Considering the intricacies of urban boundaries: the South African story

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ABSTRACT

Urban boundaries play a decisive role in the growth and form of cities. It is characterised by a series of intricacies giving rise to the questioning of its function and its feasibility. The major driving force in contemporary South African planning, integrated planning, further considers the desirability and applicability of the borders. Recent legislation in South Africa, although not explicit, requires that Spatial Development Frameworks should interpret the short and long term vision for urban development that, by definition, implies the identification and representation of boundaries. Demarcation undertaken in South Africa since 1994, further revolutionised municipal boundaries, also giving additional jurisdiction, over initially state-owned land, to municipalities. The primary purpose of this research is to consider the intricacies of urban boundaries in the South African context. The empirical research focus on two purposefully selected case studies where a legal and spatial analysis was conducted, to consider the effectiveness of urban boundaries in local context. It was further attempted to reflect on the perspectives of professional planners concerning urban boundaries. The research finally questions the role and function of urban boundaries, as an integral component of current spatial planning approaches, in an ever-changing South Africa. The study concludes that urban boundaries are still an essential element of spatial planning approaches, especially when effectively applied and enforced by all levels of government.

Key terms: Urban boundary, Growth management, Intricacies, Spatial planning, South African perspective.

OPSOMMING

Stedelike grense speel ’n deurslaggewende rol rakende die groei en vorm van stede. Dit word gekenmerk aan ’n reeks van kompleksiteite, wat aanleiding gee tot die bevraagtekening van die funksie en uitvoerbaarheid daarvan. Die groot dryfveer in hedendaagse Suid Afrikaanse beplanning, geïntegreerde beplanning, beskou verder die wenslikheid en toepaslikheid van die grense. Onlangse wetgewing in Suid Afrika, hoewel nie eksplisiet nie, vereis dat Ruimtelike Ontwikkelingsraamwerke, interpretasie moet gee aan die kort- en langtermyn visie vir stedelike ontwikkeling wat, per definisie, die identifikasie en voorstelling van grense impliseer. Herafbakening wat sedert 1994 in Suid Afrika onderneem is, het ’n verdere omwenteling gebring in soverre dit munisipale grense aan betref en gee ook nuwe jurisdiksie, oor aanvanklik staatsbeheerde gronde, aan munisipaliteite. Die primêre doel van hierdie navorsing is om die kompleksiteite van stedelike grense in die Suid-Afrikaanse konteks te ondersoek; dit word gedoen die hand van twee doelgerig verkose gevallestudies. Die doeltreffendheid van stedelike grense is ondersoek aan die hand van 'n wetlike en ruimtelike analise. Daar is verder gepoog om na te dink oor die perspektiewe van professionele beplanners rakende stedelike grense. Die navorsing bevraagteken vervolgens die rol en funksie van stedelike grense, as integrale komponent van heersende beplanningbenaderings, in ’n steeds veranderende Suid-Afrika. Die studie kom tot die gevolgtrekking dat stedelike grense steeds ’n noodsaaklike element van die ruimtelike beplanningbenadering is, veral die effektiewe toepassing en afdwinging daarvan deur alle regeringsvlakke.

Sleutelterme: Stedelike grens, Groeibestuur, kompleksiteite, Ruimtelike beplanning, Suid-Afrikaanse perspektief.

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ABBREVIATIONS

ANC	African National Congress
CBD	Central Business District
CMC	Cape Metropolitan Council
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DFA	Development Facilitation Act, 67 of 1995
DRDLR	Department of Rural Development and Land Reform
EIA	Environmental Impact Assessment
GGCR	Gauteng Global City Region
GIS	Geographic Information System
IDP	Integrated Development Plan
LGMPPR	Local Government: Municipal Planning and Performance Regulations, 2001
LGMDA	Local Government: Municipal Demarcation Act
LGMSA	Local Government: Municipal Systems Act, 32 of 2000
LTAB	Land Tenure Advisory Board
LUS	Land Use Scheme
MOSS	Metropolitan Open Space System
MPT	Municipal Planning Tribunals
MPRDA	Mineral and Petroleum Resources Development Act, 2002
MSDF	Metropolitan Spatial Development Framework
MSDF	Municipal Spatial Development Framework
NEMA	National Environmental Management Act, 107 of 1998
NDP	National Development Plan 2030: Our Future – Make it Work
NSDF	National Spatial Development Framework
PDALFA	Draft Preservation and Development of Agricultural Land Framework Bill, 2013
PPA	Physical Planning Act
PSDF	Provincial Spatial Development Framework
RSDF	Regional Spatial Development Framework
RDP	Reconstruction and Development Programme
SALA	Subdivision of Agricultural Land Act, 70 of 1970
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SPLUMA	Spatial Planning Land Use Management Act, 16 of 2013
UEA	Urban Expansion Area
UDA	Urban Development Area
UDB	Urban Development Boundary
UDF	Urban Development Framework
UGB	Urban Growth Boundary
WPSPLM	White Paper on Spatial Planning and Land Use Management, 2001

CHAPTER 1: INTRODUCTION

1.1 Research orientation

The primary purpose of this research is to consider the intricacies of urban boundaries in the South African context. The motives behind South African urban boundaries varied throughout history from segregation, municipal demarcation and most recently to conserve rural areas/ environments. The context and role of the urban boundary, thus produced confusion in the spatial planning environment, especially with regