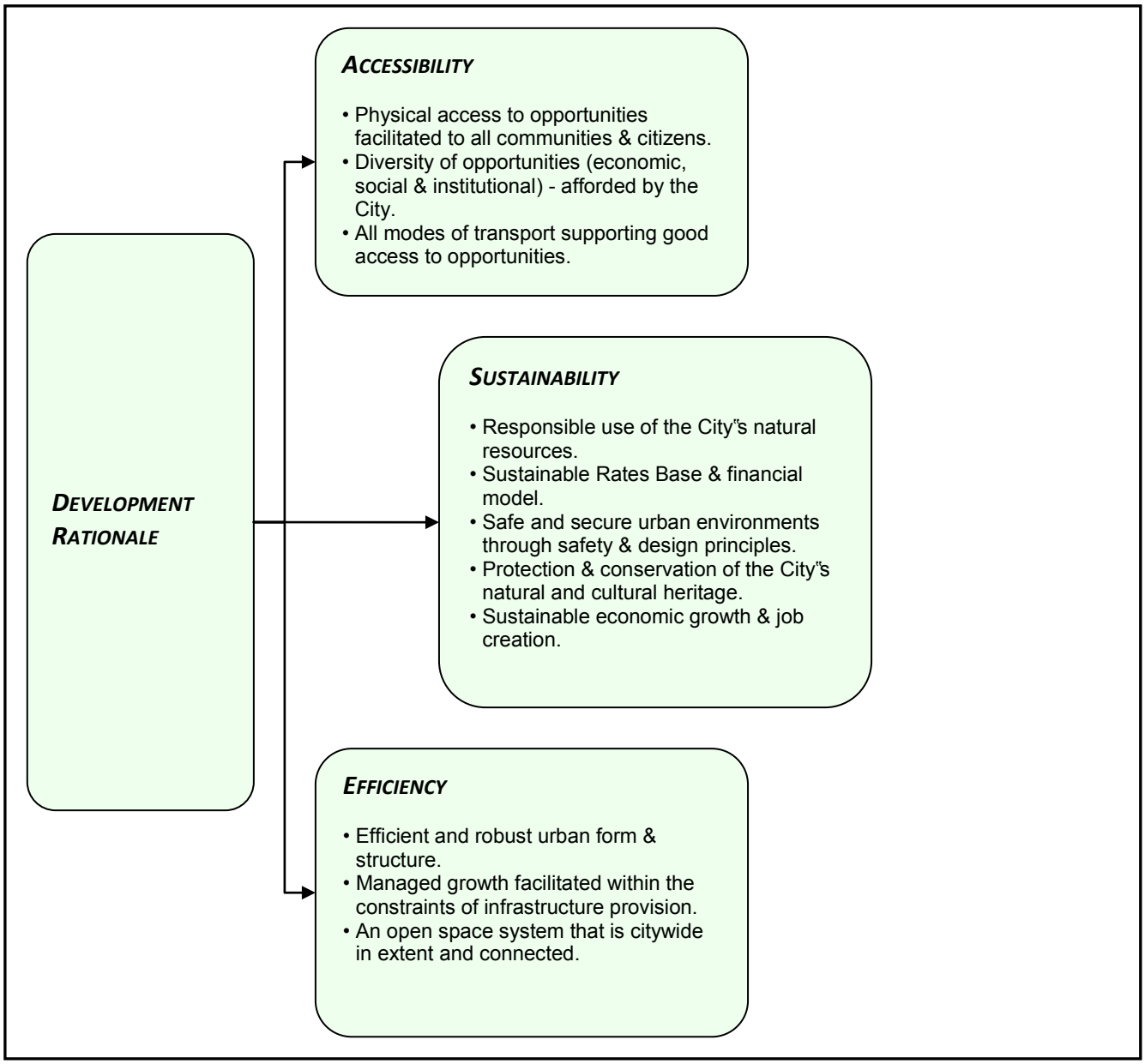


Figure 6.5 Key principles of the SDF and the related outcomes

Key considerations at this level of assessment (city-wide), with specific reference to potential developments along Ontdekkers Road include:

- Corridor development – the impact on the East-West Development Corridor
- Sustainable neighbourhoods
- The movement network
- Nodal development, accessibility and linkages
- Residential densities
- Open space system – such as the park erven abutting Ontdekkers Road

The primary strategies applicable at this level of assessment, as contained in the 2010/2011 SDF, which are of particular relevance in this study, are:

- *The Nodal Strategy*

  The main focus of this strategy is to contain existing nodes by confining non-residential uses to the existing and emerging, managed nodal points. The boundaries of the demarcated nodes will not be extended and additional nodes will not be identified until the need has been proven during the annual SDF/RSDF review cycles. Increased densities within nodes are supported in order to realise a defined spatial structure and a compact city form. Proposed non-residential developments along Ontdekkers Road must be evaluated on the premise that nodal boundaries will not be extended until the nodes have reached points of saturation. Although the nodal strategy restricts non-residential uses to the demarcated nodes, the Ontdekkers Road Development Policy (ORDP) makes provision for small scale offices along Ontdekkers Road. As detailed in the previous chapter, a wider variety of non-residential uses are permitted at higher intensities within the nodes. In terms of the nodal density guidelines contained in the SDF, density bands of 15 – 30 dwelling units per hectare and 20 – 90 dwelling units per hectare will be considered within 500 m of a defined Regional nodal boundary and within a District node respectively.

- *The Movement Strategy*

  This strategy promotes the linkage of nodes within the city through the movement network. Increased densities along main transportation routes is promoted, especially in light of the fact that several main transport routes have been identified as SPTN routes, where public transportation will play a key role. Since Ontdekkers Road has been given the status of a mobility spine and has been identified as a SPTN route, developments fronting onto Ontdekkers Road will be considered at a density band of 50 – 70 dwelling units per hectare. In addition, erven within 500 m of an existing or proposed train station could be developed at a density ranging from 30 – 60 dwelling units per hectare[3].

  The elements of the city (i.e. movement network, nodes and corridors) will be discussed in detail in the subsequent chapter.

[3] The density permitted will be determined per development proposal and in line with infrastructure, access and design parameters

6.3.2 Area and site specific opportunities and constraints

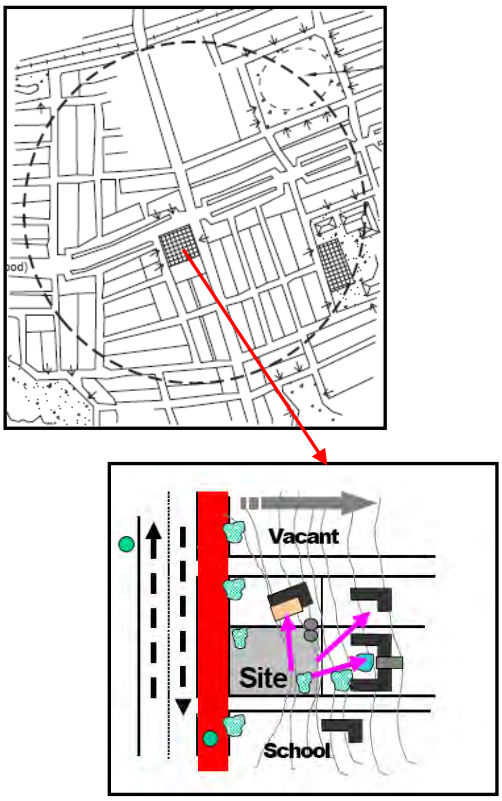


Figure 6.6 Area & site specific opportunities & constraints

These levels of assessment focus on the impact any developments will have on the surrounding area or neighbourhood and entails the recognition of opportunities and mitigating against possible constraints.

The most relevant factor for developments along Ontdekkers Road is the compatibility of the proposed development with the surrounding area. Developments abutting Ontdekkers Road must be compatible with the surrounding developments and protect the residential component that is situated behind the erven that fall within the ambit of the ORDP.

Key considerations at these levels of assessment with specific reference to potential developments along Ontdekkers Road include:

- The linkages with the public transportation system, since Ontdekkers Road is a major arterial route;
- The relationship of the site with other land parcels and the potential of integration
- Opportunities for increased density, since higher densities are permitted along major routes within the City in terms of the Nodal Strategy;
- The scale/mix of developments, which is controlled by the land uses permitted within and between the identified nodes along Ontdekkers Road;
- Adequacy of access, especially since the mobility of Ontdekkers Road must be protected and access is mainly gained via the service lane;
- Inputs from Municipal Owned Entities (MOEs) such as City Power, City Parks, Johannesburg Roads Agency and Johannesburg Water;

- Availability of social and engineering infrastructure;
- Natural features and site topography;
- Impact of the development on the intersections (related to development contributions payable in terms of the ORDP); and
- Opportunities for integrated developments.

Some of these elements will be detailed in the subsequent chapter.

6.3.3 Site specific detailed design

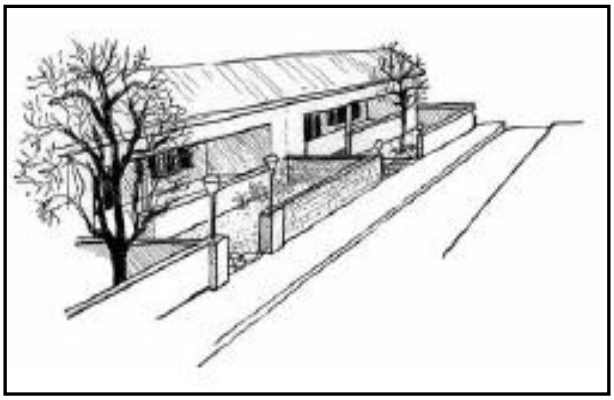


Figure 6.7 Site specific detailed design

The *detailed design* of developments along Ontdekkers Road is of specific consequence, as conditions imposed in terms of the ORDP typically relate to the urban design elements and details presented at the level of a Site Development Plan (SDP) submission. The focus of this level of assessment is to optimize the development through the application of sound urban design guidelines.

The arrangement of structures on properties along Ontdekkers Road is of particular consequence as it could affect Ontdekkers Road, and the vision of it being a major arterial route with an open boulevard character (Jonathan Stone Architect, 1997).

Key considerations at this level of assessment with specific reference to potential developments along Ontdekkers Road include:

- The arrangements of buildings on site and the orientation;
- The setback of structures from the streetfront to retain the openness and limit the corridor effect;
- Varying development controls (i.e. coverage, floor area ratio and height) applicable within and between nodes;
- Stormwater management;
- Landscaping specifications;

- Elevational treatments (e.g. colours of the exterior of buildings);
- Provision of parking and restricting shade-netting on street fronts;
- Restrictions on advertising;
- Cognisance of the roof materials - to avoid interference with visibility of drivers using Ontdekkers Road; and
- Noise attenuation measures (e.g. boundary walls, landscaping).

6.4 Conclusion

Development along arterial routes, such as Ontdekkers Road is multi-faceted due to economic, physical and social facets driving such development. This multi-faceted nature of developments necessitates the formulation and implementation of policies with due consideration of the inputs of the relevant disciplines, sectors and affected parties. Although the ORDP predominantly focuses on the principle of mobility above accessibility, which is a key transportation principle, the policy incorporated the proposals issued by the various disciplines to ensure that the policy is multidisciplinary in nature.

The assessment of any proposed developments must take note of the city"s strategies and desired urban structure and the impact such developments will have on the city as a whole. Therefore, the assessment of any potential development along Ontdekkers Road must consider the development at all levels (i.e. city, area and site-specific).

CHAPTER 7

THE JOHANNESBURG METROPOLITAN STRUCTURE

7.1 Introduction

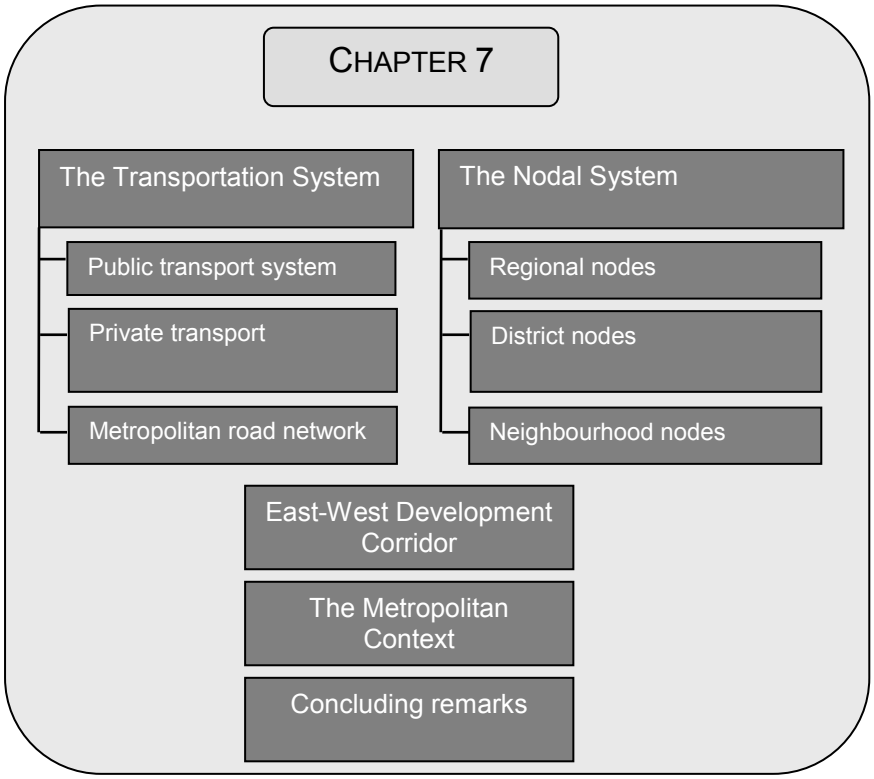


Figure 7.1 Components of Chapter 7

The city's urban structure comprises the configuration and connectivity of various activities, routes and spaces. The structuring elements of Johannesburg include main routes and arterials, nodal developments, residential patterns, open space and restrictive geotechnical conditions and the mining belt (CoJMM, 2008a:15). Ontdekkers Road forms a vital component of the urban structure of Johannesburg and is therefore linked to the other structuring elements of the metropolitan system/structure. The role Ontdekkers Road plays in the urban structure and the interrelationship that exists between this route and the other urban elements will be detailed in this chapter (See Figure 7.1)

7.2 The Transportation System

The transportation system is a significant structuring element of the City. The Integrated Transport Plan (ITP) of the CoJMM (2003-2008) focuses on three main elements of land transportation, of which two, namely public and private transportation mainly influence the development along Ontdekkers Road. As demonstrated in the CoJMM ITP, the predominant modes of transport used by Johannesburg residents to commute from home to work are the private motor-vehicle (42.2%) and minibus-taxi (34.6%). Other modes of transport used by

Johannesburg residents, excluding walking, include the train (8.2%) and bus (4.4%) (See Figure 7.2).

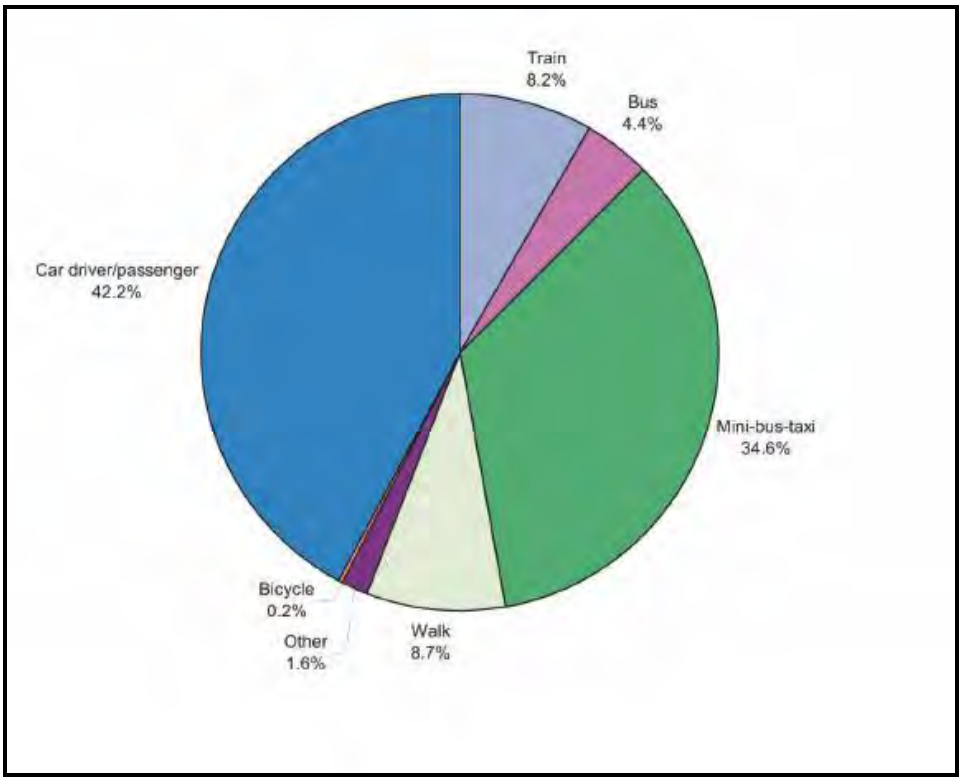


Figure 7.2: Modal split status quo

Source: CoJMM (2004:11)

7.2.1 Public Transportation System

The key public transportation services available within the City of Johannesburg impacting the study area include minibus-taxi services, subsidised bus services (e.g. Metrobus) and rail services.

The capacity of the public transport system in the morning peak period by modes is depicted in Figure 7.3. It is evident from this representation, that the capacity of public transportation utilisation, especially with regards to bus services is limited along Ontdekkers Road in comparison with other major roads, such as Hendrik Potgieter Road.

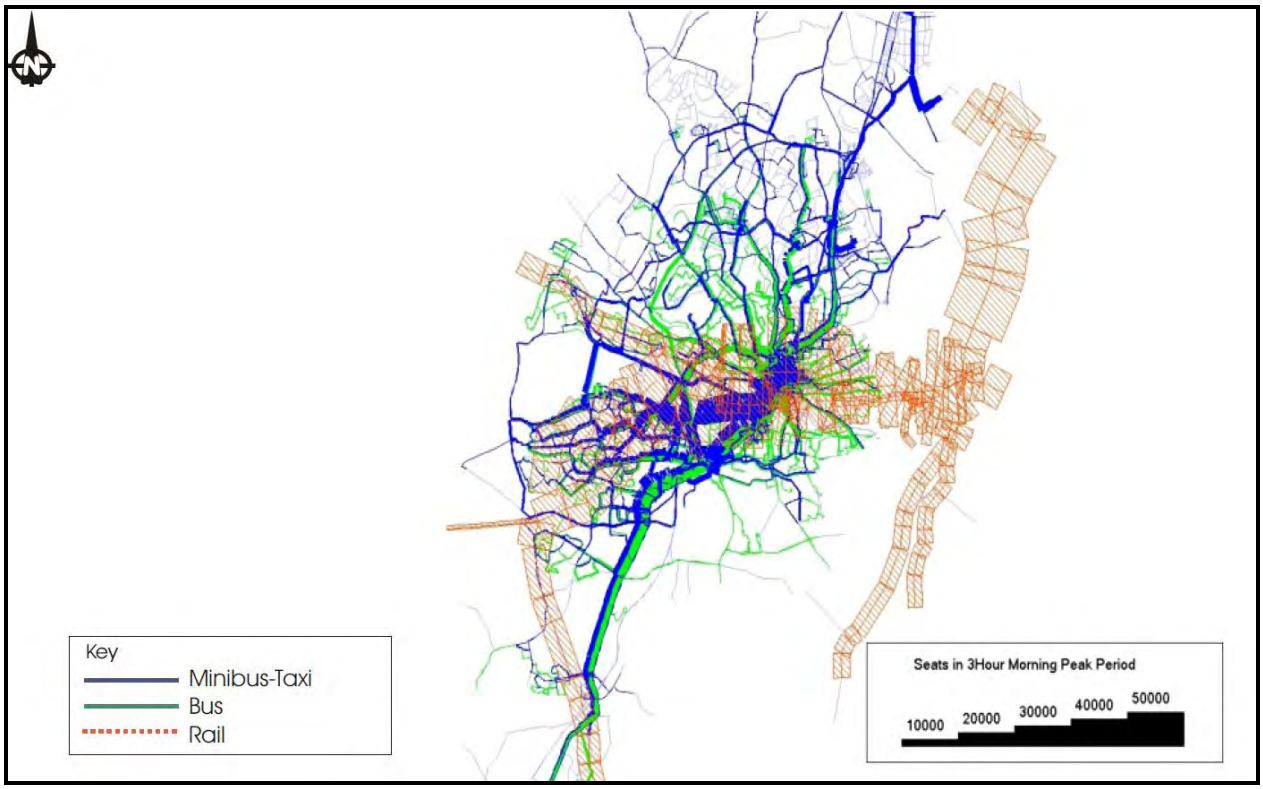


Figure 7.3: Capacity of public transport system by mode

Source: CoJMM (2004:58)

7.2.1.1 Minibus-taxi services

The minibus-taxi is the main public transportation mode utilised by commuters within the City of Johannesburg. According to statistics obtained from the analysis of data surveyed in the Gauteng Household Interview Survey (GHIS) of 2002, 34.6% of Johannesburg residents make use of minibus-taxis to travel to and from work. The major minibus-taxi ranks that are located north of the railway line, in proximity to Ontdekkers Road, are depicted in Figure 7.4. Checkers (Roodepoort), Roodepoort Station, and Westgate Stations are the formalised minibus-taxi ranks in the study area.

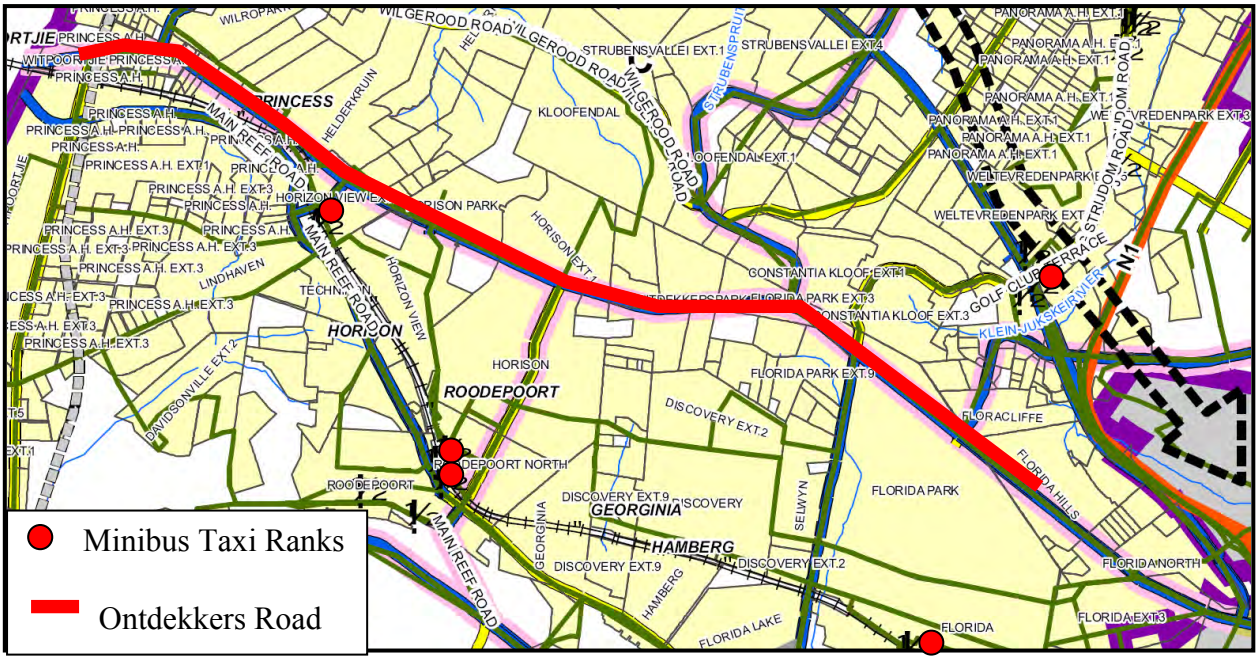


Figure 7.4 Major minibus taxi ranks north of the railway line in proximity to Ontdekkers Road

(Source: CoJMM, 2008b:17)

Minibus-taxis make a significant contribution to the traffic numbers along Ontdekkers Road. The largest concentration of taxi trips in the morning peak is the Johannesburg CBD, predominantly due to the fact that it is a transfer hub for many commuters from the Greater Soweto. A noteworthy point for this study is the fact that Roodepoort CBD also acts as an origin for many trips, since it is an important transfer point for passengers coming from western Soweto (CoJMM, 2004:133). Ontdekkers Road serves as the east-west linkages from Roodepoort to the Johannesburg CBD and is considered an important minibus-taxi route.

7.2.1.2 Subsidised bus services

The subsidised scheduled bus services that operate within the City of Johannesburg that have an impact on the study area include:

- Metrobus – a municipal service of the CoJMM
- Putco Soweto – operated on an interim contract with Gautrans

The routing of *Metrobus* was historically designed around the Johannesburg Central Business District (CBD), with the majority of routes radiating from the CBD to the suburbs. Numerous bus stops are located along the route network, some as little as 500m apart. Routes of particular relevance in this study are listed in Table 7.1.

Table 7.1 Metrobus routes of consequence to this study (2004 data)

Route No	Route Name	Departures Up To 08:30	Departures 08:30 - 15:30	Departures 15:30 On	Weekday departures
412	Witpoortjie/Horison to Johannesburg	23	15	21	59
413	Roodekrans to Johannesburg (Gandhi Square)	12	12	18	42
414	Lindhaven/Roodepoort to Johannesburg (Gandhi Square)	5	-	7	12
416	Helderkruin to Johannesburg (Gandhi Square	3	-	6	9

Source: CoJMM (2004:165)

For all Metrobus routes, during a normal weekday, 36% of departures take place in the morning peak (up to 8:30), 29% take place in the off-peak (between 08:30 and 15:30); and 35% take place in the afternoon peak (15:30 on) (CoJMM, 2004). In contrast, the following can be concluded for the four routes affecting this study (see Table 7.1 and Figure 7.5):

- An average of 35% of departures take place in the morning peak (up to 8:30)
- An average of 14% of departures take place in the off-peak (between 8:30 and 15:30)
- An average of 51% of departures take place in the afternoon peak (15:30 onwards)

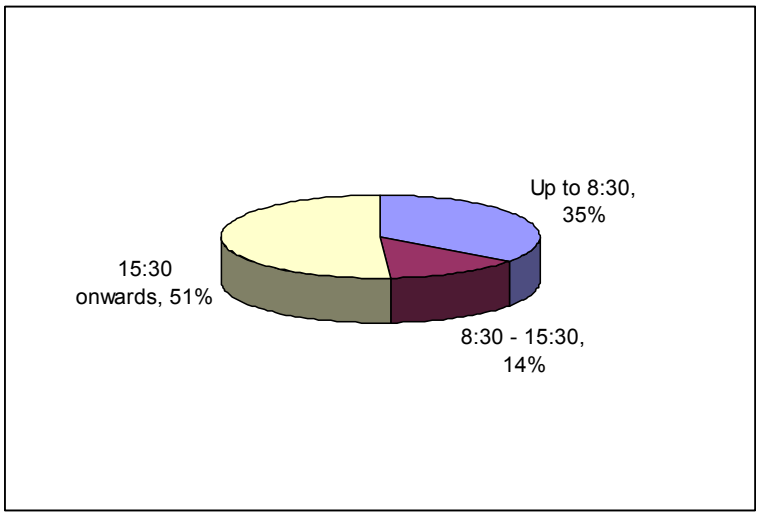


Figure 7.5: Comparison of the percentage of Metrobus departures during peak times and off-peak times

Source: Author"s own representation

It is evident that the Metrobus services" predominant contribution towards traffic numbers along Ontdekkers Road takes place during peak hours, but predominantly during the afternoon peak period.

Putco Soweto only makes a minor contribution to traffic numbers along Ontdekkers Road. In the morning peak, the majority of routes originate from the Greater Soweto, with Greater Soweto being the main destination in the afternoon peak period. The terminus and route that impact on Ontdekkers Road are the Gordon/Florida Hills Extension Terminus and Route 29 (Florida Hills/Helderkruin/Hillfox). According to 2004 data (CoJMM, 2004:174), two trips are generated from the Gordon/Florida Hills Extension Terminus during the afternoon peak and 5 trips are noted in the morning peak period along the Florida Hills/Helderkruin/Hillfox route.

7.2.1.3 Rail services

Commuter rail services are predominantly operated on railway lines owned by the Passenger Rail Agency of South Africa (PRASA)[4]. According to the Johannesburg ITP, the most important stations in terms of passenger volumes in the area are Johannesburg, Naledi and Roodepoort. The data used in the Johannesburg ITP (2004) reveals that the 34 075 persons embarking and disembarking from trains at the Roodepoort Station renders it one of the top ten busiest stations in the Johannesburg area. The Roodepoort station is of particular relevance in this study due to its proximity to Ontdekkers Road.

The essence of PRASA is to integrate inter-modal facilities and services into public transport solutions that optimise the performance of the whole transport system.

The extent of the railway network in the Greater Johannesburg area and the population density is illustrated in Figure 7.6.

[4] PRASA merged South African Rail Commuter Corporation (SARCC), Metrorail, Intersite Property Management Services, Shosholoza Meyl and the long distance bus company, Autopax (Translux and City-to-City)

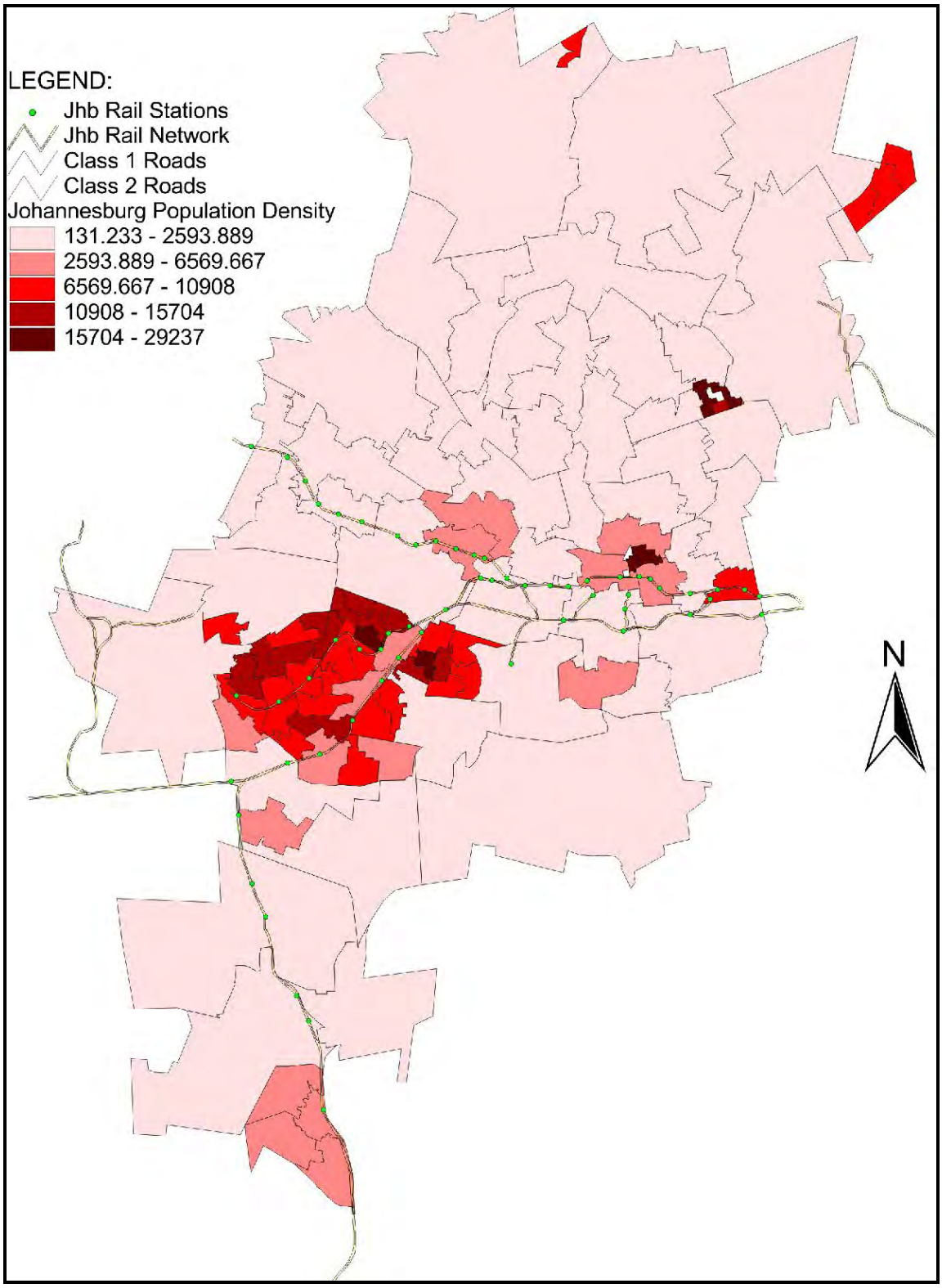


Figure 7.6 Extent of the railway network in CoJ Metropolitan Area and the population density

Source: CoJMM (2004:274)

The route that is most relevant in this study is the Randfontein/Johannesburg route, of which eight stations fall within the study area, including:

- Florida
- Hamberg
- Horison
- Maraisburg
- Unified
- Roodepoort
- Princess
- Georgina
- Witpoortjie[5]

Data available regarding the service capacity utilization for the Randfontein-Langlaagte section of the Randfontein-Johannesburg route reveals that during the morning peak period 12 474 passengers travel on the route section; while the available service capacity (the number of people that can be accommodated) is 23 100, this translates to 54% capacity utilisation during the morning peak period. In comparison to other rail routes within the Johannesburg area, only 27% have a higher service capacity utilisation than the Randfontein-Langlaagte route in the morning peak period. The Langlaagte-Randfontein route"s service capacity utilisation during the morning peak period is higher than 57% of the other routes. The service capacity utilisation of this route clearly indicates that it is a significant route in terms of the number of passengers.

According to the Gauteng Rail Passenger Transport Status Quo overview for the City of Johannesburg, only six of the 55 stations in Johannesburg are considered to be intermodal transfer facilities, none of which fall within the study area. The lack of intermodal facilities hampers the efforts of the City to promote the integration of transport modes, as envisioned in the Integrated Transport Plan (ITP) (CoJMM, 2004:301).

As previously stated in Chapter 4, Public Transport Priority Areas have been identified in terms of the Growth Management Strategy of the City of Johannesburg. A number of PRASA Rail stations, specifically the Princess, Roodepoort and Florida station precincts were identified as the Public Transport Priority Areas of Administrative Region C of the City of Johannesburg. (CoJMM, 2010b:24).

[5] Witpoortjie Station also serves the residents of the City of Johannesburg although it is located in Mogale City.

7.2.1.4 Key public transport infrastructure and initiatives

Three key public transport initiatives are defined in the RSDF (CoJMM, 2010b:32) of Administrative Region C of the City of Johannesburg, namely:

- **The *Strategic Public Transport Network (SPTN)***

The Strategic Public Transport Network (SPTN) is a strategic initiative which aims at improving accessibility and mobility and promoting/encouraging public transport. The SPTN is based on the linkage of „residential departure points and nodal destination points" (RSDF region c) through a network of routes along key mobility spines within the city, as indicated in Figure 7.7.

The physical features of the SPTN include:

- Dedicated lanes if volumes warrant it (>100 buses/hour or >150 minibuses/hour).;
- Network to give priority to public transport, e.g. High Occupancy Vehicle Lanes.
- Park and ride facilities;
- Public transport facilities focussed at nodes;
- Transfers at identified interchange nodes;
- Most nodes require separate feeder and distribution services

(CoJMM, 2010c:32)

Roads located within the study area that have been identified as SPTN routes include Ontdekkers Road, Main Reef Road and Christiaan de Wet Road.

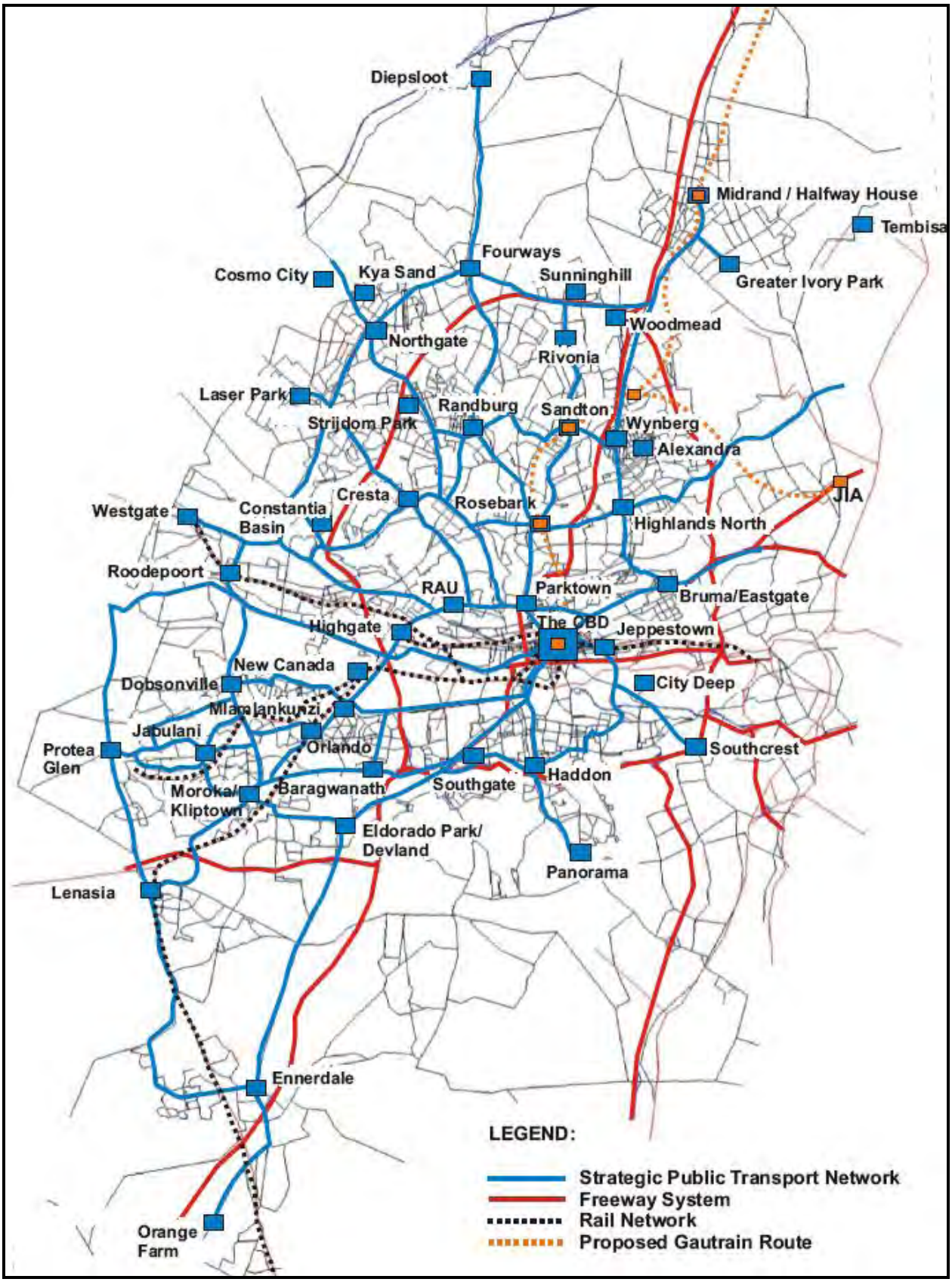


Figure 7.7 Proposed Strategic Public Transport Network

Source: CoJMM (2004:421)

- ***Bus Rapid Transit (BRT)***

The SPTN was upgraded to a Bus Rapid Transit (BRT) System, which is a more aggressive system based on similar principles as the SPTN. The Rea Vaya BRT features dedicated bus lanes and comprises of a hierarchy of three routes, namely BRT trunk routes, complimentary routes and feeder routes. The municipality has also developed a development framework for supporting land uses along the pilot route.

The BRT system aims at providing a high quality, affordable public transport system that ensures that residents of Johannesburg have access to a BRT route or its feeder system.

The Roodepoort to Randburg link was excluded from the Phase 1 prioritisation of the BRT (see Figure 7.9). However, as indicted in Figure 7.8 below, Ontdekkers Road forms a vital component of the BRT (Rea Vaya) network.

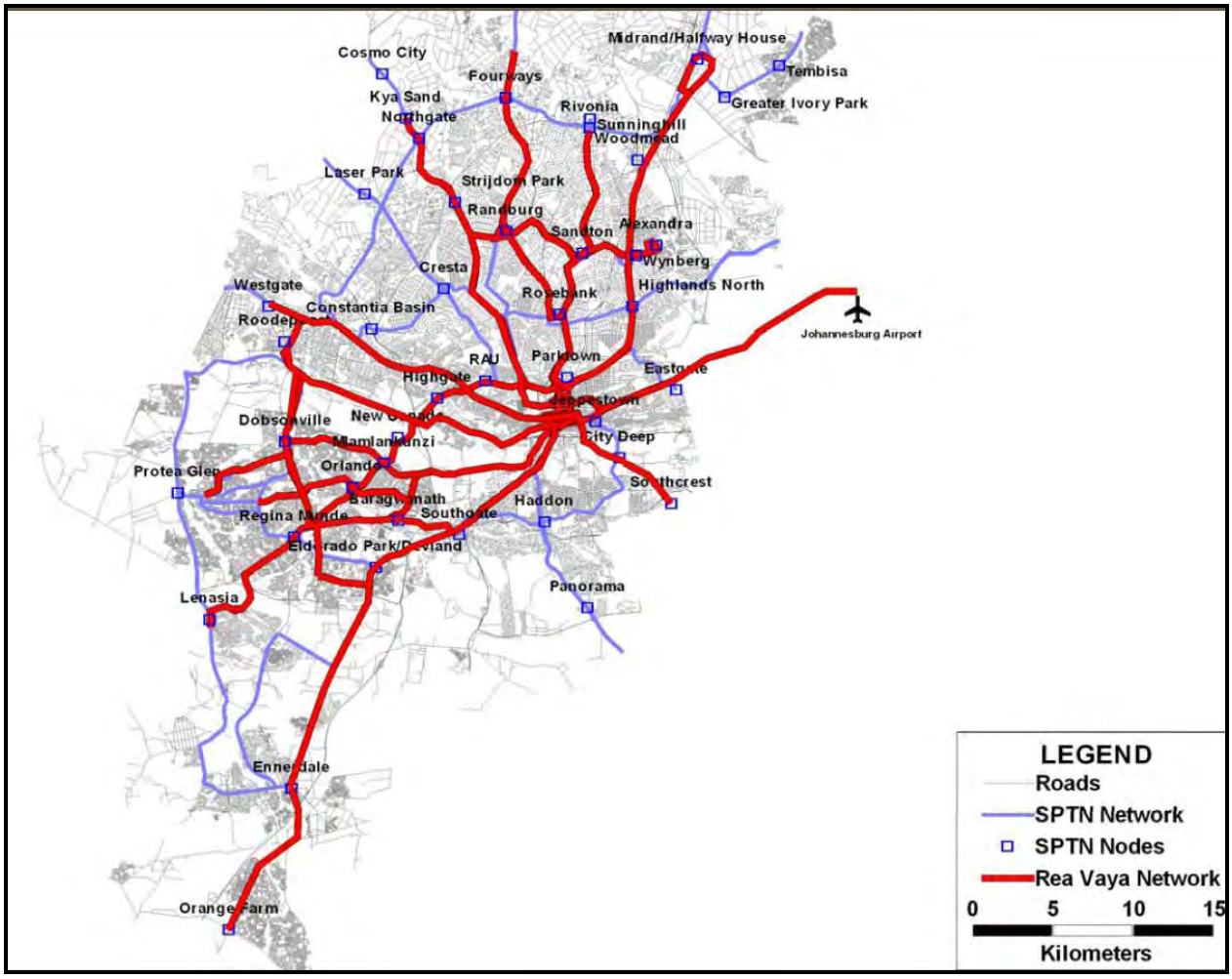


Figure 7.8 Full BRT system and SPTN Network

Source: CoJMM (2008a:69)

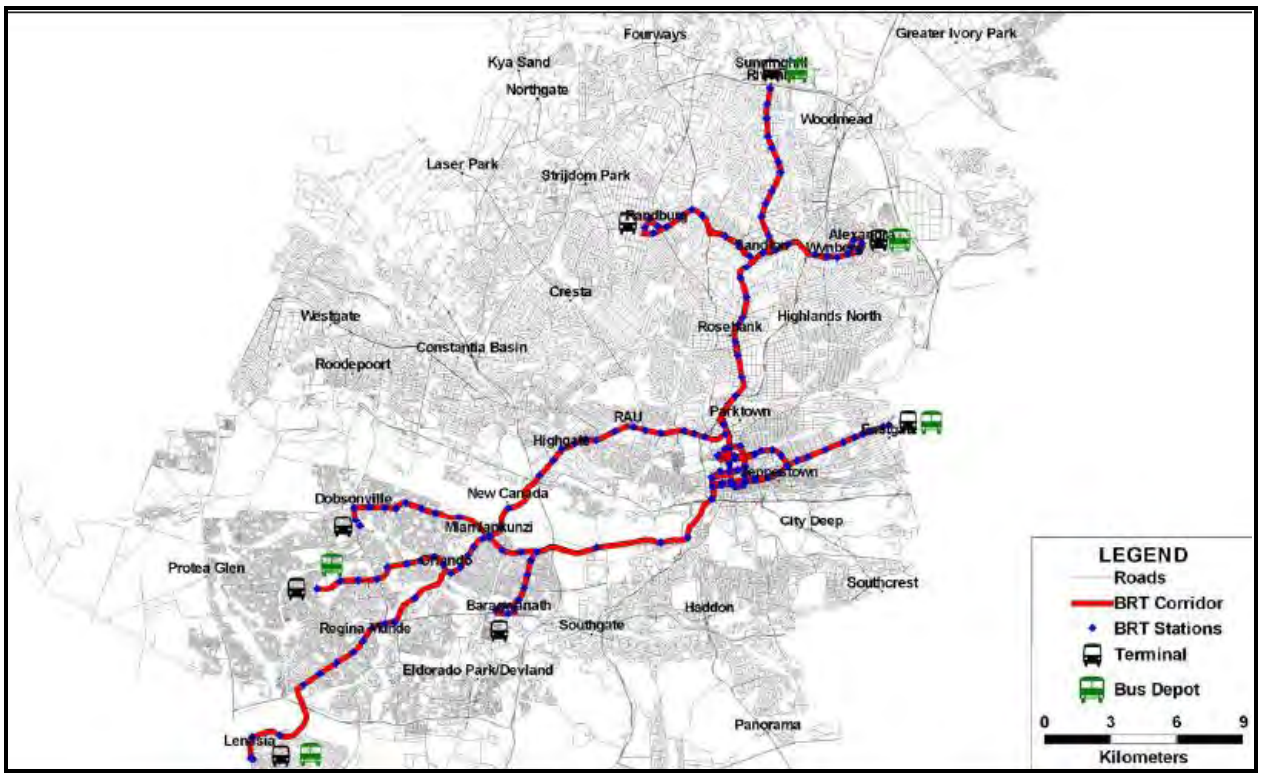


Figure 7.9 Phase 1 BRT Stations, Terminals and Depots

Source: CoJMM (2008a:70)

- ***Rail network***

The rail network plays a vital role in facilitating access to the economic opportunities within the City of Johannesburg. As previously indicated, 8.2% of commuters make use of the train as a mode of transport. This translates to a 14% share of the public transportation trips within the City.

The RSDF (Region C) recognises the opportunity to promote Transport-oriented Development (TOD) at rail stations within the city. The stations of particular significance in this regard include the Florida, Princess and Roodepoort station precincts, for which Development Frameworks have been adopted. These stations have been identified as „major catalysts based on the regional scale of use and intensification potential" (CoJMM, 2009:37). The Florida Transit Oriented Development Framework is in the process of being formulated.

Another key public transportation initiative is the Gautrain Rapid Rail Link - a state-of-the-art rapid rail network in Gauteng. The Gautrain was initiated as one of the eleven Blue IQ initiatives of the Gauteng Provincial Government (GPG) and is now managed by the Gauteng Department of Transport.

The rail network links Pretoria and Johannesburg and OR Tambo International Airport and Sandton (see Figure 7.11). There are three anchor stations (i.e. O.R. Tambo International Airport, Pretoria and Johannesburg) and seven other stations along the approximately 80 kilometre rail route.

The existing public transportation services are not dedicated to the Gautrain; however certain existing public transport services and operators can provide feeder, and to a limited extent, distribution services to the Gautrain (see Figure 7.10). Public transportation services (such as Metrorail services at Johannesburg Park and Pretoria Stations, municipal and other bus services and minibus-taxes) will play an important role in bringing passengers form the periphery of the catchment[6] area, or outside this area, to Gautrain Stations. The Gauteng Provincial Government (GPG) recommends the inclusion of the proposed feeder and distribution services in local plans (i.e. Integrated Transport Plans, Land Development Objectives and Integrated Transport Plans) in order to promote transport planning co-ordination and land-use and transportation integration.

Therefore, although Ontdekkers Road is not directly impacted by the Gautrain, Ontdekkers Road acts as a feeder route to the greater public transportation system by means of other public transportation services (i.e. Metrobus, minibus-taxi services and the PRASA rail network).

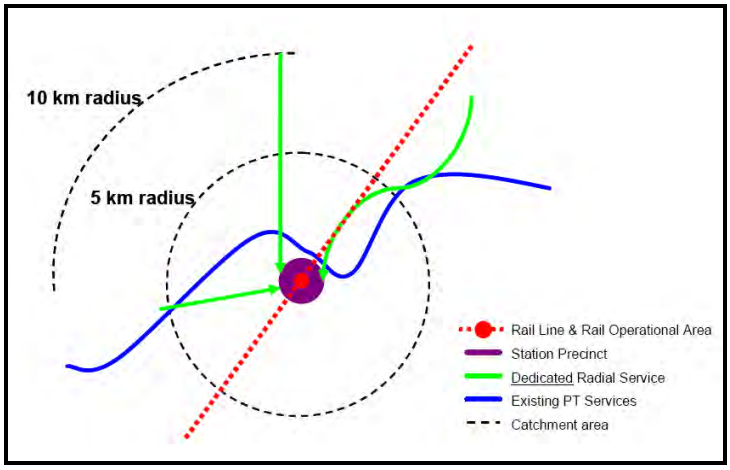


Figure 7.10 Dedicated radial feeder and distribution services in relation to the Gautrain rail line
Source: GPG (2002)

[6] The catchment are is the areas within which passenger trips start or finish

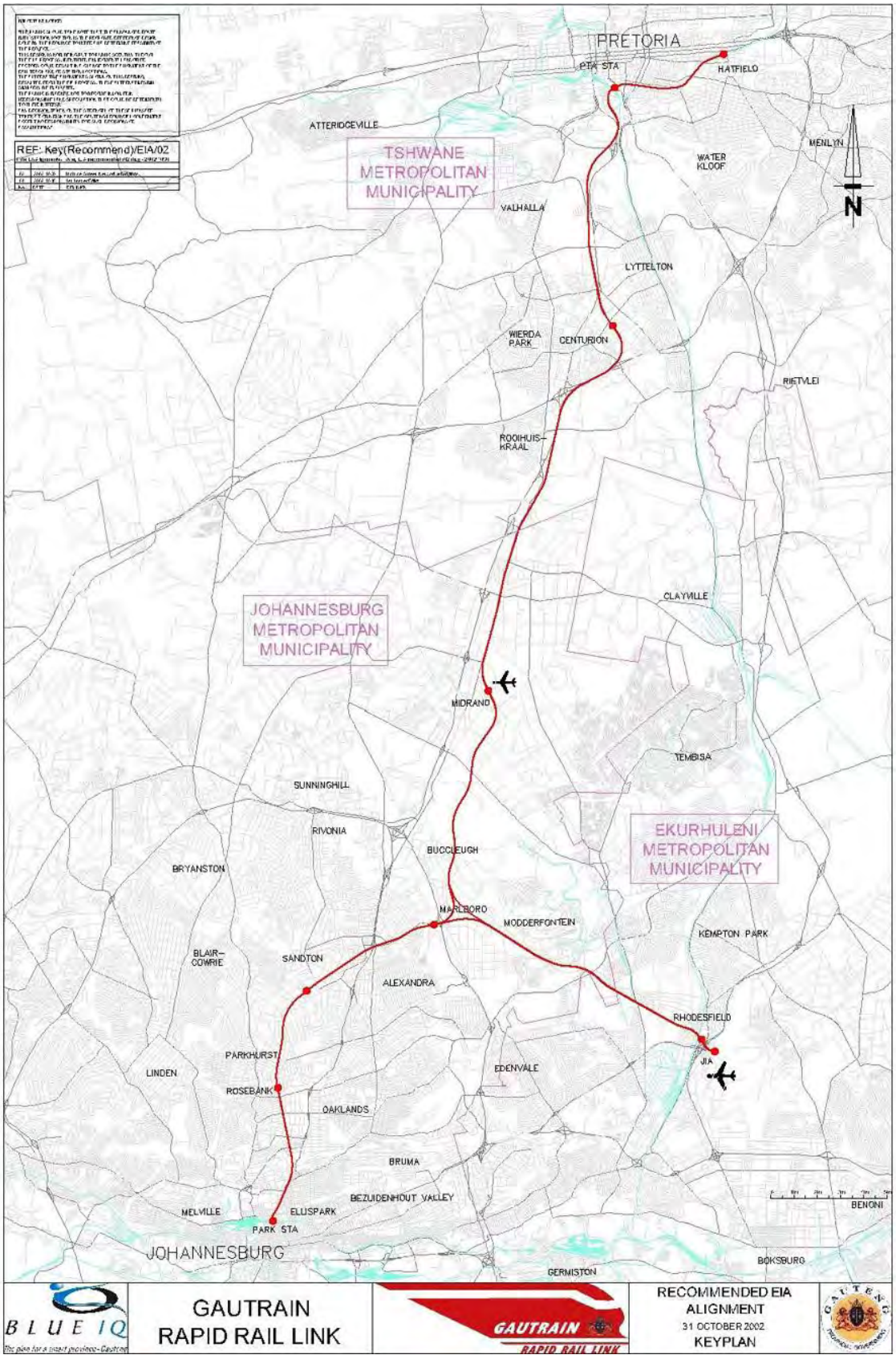


Figure 7.11 Gautrain Rapid Rail Link routes

Source: GPG (2002)

7.2.2 Private Transportation

According to information collected in the General Household Information Survey (GHIS), the car is the primary transport mode used in commuting from home to work and represents 42,2% of all trips in this trip category.

The ratio of private and public transportation usage for commuting to work is approximately 53 to 47 (53% vs. 47%). The large number of private vehicles used to commute to work makes a significant contribution to the traffic congestion experienced along major routes such as Ontdekkers Road.

Data analysed in the Johannesburg ITP 2003/2008 revealed the following about the volume capacity along Ontdekkers Road during the morning peak hour:

- The eastbound section of the road is running over its capacity at an average Volume Capacity Ratio (V/C Ratio)[7] of 1.17.
- The westbound section of the road is running at stable capacity at an average Volume Capacity Ratio (V/C Ratio) of 0.49.

This suggests that Ontdekkers Road is a major east-west linkage between Roodepoort and Johannesburg CBD in the morning peak period and vice-versa in the afternoon peak period.

7.2.3 The Metropolitan road network

The road network is of particular importance in this study due to the linkages of Ontdekkers Road with other routes within the city and the impact it has on development along Ontdekkers Road. The road network in the City of Johannesburg is comprised of north-south and east-west linkages. Ontdekkers Road (M18) is classified as a major arterial that provides an east-west linkage between the Roodepoort area and the Johannesburg CBD. Other major arterials with an east-west orientation within Region C of the City of Johannesburg include Main Reef Road (M24) and Randfontein Road (R41). North-south linkages that are relevant to this study include Christiaan de Wet Road, West Lake Road/Golf Club Terrace and Hendrik Potgieter Road

[7] V/C Ratio is an indicator of a road"s traffic volume versus its capacity, on a numerical scale, where a v/c ratio equal to 1.0 or greater indicates that the demand volume is exceeding the available capacity of the road segment. The v/c ratio provides a good indication of whether the road segment is congested by relating whether there is “excess” capacity available or saturated conditions exist.

(which radiates in a north-westerly direction). Figure 7.12 illustrates the road network within the Region and indicates the major east-west and north-south linkages.

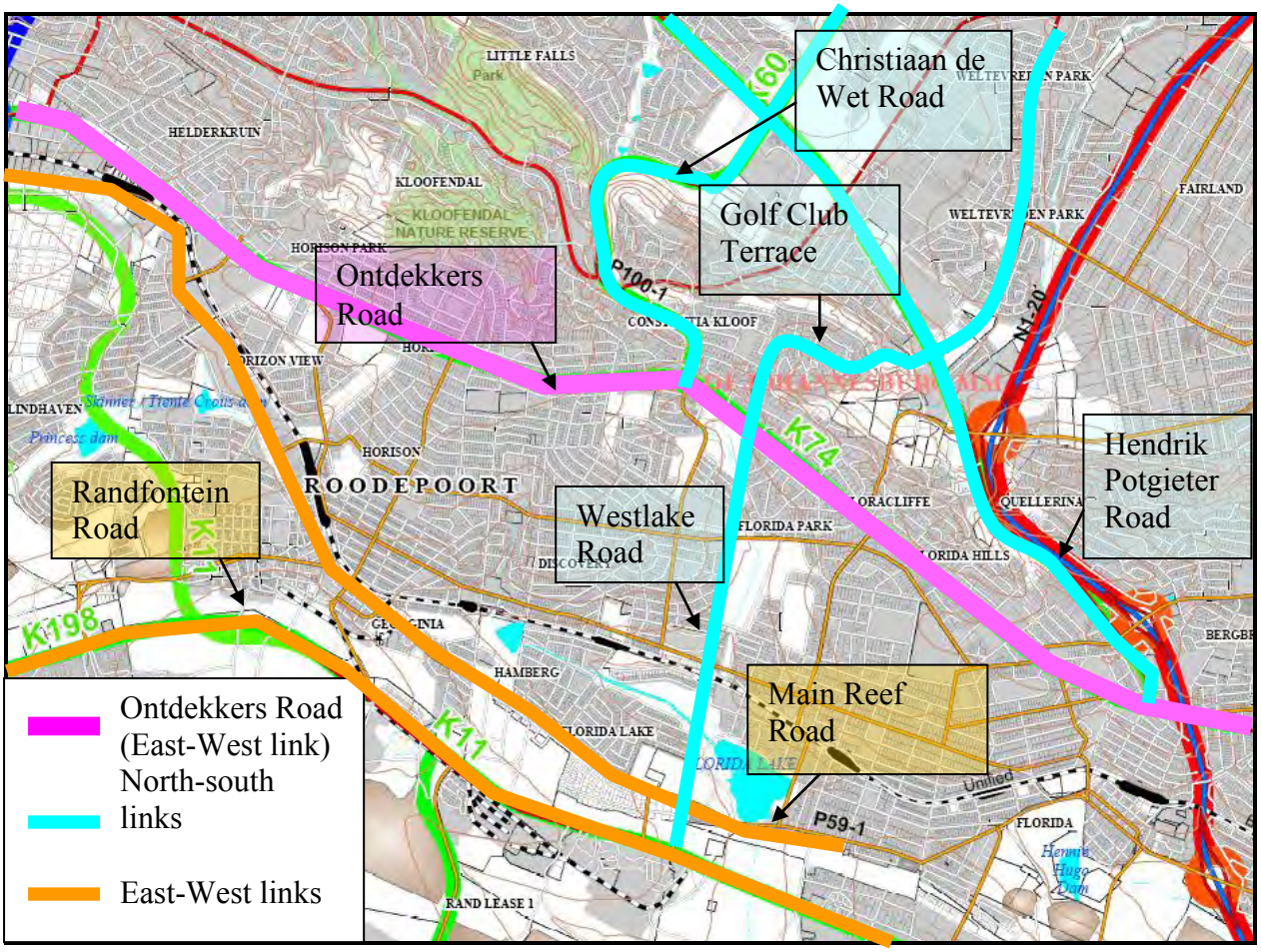


Figure 7.12 Routes impacting Ontdekkers Road

Source: Author"s own representation

The importance of the routes that are either directly or indirectly linked to Ontdekkers Road is evident from the traffic volumes. With respect to volume capacity ratios (v/c ratio) along these routes during the morning peak hour, the following can be stated:

- *Christiaan de Wet Road* operates at an average v/c ratio of:
  - 1.1 in the northerly direction, which means it is running at over-capacity conditions
  - 0.66 in the southerly direction during the morning peak hour, which means it experiences marginal to moderate congestion

- *Hendrik Potgieter Road* operates at an average v/c ratio of:
  - 0.64 in the northerly direction (i.e. marginal to moderate congestion)
  - 0.42 in the southerly direction (i.e. some congestion)

- *Main Reef Road* operates at a v/c ratio of:

  - 1.09 in the easterly direction (i.e. serious congestion)
  - 0.55 in the westerly direction (i.e. marginal congestion)

- *Roodepoort Road* at a v/c ratio of:

  - 0.40 in the northerly direction (i.e. some congestion)
  - 0.52 in the southerly direction (i.e. marginal congestion)

(CoJMM, 2004)

7.3 The Nodal System

Economic nodes are locations of concentrated activity, strategically located along major routes and/or major intersections, which make them highly accessible. This often results in the nodes acting as destinations for public transport. The City of Johannesburg formulated a nodal strategy to ensure the management and development of nodes within the City boundaries. The strategy is premised on „the clustering of various activities at appropriate and accessible nodal locations to provide the City with a network of opportunity centres" (CoJMM, 2009b:40). The Nodal Strategy uses a Nodal Hierarchy to define the City's nodes and to describe the management approach to these nodes. The nodal strategy distinguishes between Regional, District and Neighbourhood/Local nodes. Figure 7.13 illustrates the nodes within the study area.

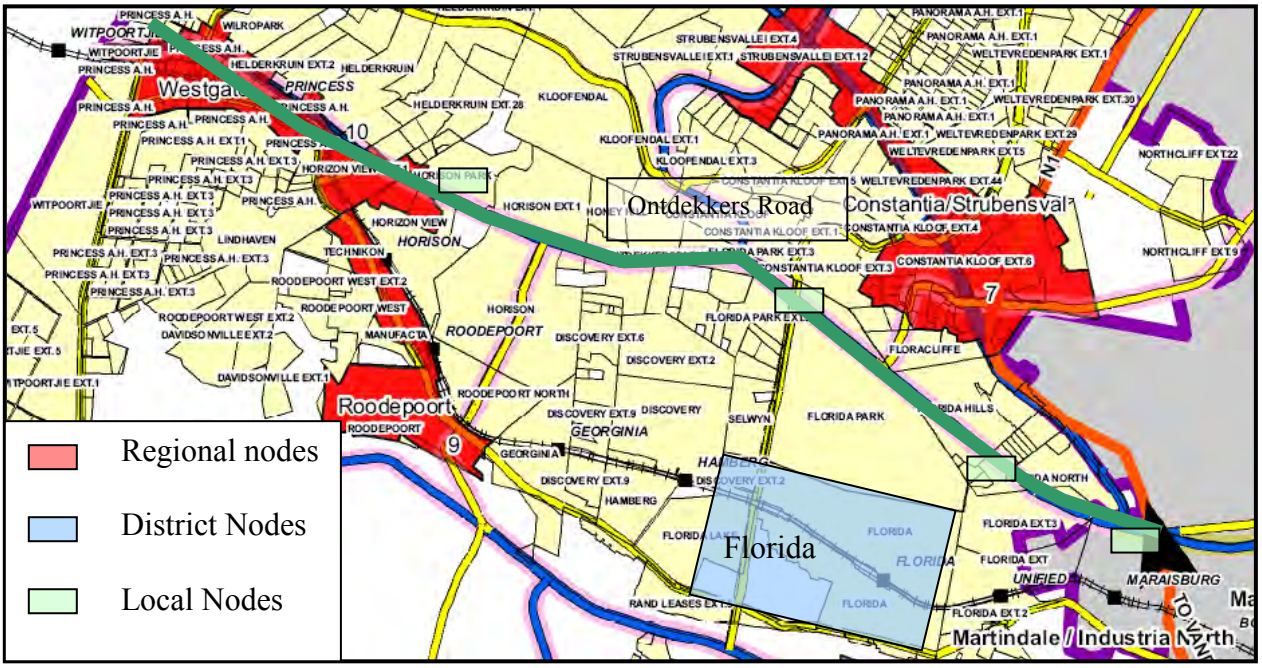


Figure 7.13 Nodes impacting Ontdekkers Road

Source: Author's own representation

7.3.1 Regional Nodes

Ontdekkers Road is directly and/or indirectly linked to four *Regional nodes* within Region C, of which the first three are of critical importance in this study:

- Constantia/Strubensvalley
- Princess/Westgate
- Roodepoort
- Northgate

7.3.1.1 The Constantia/Strubensvalley Regional node

The main developments within this node include the shopping centres, Clearwater Mall and Hillfox. This node is characterised by retail uses, office developments, motor related uses and a strong private medical cluster. The predominant mode of transport is private motor vehicles, as there is a lack of formal public transportation facilities. This places immense pressure on the road infrastructure. The following key strategic planning issues were identified:

- Promoting public transportation usage by providing the necessary facilities and marketing it as an alternative to private transport
- Containing the node, promoting infill development and intensifying to aim towards the classification as a Metropolitan node
- Promoting residential densification so as to support future public transportation initiatives
- Improving pedestrian movements between developments within the node
- Improving sense of place, identity and legibility

(CoJMM, 2009:42)

7.3.1.2 The Princess/Westgate Regional node

The Princess/Westgate Regional Node is characterised by retail uses, service businesses, motor related uses and limited light industrial uses. The dominant developments within the node are the shopping centres, Princess Crossing and Westgate Mall.

The node has high development potential due to its optimal location in terms of accessibility. The node is served by two mobility spines (i.e. Ontdekkers Road to the north and Randfontein Road to the south) that feature existing public transport services in the form of buses and minibus-taxis. The Princess Train Station is also centrally located within the node. The Princess

Station Precinct Area has been identified as a high priority area in terms of the Growth Management Strategy (GMS) of the City of Johannesburg. The Princess Urban Development Framework (UDF) was approved in 2008 with the emphasis being on the promotion of public transport, intensification of land uses and urban design elements relating to safety and security.

The main constraints experienced in the area in and around this node include:

- The fragmentation of development due to proposed provincial roads such as PWV5
- The lack of safety and security around the station precinct
- The location of a large informal settlement partly on environmentally sensitive areas
- Lack of proper connectivity between the area and the Regional shopping facilities
- Lack of safety and security around the station precinct

The following key strategic interventions were identified:

- Upgrading the Princess Station Precinct to encourage safer and desirable use of the existing rail network
- Formalisation of the Princess Informal settlement with emphasis on different housing typologies and levels of affordability
- Improving the nodal character and legibility
- Developing the Station Precinct with provision for informal businesses
- Improving accessibility to public transportation, pedestrian accessibility and linkages between developments
- Supporting residential densification in and around the node
- Support establishment of a social node with schools, clinic, park etc
- Constructing strategic linkages (e.g. the extension of C.R. Swart Road southwards)
- Improving the sense of place.
- Upgrading engineering services (i.e. roads, stormwater and electricity)

(CoJMM, 2009: 43,146)

7.3.1.3 The Roodepoort Regional Node

The Roodepoort Regional Node is focused around the old Roodepoort town centre (CBD) and includes areas along the railway line and Main Reef Road (such as the industrial areas of Manufacta and Technikon). The Roodepoort CBD used to be a vibrant transport and commercial node, but decay has progressively set in due to the relocation of businesses to other nodes.

The node is well serviced in terms of the public transportation system:

- The formal minibus-taxi ranks; and
- Roodepoort Rail Station

The Roodepoort CBD has been identified as a high priority area in terms of the Growth Management Strategy (GMS) of the City of Johannesburg. The Roodepoort Urban Development Framework was approved in 2008 with the emphasis being on the promotion of public transport, intensification of land uses and urban design elements relating to safety and security.

A number of constraints present in this node include:

- Illegibility of the road network system
- Inability to sustain businesses
- The association of the node with crime and grime
- The relocation of anchor businesses to other nodes
- Geotechnical/undermining limitations on certain areas that restrict developments or the height of buildings
- Lack of interest by businesses to the establishment of a City Improvement District (CID).

(CoJMM, 2009:146)

The key strategic planning issues and interventions identified include:

- Promoting high densities in support of the BRT
- Providing affordable housing
- Ensuring that adequate provision is made for public transport facilities to ensure effective implementation of the BRT route
- Establishing a City Improvement District focusing on revitalisation and regeneration
- Improving the pedestrian links and landscaping
- Upgrading roads and stormwater and the public environment
- Upgrading the Roodepoort Station by providing inter-modal facilities around the Roodepoort Station
- Encouraging development of vacant land within the Roodepoort Town Centre
- Addressing Urban Management Issues
- Addressing perceptions related to crime through socio-economic developments
- Improving the sense of place
- Facilitating the conversion of vacant offices and bad buildings into residential stock

- Upgrading north-south linkages southwards over the mining land to improve the connection of Roodepoort CBD and Soweto (Durban Roodepoort-Deep Goldmine)

(CoJMM, 2009:43,146)

A comparison of Figure 7.12 and Figure 7.13 reveals the role transportation routes play in ensuring nodal connections.

7.3.2 District Nodes

District nodes serve one or more neighbourhoods and provide services related to convenience, daily needs and social services. The RSDF (Region C) identifies the Florida "town centre" as a District Node in the region. The Florida node was previously a vibrant transport and commercial node; however it has experienced a continual decline in economic activity and the relocation of businesses to other nodes.

The Florida District node falls within the ambit of the Greater Florida Development Plan, which identifies the Florida (Transit Oriented) Development Framework as the relevant policy for development within the node. The Florida Rail Station provides public transport opportunities within the node and has been identified as a major catalyst based on the regional scale of use and intensification potential.

The main constraints experienced within the node include:

- Insufficient threshold to support the node
- Low generation of revenue
- Lack of safety and security
- Unregulated informal businesses

The approach of the CoJMM to district nodes is to ensure that they are contained within their demarcated boundaries.

The key strategic interventions identified are:

- Supporting residential densification in support of public transport
- Encouraging public and business investments within the node
- Creating a safe and clean environment
- Promoting intensification of non-residential uses (subject to the availability of services and infrastructure)
- Promoting transit oriented developments

- Moving the rail station closer to main business activities
- Improving pedestrian movement

7.3.3 Neighbourhood Nodes

Mixed use neighbourhood nodes serve a specific neighbourhood by predominantly providing convenience related services and products. A number of neighbourhood nodes, varying in size and function, have been identified in the most recent review of the RSDF (2010c:41). Although the RSDF only identifies Horizon View as a neighbourhood node, certain nodes along Ontdekkers Road (with specific reference to the Florida North, Florida Park and Horizon View nodes) can be considered neighbourhood nodes due to the function they perform and the scale of the nodal developments.

The CoJMM"s approach towards neighbourhood nodes is based on the following principles:

- Discouraging the development of new neighbourhood nodes beyond identified locations
- Supporting the redevelopment of existing neighbourhood nodes
- Integrating new nodal development with public transport, informal trading facilities and the SPTN where possible
- Ensuring a balance between parking provision at the node and public transport infrastructure
- Encouraging residential densification within, adjacent and contiguous to an existing neighbourhood node.

(CoJMM, 2009:44)

Management guidelines for neighbourhood nodes are specified within the RSDF sub-area management tables and provide details including, but not limited to:

- Design guidelines
- Guidelines on the containment/expansion of nodes
- Desired land uses within the nodes and the surrounding area
- Land use controls
- Specific density requirements around the node

With regards to development within the neighbourhood nodes along Ontdekkers Road, the Ontdekkers Road Development Policy (ORDP) provides management guidelines, including design guidelines (i.e. aesthetics, landscaping, etc), land uses permitted within the nodes and the surrounding area and specific land use controls applicable within and between nodes.

7.4 The East-West Development Corridor (EWDC)

The movement and nodal components detailed previously (i.e. transportation routes and nodes) are most prominent and intense within development corridors. Corridor development is one of the main structuring elements used to direct development in the City. The concept of linear development focuses on the concentration of major activities within nodes in a single linear configuration, centred on a transportation axis. In the case of the EWDC, the central transportation route that anchors the corridor is Main Reef Road. Other components include the other east-west road linkages (such as Ontdekkers Road) and the railway line. The Ontdekkers Road is an integral component of the East-West Development Corridor (EWDC), as it forms the northern most boundary of this corridor – see Figure 7.14.

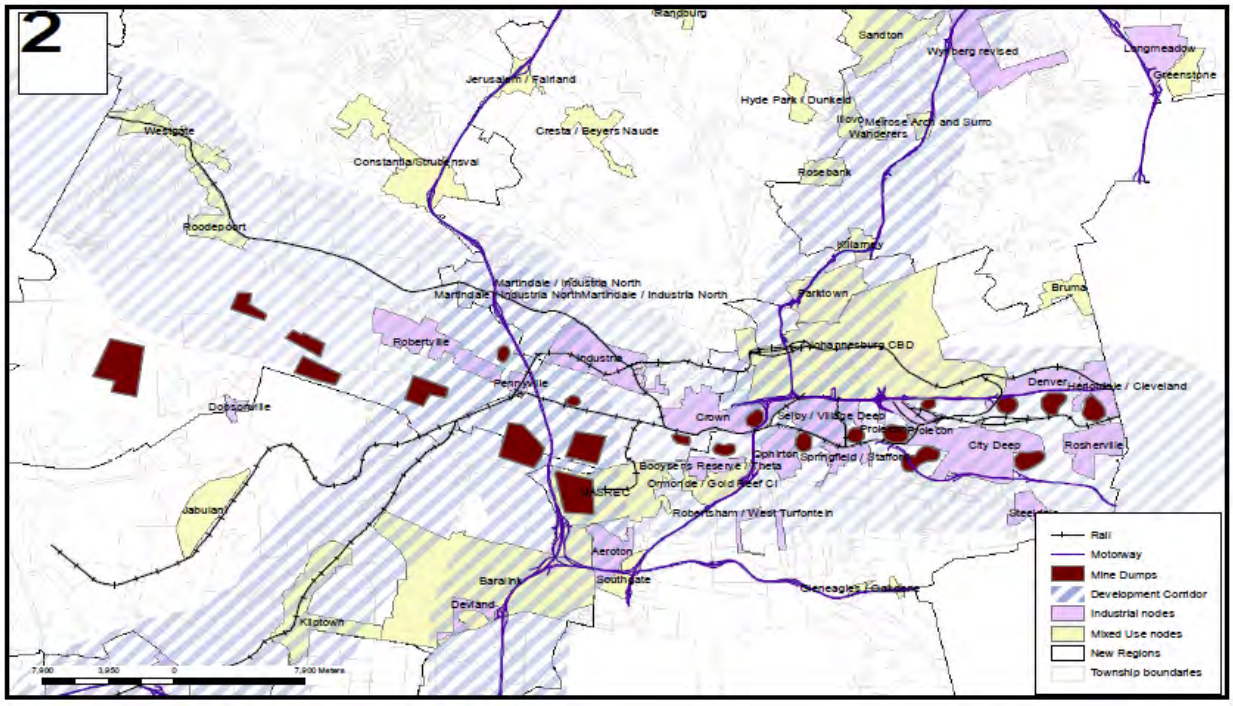


Figure 7.14 Conceptual East-West Development Corridor

Source: CoJMM (2009b)

The EWDC has four main development goals that are collectively used to plan and implement the EWDC, namely:

- Creating an efficient transport system.
- Creating an efficient urban structure.
- Integrating and sustaining neighbourhoods.
- Economic regeneration.

(CoJMM, 2008b: 24)

The promotion of development corridors within the city will facilitate the decrease in private motor vehicle dependence and an increase in public transport usage.

7.5 The Regional and Metropolitan context

As detailed in sections 7.2 and 7.3 of this chapter, the metropolitan structure is composed of movement networks and nodes of varying scales and intensities. The interconnectivity of nodes within the metropolitan system by means of the transportation network, and specifically the road network, is vital to ensure modal transfers and economic linkages.

Development potential is either strengthened or weakened by its accessibility and links with the broader development environment. The relationship between activity nodes, interaction and interdependence of these nodes by means of transportation routes influences the development along the routes.

Development along major routes within the city resulting from the interaction between nodal points can influence development along other routes within the metropolitan system. An example of the dynamic nature of the interrelationships between the structuring elements within the Johannesburg metropolitan system is detailed below.

A number of significant inter-regional road linkages exist between the City of Johannesburg and Mogale City, including Randfontein Road, Voortrekker/Ontdekkers Road and Hendrik Potgieter Road (MCLM, 2008). The Mogale City Integrated Development Plan (IDP) identified the area around the Hendrik Potgieter Road and N14 intersection as a major pressure point for development. The interaction between this nodal point and the nodal points further south-east along Hendrik Potgieter Road (such as the Constantia/Strubensvalley Regional Node) within the boundaries of the City of Johannesburg, combined with the surge of residential developments to the north-east of Hendrik Potgieter (GIS, 2010) steered the development along Hendrik Potgieter Road. However, the initial development pressure and expected intensity and path of development along this major link between Mogale City and the City of Johannesburg did not realise to the extent it was expected due to a number of constraints to spatial development, including:

- Severe engineering services constraints within Mogale City
- The Gauteng Urban Edge
- The buffer zone of the Cradle of Humankind World Heritage Site

(MCLM, 2008:83)

In contrast with the urban landscape along Hendrik Potgieter Road towards Mogale City, there is a noticeable continuation of the urban fabric along Ontdekkers Road over the Mogale City municipal boundary – thereby giving the impression that the two cities are one. The primary reasons for this manifestation along Voortrekker/Ontdekkers Road and not Hendrik Potgieter Road include:

- The continual interaction between the nodes along the route (between Mogale City and Johannesburg) – See Figure 7.15;
- The importance of Ontdekkers Road as one of the key east-west linkages;
- The significant role Ontdekkers Road plays as a key public transportation route;
- The significant role Ontdekkers Road plays as a key linkage within the municipal structure; and
- The restrictions on development along Hendrik Potgieter Road due to the delineated Urban Development Boundary (UDB) of the City of Johannesburg

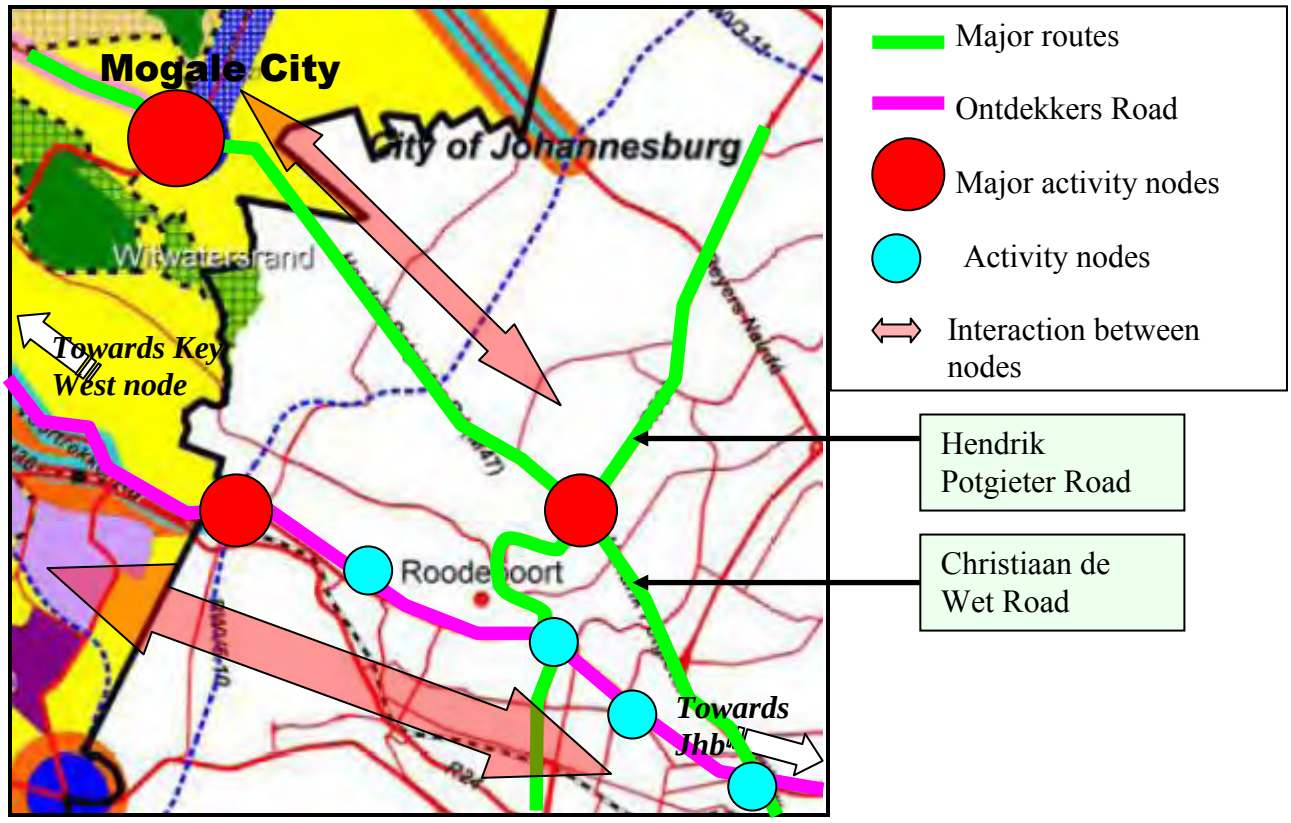


Figure 7.15 Interaction between nodes

Source: Author"s own representation

The development of the Clearwater Mall Shopping Centre during 2004; the upgrading of this shopping centre during 2010; the construction of the Clearwater office park during 2005 and the establishment of numerous other office developments (including Constantia Kloof and

Panorama Office Park) strengthened the interaction link between the nodes and ensured a good north-south and east-west network of roads.

7.6 Conclusion

It can be concluded that Ontdekkers Road plays a vital role in the metropolitan urban structure and system of the City of Johannesburg, which is made evident by the immense traffic volumes. The route directly links with major routes in the metropolitan system, including Christiaan de Wet Road and Hendrik Potgieter Road and is indirectly linked to routes such as Main Reef Road and Randfontein Road. These linkages result in a lattice of transportation routes that link the nodes within the system, thereby contributing to access to urban opportunities. The role that Ontdekkers Road plays in the metropolitan structure reveals that the principles of accessibility and integration can be achieved through the promotion of urban nodes and corridors and the provision of public transportation facilities along the route. Ontdekkers Road is essentially linked with the public transport system in a number of direct (i.e. minibus-taxi, railway services and bus services) and indirect (i.e. Gautrain, BRT) ways. The interaction between the nodes and linkages within the metropolitan structure influences the development potential along routes such as Ontdekkers Road.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

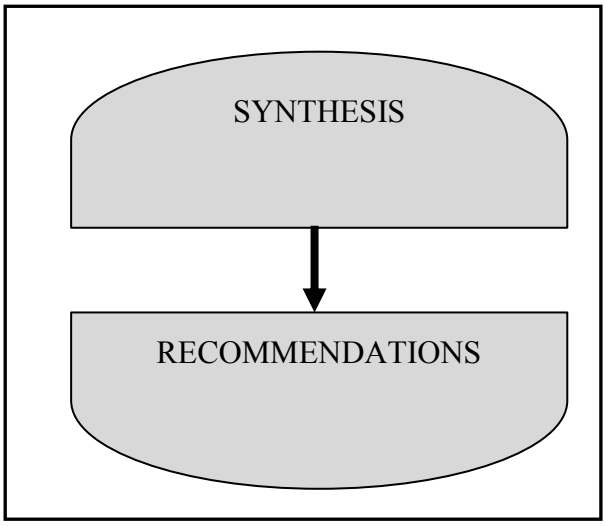


Figure 8.1 Structure of Chapter 8

This chapter presents a summary of the findings, conclusions, viewpoints and insights that have been made, with specific reference to the empirical investigation. The core findings are used to formulate recommendations in terms of the necessity of development policies along arterial routes, solutions to the problems experienced during policy formulation, the factors to be considered during policy-formulation and the implementation of the policies along arterial routes.

Section 8.2 provides a synthesis of the issues that are encountered along arterial routes and the insights gained as a result of the empirical study. Section 8.3 provides a number of recommendations with regards to the main issues experienced along arterial routes.

8.2 Findings

Arterial routes are one of the key components of the urban structure. These routes play vital roles in the metropolitan structure by:

- Connecting nodes / nodal points
- Contributing towards the urban form / structure
- Providing access to urban opportunities
- Acting as feeder systems of the great transportation system, including the public transportation system (e.g. BRT, Gautrain)
- Potentially functioning as major public transportation routes
- Often linking metropolitan areas / municipal areas

Immense pressure to develop non-residential uses along arterial routes is often experienced as a result of the roles that arterial routes play in the metropolitan structure. This development pressure, coupled with market forces and the economic climate affects the property values along such routes due to the development potential of the properties. The formulation and implementation of development policies along major arterials contributes to the stabilisation of property values by controlling and containing development within specific areas along the routes.

The comparison of the development policies along the major arterials in the study area (i.e. Voortrekker, Ontdekkers and Main Road) and the development and urban landscape along the routes revealed the following:

- *The Ontdekkers Road Development Policy (ORDP) is more detailed and specific with regards to the land uses and scale of development permitted; whereas the Voortrekker Road Development Policy (VRDP) provides general guidelines with regards to the permitted land uses.* The ORDP specifies the scale of land uses (e.g. home office versus integrated office developments) permitted along the route and lists specific land uses (e.g. hairdresser, stationery shop, etc); whereas the VRDP lists general land uses (e.g. offices, retail, etc)

- *There is a direct correlation between the policy per se and enforcement of a policy and the urban landscape and success of the route.* The presence, rigidity and varying degrees of policy enforcement along the route was evident by the noticeable difference in the urban fabric along the three sections of the study area / route (see Table 8.1):

Table 8.1 Comparison of the urban fabric along the route in relation to the applicable policies

ROAD SECTION & POLICY APPLICABLE	URBAN FABRIC / LANDSCAPE
Ontdekkers Road *Detailed & specific Ontdekkers Road Development Policy*	• Open character • Buildings set back from street boundaries • Defined, legible nodes • Retail components mostly limited to nodal areas • Awareness of the adjoining residential component • No on-street parking • Prominent road intersections • Predominantly low intensity office development along the route • Mobility of the route is not affected by accessibility to land uses
Main Road *No specific policy*	• Enclosed character of the route • Structures on or near street boundaries • No defined nodal areas • Presence of retail component throughout the route • Unawareness of adjoining residential component • On-street parking • Predominantly retail and service industry developments along the route • Mobility of the route is hindered by accessibility to land uses
Voortrekker Road *General/broad Voortrekker Road Development Policy*	• Varying degrees of openness along the route • Distance of structures from the street boundaries varies along the route • Only one defined nodal area (i.e. Silverpines) • Retail components observable along various points along the route – not limited to nodal areas • Awareness of adjoining residential component • Limited on-street parking • The route is characterised by light industrial, service industries, retail and office developments. • Mobility of the route is affected to some degree by the accessibility to land uses

Source: Author"s own representation

- *Key principles form the basis of successful development policies.* In the case of Ontdekkers Road, which can be considered relatively successful, the following key principles were applied:

    - Access and flow of traffic
    - Management of development
    - Promotion of the residential component
    - Implementation of principles to obtain a mixed land use activity spine
    - Integrated development

- *It is important to recognise the development potential along arterial routes, but at the same time, protect the mobility function of the route and the adjoining residential component.* Limiting the permitted land uses and imposing development controls and other conditions allows the functional, sustainable development of properties along major routes

- *Public participation is a vital component during the formulation-process of development policies.* The involvement of all relevant affected parties, sectors and disciplines and the consideration of all relevant inputs will contribute to a functional development policy that will promote sustainable and integrated development. Figure 8.2 illustrates the numerous factors that were considered during the investigation process of the ORDP.

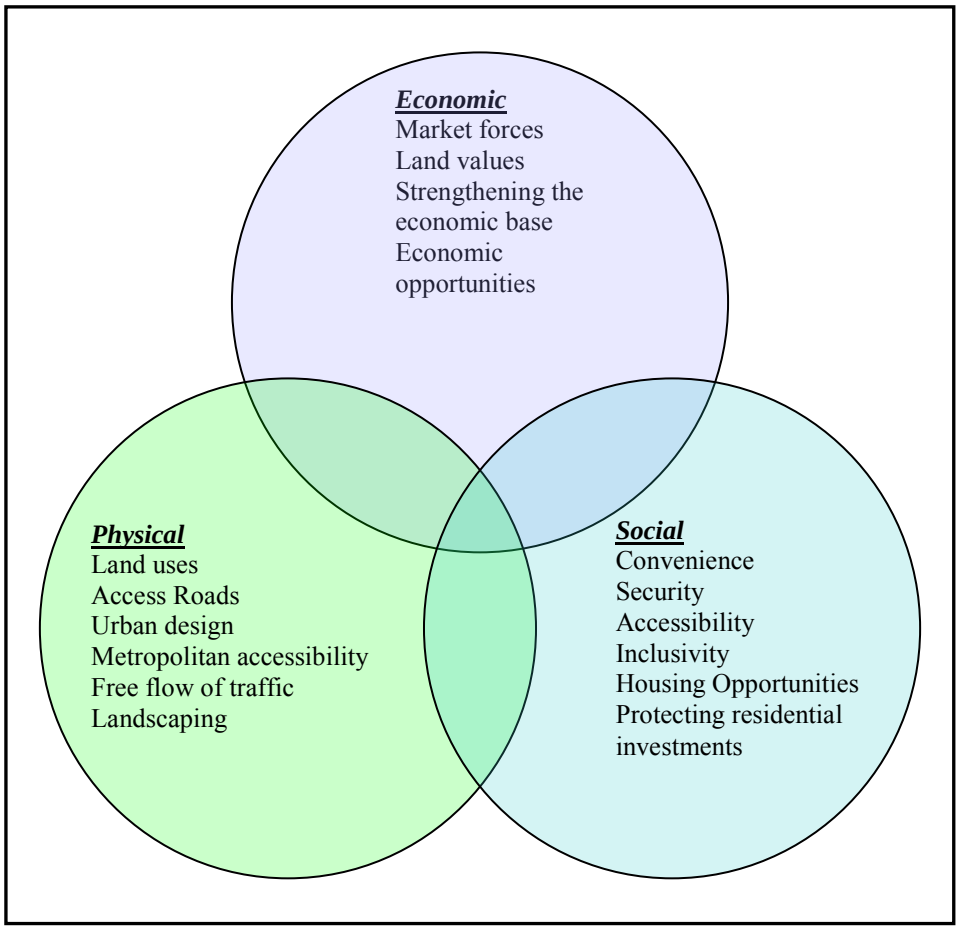


Figure 8.2 Key considerations during policy formulation

Source: Author"s own representation

- The key factors that should be considered during the formulation and the implementation of development policies along arterial routes such as Ontdekkers Road should include:
    - The potential of properties along major routes (particularly due to visibility)
    - Access to urban opportunities
    - Accessibility to individual erven
    - Integration of land uses
    - Compatibility of non-residential uses with the surrounding urban fabric
    - Protection of residential investments and mitigating measures
    - Design guidelines
    - Improving the living environment (through urban design, noise control, landscaping)

- *Development policies should be dynamic in nature.* Since development along arterial routes such as Ontdekkers Road is dynamic in nature, which is made evident by the considerable increase in non-residential land uses along the route over the years and the varying development pressure, it is important to revise the policy.

- *The protection of the functionality of arterial routes can be influenced by imposing conditions, other than development controls.* By imposing conditions related to urban design (i.e. landscaping, restrictions on signage, elevational treatments, etc), the ORDP attempts to provide further protection of the mobility-function of the route by preventing / limiting the distractions of the drivers.

- *Nodes that are identified along major arterials can be multifunctional.* Identified nodes can function as access points to the public transportation system, modal transfer points and areas of economic concentrations. One such node within the study area is the Princess/Westgate regional node – there is a concentration of economic activities (i.e. Westgate shopping centre and Princess Crossing) and access to a number of transport modes (i.e. minibus-taxi rank, Princess railway station and Metrobus route).

- *The type of development and the Floor Area of a development influences the generation of traffic along the bordering route.* The ORDP was based on this premise and consequently the Floor Area Ratio (FAR) was limited to 0.2 along most of the route. The non-residential uses that are located along Ontdekkers Road are primarily traffic generators and not traffic interceptors[8].

- *Development sites must be contextualised in terms of higher level existing requirements of city-wide plans.* The city-wide strategies and requirements of various plans such as Integrated Development Plans (IDPs), Local Development Objectives (LDOs), Spatial Development Frameworks, Integrated Transport Plans, Local Economic Development and environmental plans applicable in the area must be considered when assessing any potential development.

[8] *Traffic generators are land uses that generate traffic by attracting people to the specific use (e.g. shopping centres, offices, etc); whereas traffic inceptors are dependent on the existing traffic flow along the route and does not generate additional traffic (e.g. filling stations)*

- *Cross-border issues between municipal areas must be dealt with.* Key cross-border issues between Mogale City and the City of Johannesburg that necessitate coordination are:
  - The on-going interaction / co-operation and "anchoring" of the East-West Development Corridor (western extent)
  - Engineering and road infrastructure
  - Nodal linkages (e.g. Hendrik Potgieter/R28 nodal area & Constantia/Strubensvalley node; Key West node & Princess/Westgate node)
  - Transportation Planning and the future Strategic Public Transportation networks

- *Development policies along arterial routes (such as the ORDP) strive towards sustainable development of the routes.* The vicious traffic generating cycle that increases car-related development can be overcome by implementing a number of sustainability principles (i.e. introduction of public transportation, enforcing the land use status quo, introduction of access management) – See Figure 8.3. A number of these sustainability principles have been included in the ORDP (i.e. introduction of access management, public transportation and enforcing the land use status quo).

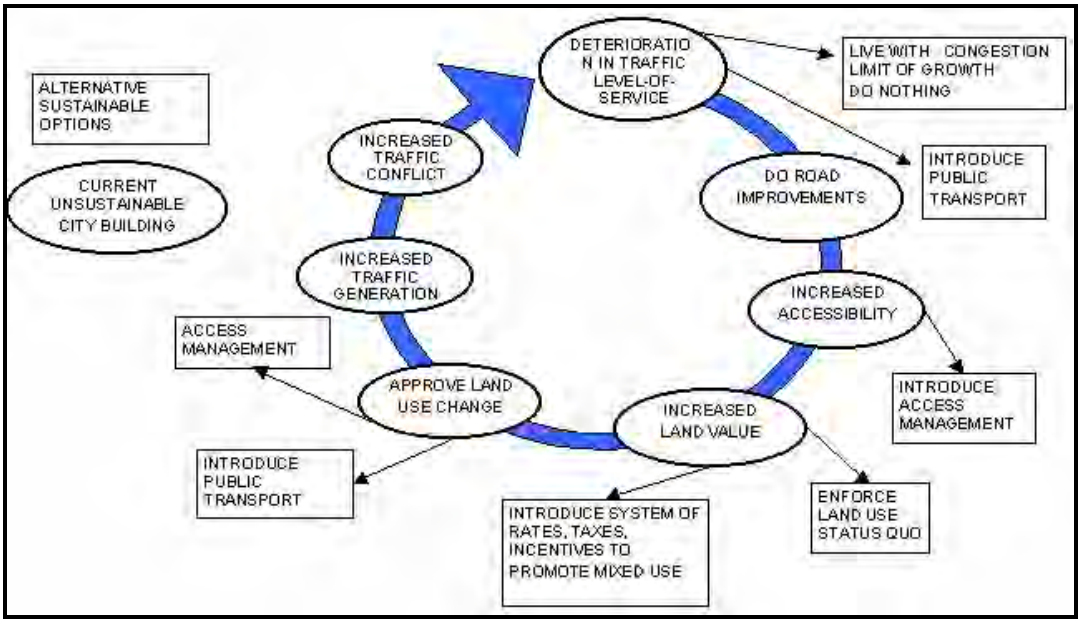


Figure 8.3 Vicious traffic cycle

Source: Jordaan, G (2003:3)

Specific conclusions that can be made about Ontdekkers Road include the following:

- The development along Ontdekkers Road is based on the theoretical concept of beads-on-a-string. The route itself and the properties adjoining the route act as the string of development and the identified nodes are the beads of intense development.

- Non-residential developments along Ontdekkers Road increased dramatically over the past ten years, especially between the nodes. This reinforced the initial approach to development along Ontdekkers Road – the development of the route with low intensity non-residential uses between nodes and higher intensity non-residential uses within the nodes.

- The identified nodes are still not developed to capacity; however the capacity utilisation has increased over the past ten years. The ORDP encourages development within nodes by imposing increased development controls and charging lower road and intersection contributions within nodes.

- Ontdekkers Road is a vital component of the East-West Development corridor as it forms the northern most boundary of the corridor.

The following challenges for policy development along arterial routes have been identified:

- Inconsistency between controlling authorities and lack of policy co-ordination
- Necessity of comprehensive public participation
- The diverse and multi-faceted nature of development along arterial routes necessitates a multi-faceted approach
- Varying economic / market forces
- Conflicting views of controlling authorities (e.g. Gautrans, CoJMM, Townships Board)
- Differing approaches of disciplines and sectors (e.g. land use planning, transportation planning)
- Historical development along the route
- Development potential of properties abutting arterial routes and the mobility versus accessibility problem
- Unsustainable development along arterial routes
- Traffic congestion

8.3 Recommendations

The following recommendations are proposed with regards to the potential constraints of policy-formulation and implementation along major arterial routes:

- Development policies should take due cognisance of the town planning theories on which they are based throughout the formulation and review process to ensure that the initial aim of the policy is still the foremost factor in the approach.

- Development policies should be reviewed annually (preferably during the RSDF review process) in order to remain current and to ensure that development trends, the economic environment, socio-economic conditions, the ever changing environment and the status quo of the route have been considered. This will ensure a continual awareness of the route and its development and enable an immediate response to any land uses (legal and illegal) which could be to the detriment of the route as a whole. Traffic impact studies should be conducted at specific intervals (such as nodal areas) along arterial routes during the review process to determine whether the existing development plan is still viable and whether any amendments should be made, based on the trip generation rates of the land uses.

- The classification of an arterial route must consider its primary function (accessibility or mobility) and the development policy should be formulated on this basis. Should mobility be identified as the primary function, conditions should be imposed to protect the mobility of the route (See Figure 8.4).

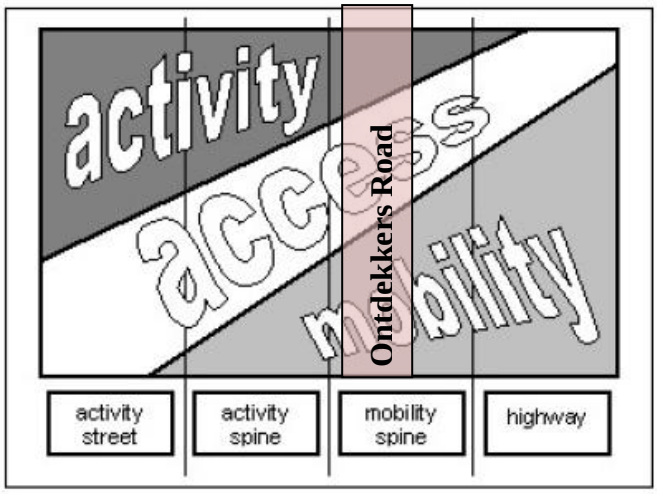


Figure 8.4 A comparison of the function of the Ontdekkers Road mobility spine

Source: Jordaan, G (2003:4)

- Policies and developments along arterial routes should strive towards the achievement of „Transit-oriented development‟ (TOD)[9] rather than „Transit-adjacent development‟ (TAD) to ensure successful integration of land use and transportation.

- Development contributions that are made for road and intersection upgrades should be ringfenced. The calculations for road and intersection upgrade contributions must be revisited regularly and based on the economic environment, condition of the road network, traffic generation rates and traffic volumes.

- Development policies should align with broader, city-wide and region-specific strategies and policies. In the case of Ontdekkers Road, an investigation to determine whether the nodes identified in terms of the ORDP should receive a nodal classification in term of the RSDF should take place. The status of shopping centres, in terms of classification, that are located within nodal area should influence the identification, delineation and ranking of the nodes.

- The formulation of policies along arterial routes must take cognisance of the fact that such routes are integral components of the urban structure. In the case of Ontdekkers Road, cognisance should be taken of the fact that this route is an integral component of the East West Development Corridor and development should be managed as such.

- Inter-governmental co-ordination must be promoted by ensuring that conditions imposed by all levels of government are harmonious and co-ordinated.

- Conditions that are imposed in terms of development policies such as the ORDP must be enforced and implemented on a stricter basis, especially at the level of Site Development Plan (SDP) submission and confirmed when issuing of the occupation certificate.

- Overall, planning should to be co-ordinated between bordering municipalities, with specific reference to the provision of public transportation, infrastructure services and spatial growth. This can either be realised through the formulation of a single development policy that will be applicable along the entire length of the route or through the continual interaction between municipalities when formulating their respective

[9] *Both TOD and TAD refer to the area within a 10-min walk, or 500 m radius, around a major transit station. While a TOD describes a station-area precinct that is compact, mixed-use, and facilitates transit connectivity through urban design, a TAD is "physically near transit [but] fails to capitalize upon this proximity. . . [It] lacksany functional connectivity to transit – whether in terms of land-use composition, means of station access, or site design" (Cervero et al. 2002:6).*

policies. Since there is a vast difference in the needs of municipal areas, residents and the general environment, it is proposed that separate development policies are formulated for each municipal area; however cross-border co-ordination must take place in order to contribute to the achievement of the Gauteng Global City Region principle. By actively seeking the advice and opinion of a neighbouring municipality, potential cross-border planning issues and the current planning thinking and discourse can be clarified and co-ordinated. A collaborative effort will ensure that potential cross-boundary planning initiatives can be followed.

- An interdisciplinary approach to development policy formulation, which promotes and incorporates all facets related to development along arterial routes should be promoted. Since the main problem experienced with the formulation of policies along arterial routes is related to the lack of an integrated and co-ordinated effort between various sectors, levels of government and disciplines, the primary recommendation in this regard is to follow a Collaborative Strategic Goal Oriented Programming (CoSGOP) approach.

  CoSGOP is a collaborative and communicative strategic planning process, which is oriented towards defined and specific goals. Since, development along arterial routes and the related development policies are multi-faceted, this approach, which ensures stakeholder participation, is ideal. CoSGOP entails a joint decision-making and structured planning process characterised by feed-back loops. The key elements of CoSGOP are illustrated in Figure 8.5.

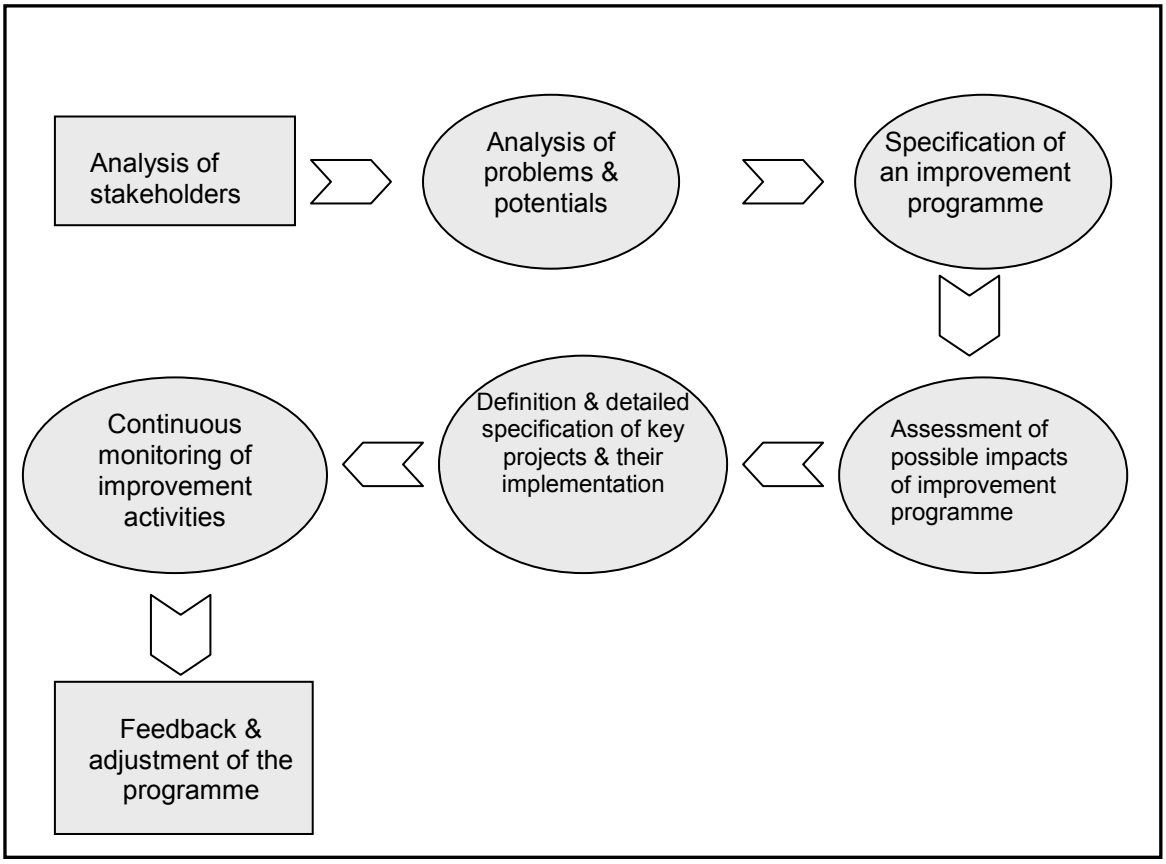


Figure 8.5 Essential elements of CoSGOP

Source: Author"s own construction from Muller *et al (2005)*

- Development policies should be based on the premise of contingency-based planning, which identifies specific responses to possible future conditions. Since contingency-based planning recognises changing conditions and the difficulty of predicting development, this approach will enable the flexible implementation of a development policy, while still making provision for changing conditions (e.g. the provision of fewer parking spaces, provided that a contingency plan is in place should more parking spaces be required in future)

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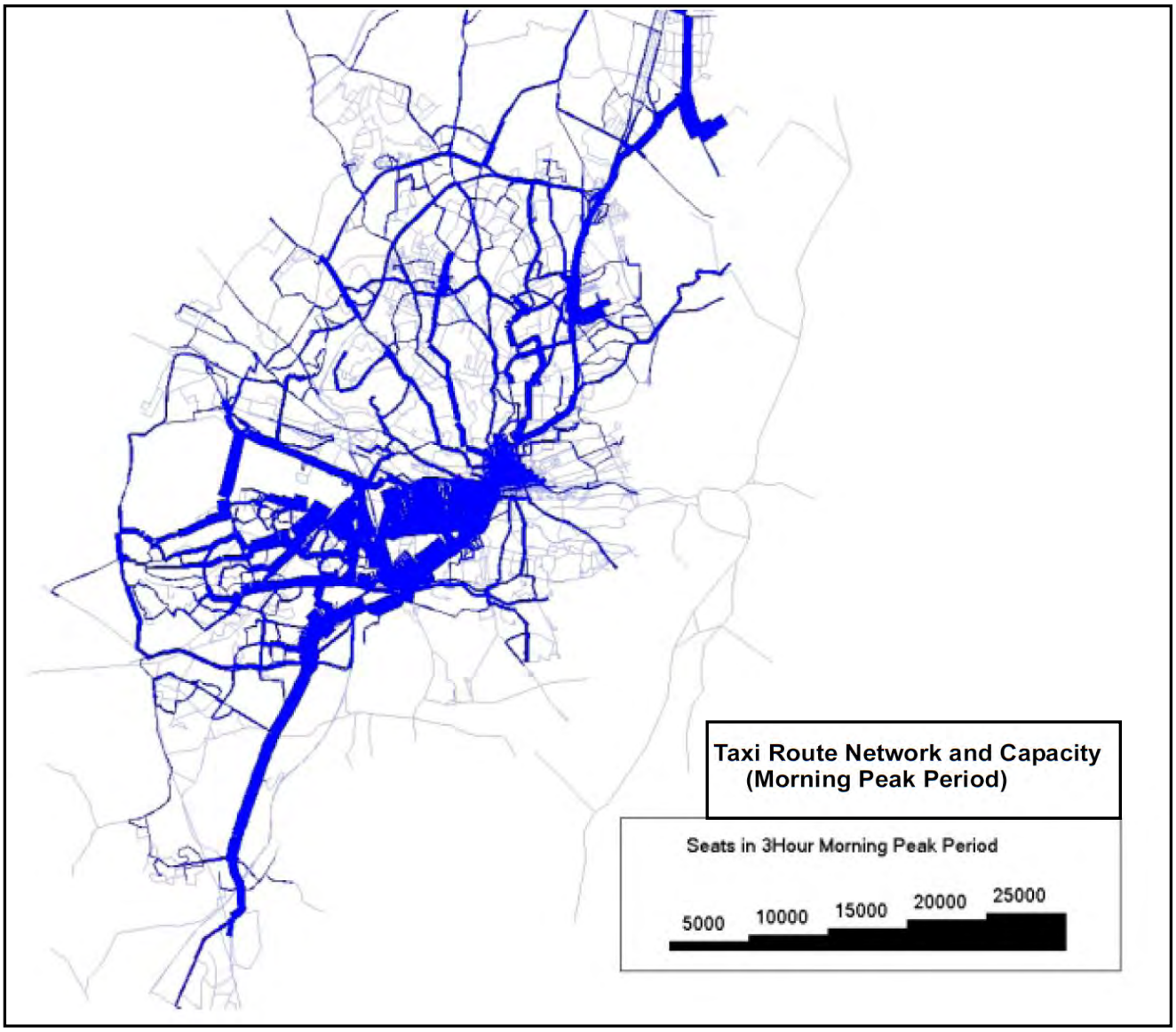
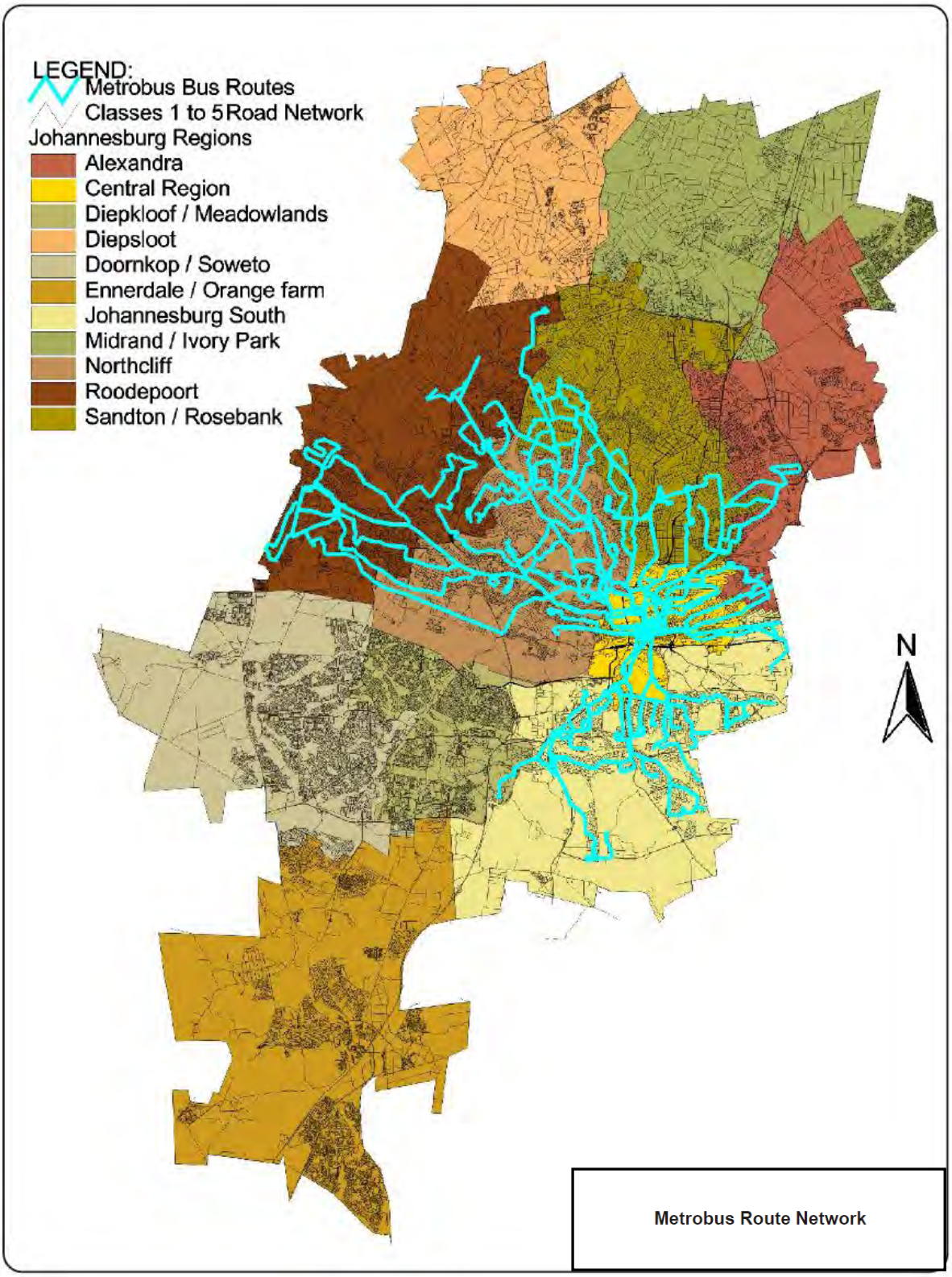
APPENDIX 1

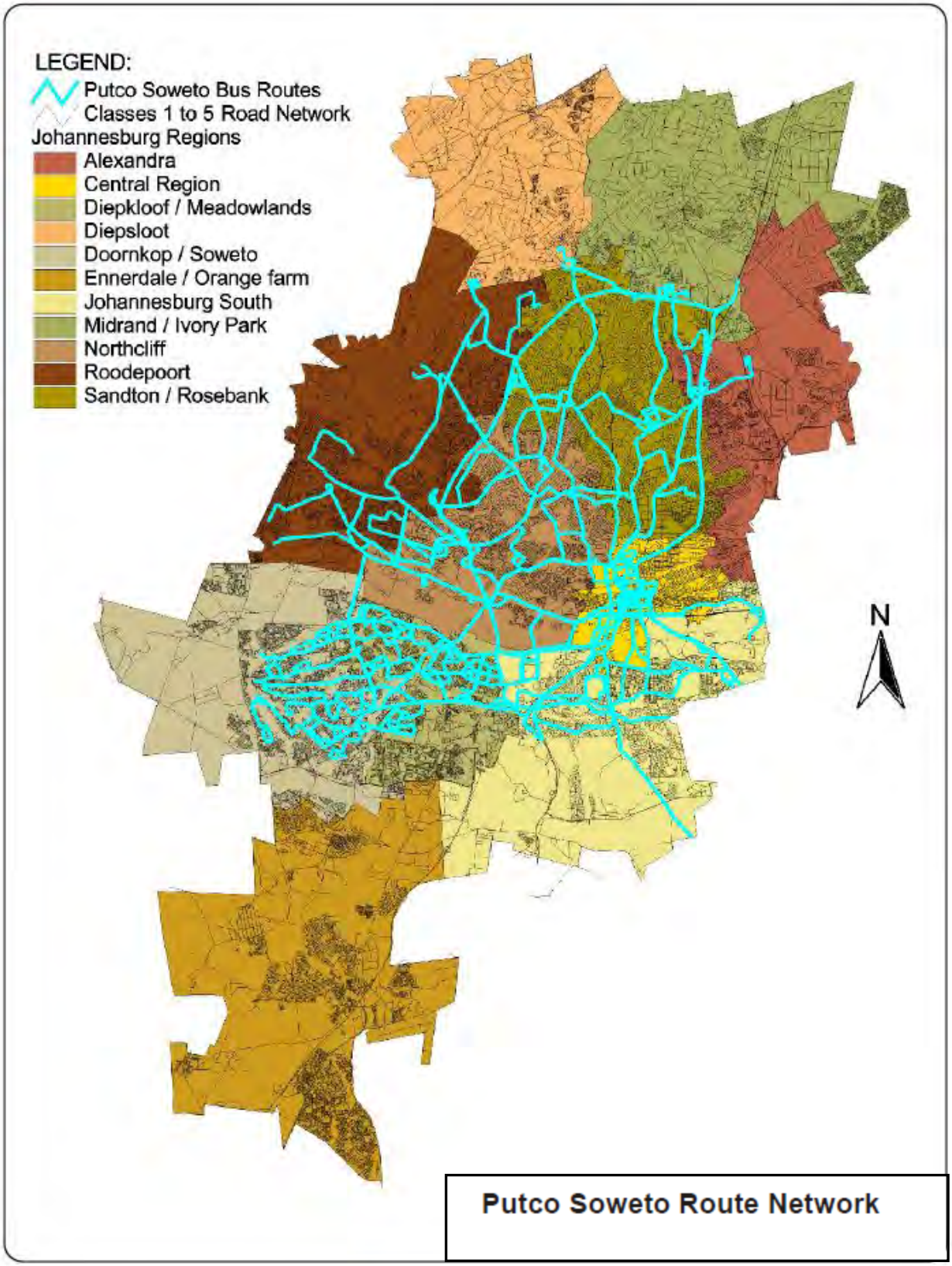
PUBLIC TRANSPORTATION ROUTES AND VOLUMES (CITY OF JOHANNESBURG)



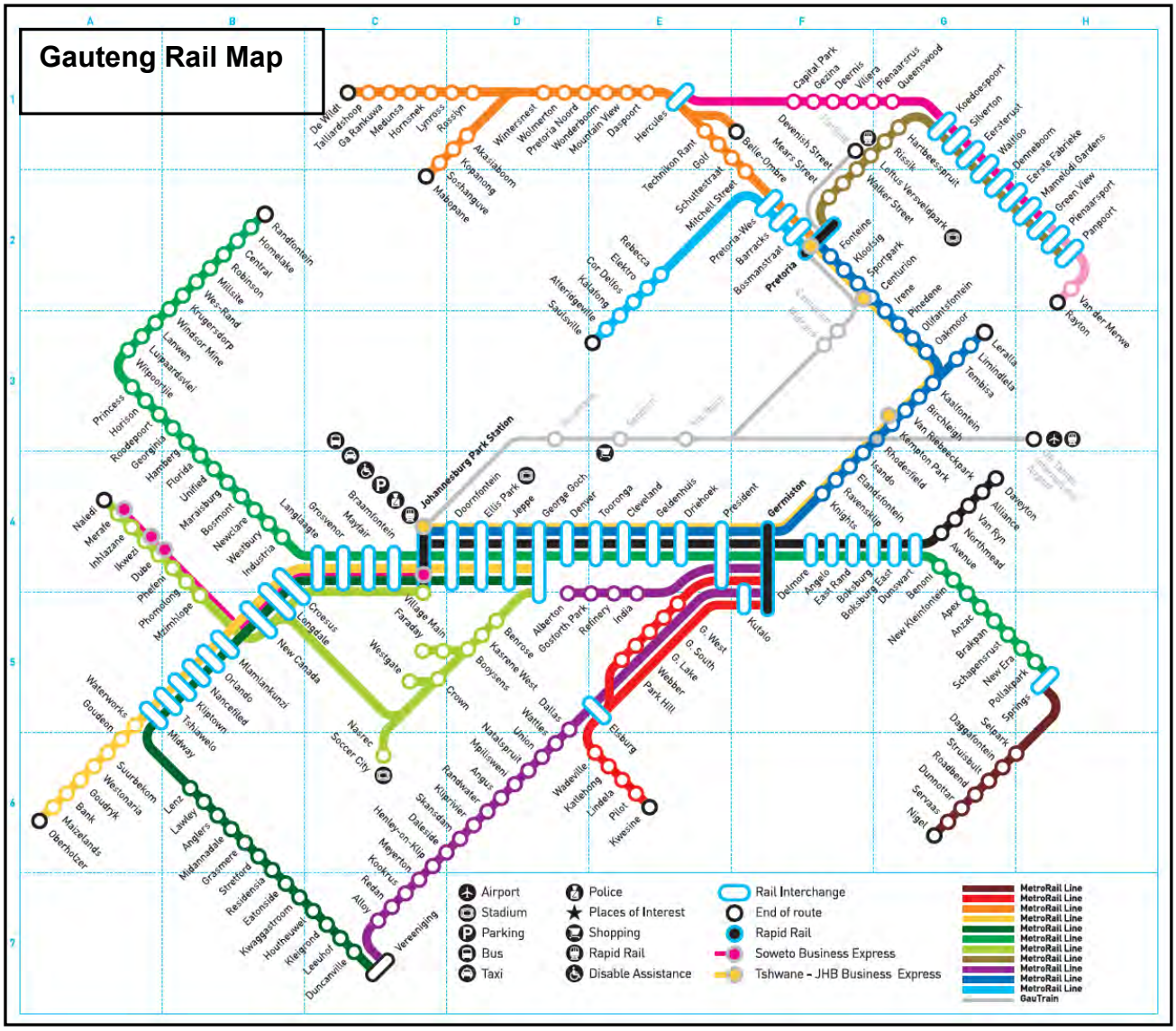
Source: CoJMM, 2004



Source: CoJMM, 2004



Source: CoJMM, 2004



Source: PRASA, 2010

APPENDIX 2

CITY OF JOHANNESBURG ROADS: LOS & V/C RATIOS

	Road Names	Location	Road Type Code	Direction 1	Direction 2	Direction 1 Volume (07:00-08:00)	Direction 2 Volume (07:00-08:00)	Direction 1		Direction 2		Peak Hour V/C	Road Capacity
								LOS	V / C	LOS	V / C		
1	9th Ave	East of Softball	2112	Eastbound	Westbound	767	562	Los D	0.73	Los C	0.53	0.73	1053
2	Beyers Naude	Near John Vorster	2211	Northbound	Southbound	1684	1761	Los D	0.72	Los D	0.75	0.75	2340
3	Beyers Naude	N1 Northern Terminal	2311	Eastbound	Westbound	2057	1263	Los C	0.59	Los B	0.36	0.59	3510
4	Beyers Naude, Northriding	West of Bailey	2122	Eastbound	Westbound	1393	1425	Los E	0.99	Los F	1.01	1.01	1404
5	Canada Road	North of Modder St	2212	Northbound	Southbound	1653	706	Los D	0.74	Los B	0.32	0.74	2223
6	Christiaan de Wet	North of John Vorster Rd	2122	Northbound	Southbound	1584	949	Los F	1.13	Los D	0.68	1.13	1404
7	Christiaan de Wet	North of Hendrik Potgieter Rd	2122	Northbound	Southbound	1501	899	Los F	1.07	Los D	0.64	1.07	1404
8	Columbine	East of Ashden	2212	Eastbound	Westbound	815	649	Los B	0.37	Los B	0.29	0.37	2223
9	East St	West of Axle Rd	2212	Eastbound	Westbound	34	25	Los A	0.02	Los A	0.01	0.02	2223
10	Golden Highway	North of Grassmere Interchange	2122	Northbound	Southbound	970	406	Los D	0.69	Los B	0.29	0.69	1404
11	Golden Highway	North of Main Rd Comptonville	2212	Eastbound	Westbound	2149	1546	Los E	0.97	Los D	0.70	0.97	2223
12	Golden Highway	South of N12 Interchange	2221	Northbound	Southbound	382	941	Los A	0.12	Los B	0.30	0.30	3120
13	Golden Highway	Near Ingram	2222	Eastbound	Westbound	621	292	Los A	0.21	Los A	0.10	0.21	2964
14	Golden Highway	near Boot Road	2222	Northbound	Southbound	623	1854	Los A	0.21	Los D	0.63	0.63	2964
15	Goldman	6th	2112	Eastbound	Westbound	1115	407	Los F	1.06	Los B	0.39	1.06	1053
16	Hans Strijdom	West of Pres. Fouche	2211	Eastbound	Westbound	439	382	Los A	0.19	Los A	0.16	0.19	2340
17	Hans Strijdom	North of Epsom	2221	Northbound	Southbound	1285	1318	Los C	0.41	Los C	0.42	0.42	3120
18	Hendrik Potgieter	East of Ranier	2211	Northbound	Southbound	1486	991	Los D	0.64	Los C	0.42	0.64	2340
19	Impala Road (M19)	West of Klipriver Drive	2112	Northbound	Southbound	805	322	Los D	0.76	Los B	0.31	0.76	1053
20	JG Strijdom	South of Springhaas	2122	Eastbound	Westbound	1562	2007	Los F	1.11	Los F	1.43	1.43	1404
21	JG Strijdom	South of Springhaas	2211	Northbound	Southbound	813	897	Los B	0.35	Los B	0.38	0.38	2340
22	John vorster	East of Hilary	2112	Eastbound	Westbound	1110	982	Los F	1.05	Los E	0.93	1.05	1053
23	Klipriver	North Leg at int. with Swartkoppies	2211	Northbound	Southbound	2336	907	Los E	1.00	Los B	0.39	1.00	2340
24	Klipriver	South leg at int. with Swartkoppies	2211	Northbound	Southbound	580	1593	Los A	0.25	Los D	0.68	0.68	2340
25	Klipspruit Valley	Above Station	2212	Northbound	Southbound	435	445	Los A	0.20	Los A	0.20	0.20	2223
26	Lola Street	West of Naomi Street	2112	Eastbound	Westbound	519	200	Los C	0.49	Los A	0.19	0.49	1053
27	Louis Botha	(Near Shell)	2212	Eastbound	Westbound	1445	501	Los D	0.65	Los A	0.23	0.65	2223
28	Main	South of Lonehill Blvd	2222	Northbound	Southbound	899	1408	Los B	0.30	Los C	0.48	0.48	2964
29	Main Reef	Near Kort	2112	Eastbound	Westbound	1123	652	Los F	1.07	Los D	0.62	1.07	1053
30	Main Reef	East of Shaft St	2212	Eastbound	Westbound	2463	1046	Los F	1.11	Los C	0.47	1.11	2223
31	Masupha	West of Dippenaar St	2112	Westbound	Eastbound	738	478	Los D	0.70	Los C	0.45	0.70	1053
32	N1	Grasmere Int. to Misgund Int.	1231	Northbound	Southbound	1273	434	Los B	0.31	Los A	0.11	0.31	4050
33	N1	Misgund Int. to Golden Highway Int.	1331	Northbound	Southbound	4711	1869	Los D	0.78	Los B	0.31	0.78	6075
34	N1	Golden Highway Int. to Diepkloof Int.	1331	Northbound	Southbound	5037	2055	Los D	0.83	Los B	0.34	0.83	6075
35	N1	Diepkloof Int. to Rand Show Int.	1231	Northbound	Southbound	2089	593	Los C	0.52	Los A	0.15	0.52	4050
36	N1	Rand Show Int. to Soweto Highway Int.	1331	Northbound	Southbound	4807	3997	Los D	0.79	Los D	0.66	0.79	6075
37	N1	Soweto Highway Int. to Maraisburg Int.	1231	Northbound	Southbound	4659	3732	Los F	1.15	Los E	0.92	1.15	4050
38	N1	Maraisburg Int. to Gordon Int.	1331	Northbound	Southbound	3400	3724	Los C	0.56	Los C	0.61	0.61	6075
39	N1	Gordon Int. to 14th Ave Int.	1331	Northbound	Southbound	4000	2750	Los D	0.66	Los C	0.45	0.66	6075
40	N1	14th Ave Int. to Beyers Naude Int.	1331	Northbound	Southbound	5148	2381	Los D	0.85	Los B	0.39	0.85	6075
41	N1	Beyers Naude Int. to Hans Strijdom Int.	1331	Northbound	Southbound	4571	3088	Los D	0.75	Los C	0.51	0.75	6075
42	N1	Hans Strijdom Int. to Willam Nicol Int.	1331	Northbound	Southbound	4592	3565	Los D	0.76	Los C	0.59	0.76	6075
43	N1	William Nicol Int. to Rivonia Int.	1331	Northbound	Southbound	5536	4204	Los E	0.91	Los D	0.69	0.91	6075

Source: CoJMM, 2004

	Road Names	Location	Road Type Code	Direction 1	Direction 2	Direction 1 Volume (07:00-08:00)	Direction 2 Volume (07:00-08:00)	Direction 1		Direction 2		Peak Hour V/C	Road Capacity
								LOS	V / C	LOS	V / C		
44	N1	Rivonia Int. to Buccleuch Int.	1431	Northbound	Southbound	6181	5178	Los D	0.78	Los C	0.65	0.78	7920
45	N1	Buccleuch Int. to Allandale Int.	1431	Northbound	Southbound	6689	6675	Los D	0.84	Los D	0.84	0.84	7920
46	N1	Allandale Int. to New Rd Int.	1331	Northbound	Southbound	4203	6400	Los D	0.69	Los F	1.05	1.05	6075
47	N1	New Rd Int. to Cliffantsfontein Int.	1331	Northbound	Southbound	4322	6190	Los D	0.71	Los F	1.02	1.02	6075
48	N3	Linksfield Int. to Modderfontein Int.	1331	Northbound	Southbound	5468	5518	Los E	0.90	Los E	0.91	0.91	6075
49	N3	Modderfontein Int. to London Rd Int.	1331	Northbound	Southbound	6500	4612	Los F	1.07	Los D	0.76	1.07	6075
50	N3	London Rd Int. to Marlboro Int.	1331	Northbound	Southbound	6600	4700	Los F	1.09	Los D	0.77	1.09	6075
51	N3	Marlboro Int. to Buccleuch Int.	1331	Northbound	Southbound	4112	4750	Los D	0.68	Los D	0.78	0.78	6075
52	N12	West of Klipspruit Int.	1231	Eastbound	Westbound	2000	500	Los C	0.49	Los A	0.12	0.49	4050
53	N12	Klipspruit Int. to Golden Highway Int.	1231	Eastbound	Westbound	2931	946	Los D	0.72	Los A	0.23	0.72	4050
54	N12	Golden Highway Int. to Misgund Int.	1231	Eastbound	Westbound	3364	1003	Los D	0.83	Los A	0.25	0.83	4050
55	N12	Diepkloof Int. to M1 Int.	1431	Eastbound	Westbound	6543	4316	Los D	0.83	Los C	0.54	0.83	7920
56	N12	M1 Int. to Xavier Int.	1331	Eastbound	Westbound	4284	2966	Los D	0.71	Los C	0.49	0.71	6075
57	N12	Xavier Int. to Klipriver Int.	1331	Eastbound	Westbound	4000	3100	Los D	0.66	Los C	0.51	0.66	6075
58	N12	Klipriver Int. to Comaro Int.	1331	Eastbound	Westbound	3942	3251	Los D	0.65	Los C	0.54	0.65	6075
59	N12	Comaro Int. to R59 Int.	1231	Eastbound	Westbound	5870	4234	Los F	1.45	Los F	1.05	1.45	4050
60	Soweto Highway	Bet. N1 and Diepkloof Boundary	2211	Eastbound	Westbound	2700	2119	Los F	1.15	Los E	0.91	1.15	2340
61	Ben Naude Ave	West of Interchange	2112	Westbound	Eastbound	556	1618	Los C	0.53	Los F	1.54	1.54	1053
62	Old Potch Rd	Bet. N1 and Diepkloof Boundary	2212	Eastbound	Westbound	1577	2867	Los D	0.71	Los F	1.29	1.29	2223
63	Canada Road	North of Modder Street	2212	Northbound	Southbound	2041	568	Los E	0.92	Los B	0.26	0.92	2223
64	Masupha	West of Dippenaar Street	2112	Westbound	Eastbound	738	478	Los D	0.70	Los C	0.45	0.70	1053
65	Roodepoort Rd	North of Luthuli	2122	Northbound	Southbound	1262	986	Los E	0.90	Los D	0.70	0.90	1404
66	R 558	West of Golden Highway	2122	Eastbound	Westbound	820	427	Los C	0.58	Los B	0.30	0.58	1404
67	Town Rd	South of Samuel Rd	2122	Northbound	Southbound	242	283	Los A	0.17	Los A	0.20	0.20	1404
68	Walter	North of Katz Rd	2122	Northbound	Southbound	297	213	Los A	0.21	Los A	0.15	0.21	1404
69	James St	North of Olympus Rd	2122	Northbound	Southbound	181	242	Los A	0.13	Los A	0.17	0.17	1404
70	Nirvana East	East of Scorpio	2122	Eastbound	Westbound	365	340	Los B	0.26	Los A	0.24	0.26	1404
71	R 554	North of Nirvana East	2122	Northbound	Southbound	681	1680	Los C	0.49	Los F	1.20	1.20	1404
72	Bangalore	West of Gandak	2122	Westbound	Eastbound	483	505	Los B	0.34	Los B	0.36	0.36	1404
73	R 554	South of Volta	2122	Northbound	Southbound	786	531	Los C	0.56	Los B	0.38	0.56	1404
74	Lenasia	South of Olive	2122	Northbound	Southbound	433	603	Los B	0.31	Los C	0.43	0.43	1404
75	R 558	North of Cuckoo	2122	Northbound	Southbound	323	333	Los A	0.23	Los A	0.24	0.24	1404
76	Flamingo	South of Protea	2122	Southbound	Northbound	269	482	Los A	0.19	Los B	0.34	0.34	1404
77	Lizard	North of Nirvana East	2122	Southbound	Northbound	550	990	Los B	0.39	Los D	0.71	0.71	1404
78	Protea	East of Salvia	2122	Southbound	Northbound	353	491	Los B	0.25	Los B	0.35	0.35	1404
79	Potchefstroom Road	West of Wanderers	2112	Eastbound	Westbound	1342	1242	Los F	1.27	Los F	1.18	1.27	1053
80	Beacon Rd	North of Union Rd	2112	Northbound	Southbound	429	1241	Los C	0.41	Los F	1.18	1.18	1053
81	Klipspruit Valley	North of Station	2112	Northbound	Southbound	435	445	Los C	0.41	Los C	0.42	0.42	1053
82	Potchefstroom Road	West of Mtangai Dr.	2112	Eastbound	Westbound	967	1035	Los E	0.92	Los E	0.98	0.98	1053
83	Moahloli St	East Koma	2112	Westbound	Eastbound	907	138	Los E	0.86	Los A	0.13	0.86	1053
84	Legwale	West of split in road	2112	Westbound	Eastbound	231	307	Los A	0.22	Los B	0.29	0.29	1053
85	Potchefstoom	West of Koma	2112	Northbound	Southbound	843	350	Los D	0.80	Los B	0.33	0.80	1053
86	Koma Street	North of Jonathan	2112	Eastbound	Westbound	664	423	Los D	0.63	Los C	0.40	0.63	1053

Source: CoJMM, 2004

	Road Names	Location	Road Type Code	Direction 1	Direction 2	Direction 1 Volume (07:00-08:00)	Direction 2 Volume (07:00-08:00)	Direction 1		Direction 2		Peak Hour V/C	Road Capacity
								LOS	V / C	LOS	V / C		
87	Roodepoort	North of Moroka Nancefield	2112	Northbound	Southbound	422	546	Los C	0.40	Los C	0.52	0.52	1053
88	Masupha	West of Ben Nauderhimmink	2112	Eastbound	Westbound	790	417	Los D	0.75	Los B	0.40	0.75	1053
89	Van Onselen	West of Forbes	2112	Eastbound	Westbound	418	432	Los B	0.40	Los C	0.41	0.41	1053
90	Vincint	East of Hennsey	2112	Northbound	Southbound	631	1005	Los C	0.60	Los E	0.95	0.95	1053
91	Mahalefele	East of Nape	2112	Eastbound	Westbound	262	198	Los A	0.25	Los A	0.19	0.25	1053
92	Kipsgnut Valley	West of Lilstang Hostel	2112	Eastbound	Westbound	656	317	Los D	0.62	Los B	0.30	0.62	1053
93	Potchefstroom	West of Moroka	2212	Eastbound	Westbound	2472	1653	Los F	1.11	Los D	0.74	1.11	2223
94	Golden Highway	East of East	2212	Northbound	Southbound	1517	1042	Los D	0.68	Los C	0.47	0.68	2223
95	N1/N12	North of Moroka Bypass	1231	Northbound	Southbound	3075	1326	Los D	0.76	Los B	0.33	0.76	4060
96	Koma	North of Bandlie	2112	Northbound	Southbound	721	1076	Los D	0.68	Los F	1.02	1.02	1053
97	Nasmith Avenue	West of N12	2122	Eastbound	Westbound	213	822	Los A	0.15	Los C	0.59	0.59	1404
98	Nicols	North of Potchefstroom Rd	2122	Westbound	Eastbound	175	80	Los A	0.12	Los A	0.06	0.12	1404
99	Northumberland	South of Aureole	2211	Northbound	Southbound	1010	1870	Los C	0.43	Los D	0.80	0.80	2340
100	Northumberland	North of Bayers Naude	2211	Southbound	Northbound	1057	2086	Los C	0.45	Los E	0.89	0.89	2340
101	Old Potch Road	Bet. N1 and Diepkloof Boundary	2212	Eastbound	Westbound	1577	2867	Los D	0.71	Los F	1.29	1.29	2223
102	Oridekkers Road	West of Atlas	2212	Eastbound	Westbound	2536	919	Los F	1.14	Los C	0.41	1.14	2223
103	Oridekkers Road	West of 4th Street (N1)	2212	Eastbound	Westbound	2659	1277	Los F	1.20	Los C	0.57	1.20	2223
104	R29/N12	West of interchange with Golden Highway	1231	Eastbound	Westbound	2931	946	Los D	0.72	Los A	0.23	0.72	4060
105	R55	North of Maxwell Drive	2122	Northbound	Southbound	1200	610	Los E	0.85	Los C	0.43	0.85	1404
106	Rabie	West of Western Bypass	2212	Northbound	Southbound	544	1251	Los A	0.24	Los C	0.56	0.56	2223
107	Soweto Highway	Bet. N1 and Diepkloof Boundary	1231	Eastbound	Westbound	2700	2119	Los D	0.67	Los C	0.52	0.67	4060
108	Swartkoppies	East leg of intersection with Klipriver Drive	2122	Eastbound	Westbound	671	908	Los C	0.48	Los D	0.65	0.65	1404
109	Swartkoppies	East leg of intersection with Klipriver Drive	2122	Eastbound	Westbound	885	1461	Los D	0.63	Los F	1.04	1.04	1404
110	Swartkoppies	West leg of intersection with Klipriver Drive	2122	Eastbound	Westbound	359	710	Los B	0.26	Los C	0.51	0.51	1404
111	Union	West of Golden Highway	2122	Eastbound	Westbound	746	273	Los C	0.53	Los A	0.19	0.53	1404
112	Vorster Ave	East of Klipriver Glenvista	2112	Westbound	Eastbound	1147	872	Los F	1.09	Los D	0.64	1.09	1053
113	Willem Nool	North of Fourways Boulevard	2212	Northbound	Southbound	1399	2004	Los D	0.63	Los E	0.90	0.90	2223
114	Witkoppen	West of Rivonia Rd	2112	Eastbound	Westbound	1174	1323	Los F	1.11	Los F	1.26	1.26	1053
115	Witkoppen	East of Riverbend	2212	Northbound	Southbound	1174	1586	Los C	0.53	Los D	0.71	0.71	2223
116	Woodmead	South of Maxwell Drive	2211	Northbound	Southbound	2106	1936	Los E	0.90	Los D	0.83	0.90	2340
117	Ysterhout	West of Melope	2212	Eastbound	Westbound	1336	515	Los D	0.60	Los A	0.23	0.60	2223

COJ EXTERNAL & incl RING ROAD			
Peak Direction	Average V / C	0.7	
	Average LoS	Los D	
Other Direction	Average V / C	0.5	
	Average LoS	Los C	

NOTE: Surrogate V/C ratios used
Los A - Volume Capacity Ratio =<0.25
Los B - Volume Capacity Ratio >0.25 and =<0.4
Los C - Volume Capacity Ratio >0.4 and =<0.6
Los D - Volume Capacity Ratio >0.6 and =<0.85
Los E - Volume Capacity Ratio >0.85 and =<1.0
Los F - Volume Capacity Ratio >1.0

Source: CoJMM, 2004

V/C RATIOS & LEVEL OF SERVICE (LOS) ACCORDING TO THE HIGHWAY CAPACITY MANUAL

v/c < 0.65 = LOS A,B,C (Not Congested)

0.65 < v/c < 0.85 = LOS D (Marginal Congestion)

0.85 < v/c < 1.00 = LOS E (Moderate Congestion)

v/c > 1.00 = LOS F (Serious Congestion)

PROPOSED V/C RATIOS & LEVEL OF SERVICE (LOS) FOR SOUTH AFRICAN ROADS

LOS	2 Lane Road	4 Lane Road	Description
A	v/c < 0.25	v/c < 0.28	Not Congested
B	0.25 < v/c < 0.4	0.28 < v/c < 0.47	Some Congestion
C	0.4 < v/c < 0.6	0.47 < v/c < 0.66	Marginal Congestion
D	0.6 < v/c < 0.85	0.66 < v/c < 0.79	Moderate Congestion
E	0.85 < v/c < 1.0	0.79 < v/c < 1.0	Heavy Congestion
F	v/c > 1.00	v/c > 1.00	Serious Congestion

Source: Heyns, W, 2008

APPENDIX 3

SEMI-STRUCTURED INTERVIEWS

Questions
1. **What policy, if any, is applicable along Voortrekker Road (or Ontdekkers Road)?**
2. **What is the approval date of the policy?**
3. **Are you aware of the details of the neighbouring municipality's policy along Voortrekker Road (or Ontdekkers Road)?**
4. **What principles were applied in the formulation of the development policy? Which factor is the most important to consider during the policy-formulation process?**
5. **Is the policy stringently enforced? Are exceptions made to the stringent implementation of the policy?**
6. **What is the primary function of Voortrekker Road (or Ontdekkers Road) in the metropolitan system?**
7. **Is the applicable development policy considered a success?**
8. **Is the policy considered primarily a transportation policy, a land use policy or a combination of the two?**
9. **What were the initiating factors of the policy formulation process?**
10. **Are you aware of any cross-border issues?**
11. **Should the development policy align with the neighbouring municipality's policy?**

12. **Should a development policy, such as the policy along Voortrekker Road (or Ontdekkers Road) be dynamic in nature? Which factors should be considered during the amendment of such a policy?**

13. **Have amendments been made to the policy? Are there any future plans to amend the policy?**

14. **What are the primary issues experienced with regards to development along the route and the implementation of the policy?**

15. **In your professional opinion, is it necessary to define nodes along arterial routes?**

16. **Have any road or intersection upgrades taken place as specified in the policy?**

17. **Do historical developments, development trends / market pressure and developments approved by other bodies, such as the Townships Board, result in pressure on the Council to amend the policy? Should these factors necessarily be considered during the revision of the policy?**

18. **Does Council provide any incentives for businesses to establish in demarcated areas, such as identified nodes?**

19. **Does Council experience pressure to extend the node(s)? Were historical developments considered when the node(s) were defined?**

20. **Are there any other authorities that regulate development along the route?**

APPENDIX 4

STATUS QUO ALONG ONTDEKKERS ROAD (2000)

STATUS QUO IN NODES REGARDING DEVELOPED ERVEN AS A PERCENTAGE

WITHIN NODES										
NODE	NUMBER OF ERVEN	NON-RESIDENTIAL USES	%	APPLICATIONS RECEIVED	%	APPROVED	%	TOTAL ILLEGAL LAND USES	POTENTIAL FAR	ACTUAL FAR
1	29	11	38%	5	17%	3	10%	8	5 800M²	2 200m²
2	155	43	28%	34	22%	30	19%	13	37 000M²	10 320m²
3	95	44	46%	29	31%	29	31%	15	28 500M²	13 200m²
4	63	38	60%	35	56%	35	56%	3	13 230M²	7 980m²
5	37+39	38	50%	14+15	38%	14+15	38 %	24	9 620m² 253 500m²	3 640m² 110 000m²
TOTAL	418	174		132		126		63	347 650m²	147 340m²

Source: WMLC, 2000

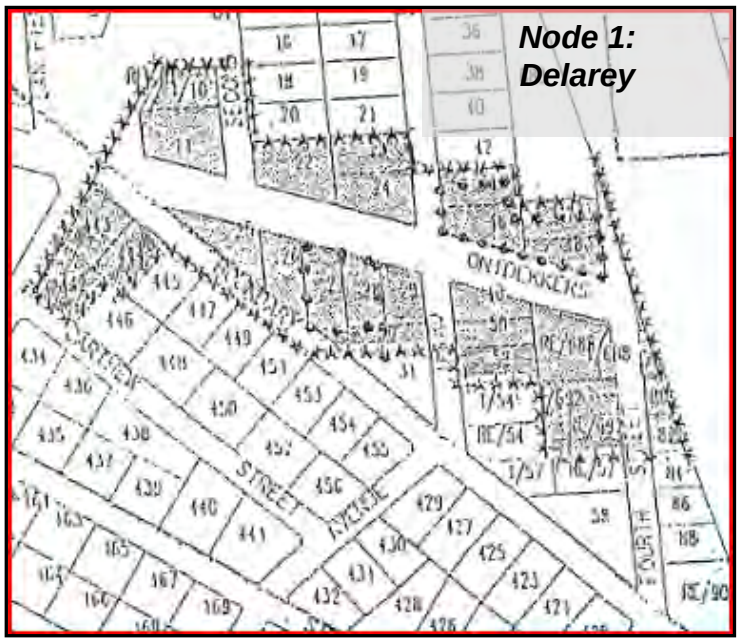
STATUS QUO BETWEEN NODES REGARDING DEVELOPED ERVEN AS A PERCENTAGE

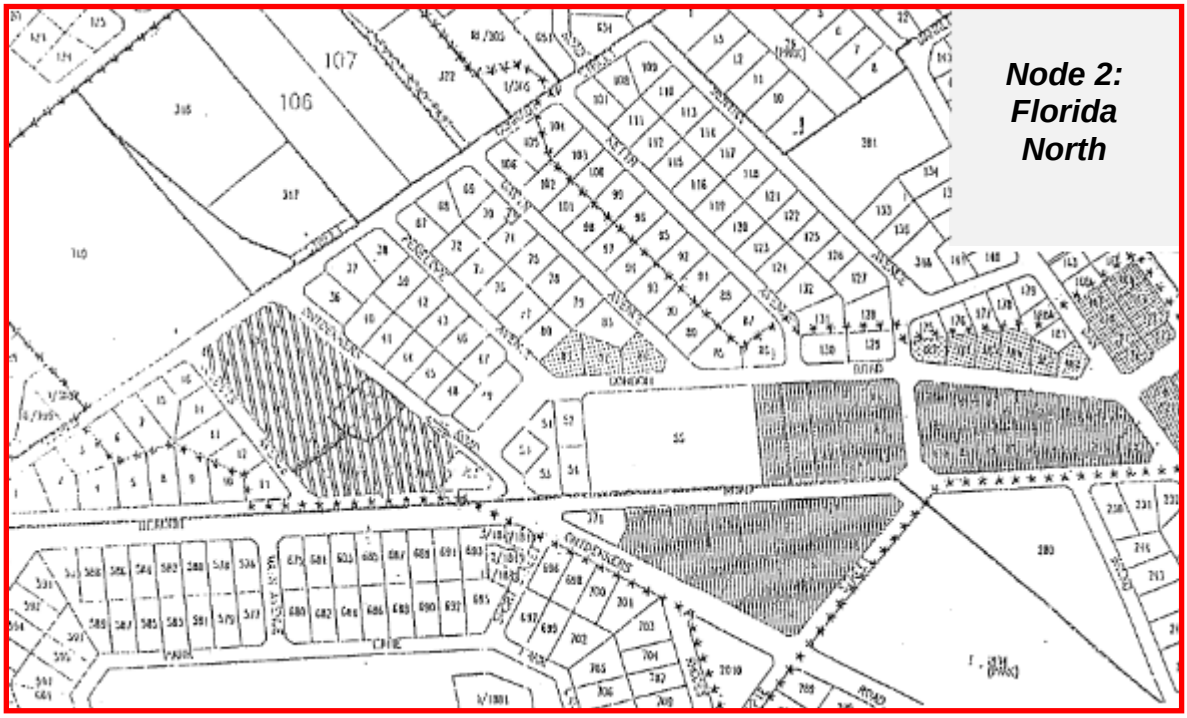
BETWEEN NODES										
NODE	NORTH/ SOUTH	NUMBER OF ERVEN	NON-RESIDENTIAL USES	%	APPLICATIONS RECEIVED	APPROVED	%	TOTAL ILLEGAL LAND USES	POTENTIAL FAR	ACTUAL FAR
1 > 2	NORTH	10	2	18%	2	2	12%	1	4 760m²	1 400m²
	SOUTH	7	1							
2 > 3	NORTH	67	16	25%	12	12	9%	20	42 900m²	10 560m²
	SOUTH	63	16							
3 > 4	NORTH	89	29	24%	31	27	19%	6	36 140m²	8 580m²
	SOUTH	50	4							
4 > 5	NORTH	0	0	0%	0	0	0%	0		
	SOUTH	0	0							
TOTAL		286	53		45	41		27	83 800m²	20 540m²

Source: WMLC, 2000

APPENDIX 5

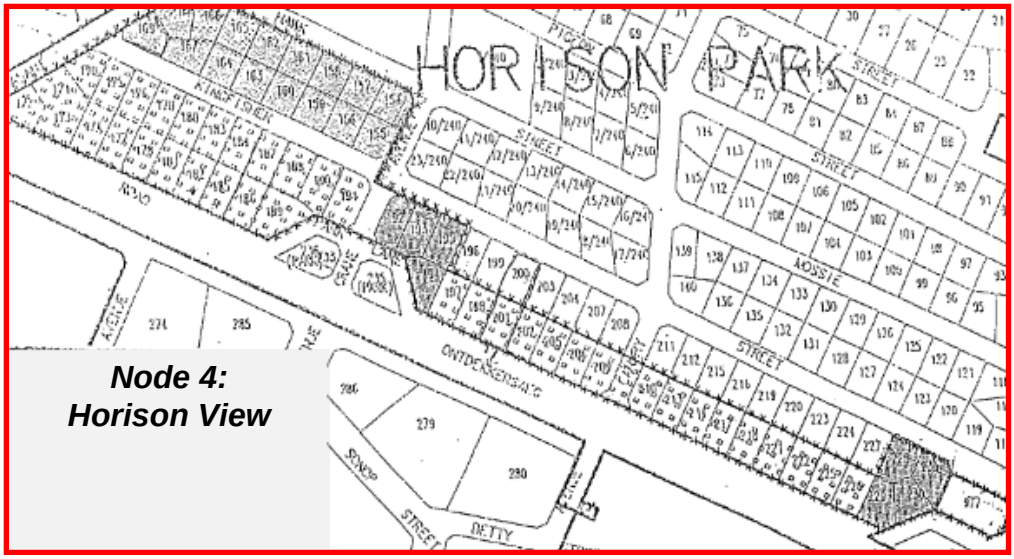
DEFINED NODES: ONTDEKKERS ROAD DEVELOPMENT POLICY





Node 3: Florida Park

Node 4: Horison View



Node 5: Princess

Source: WMLC, 1997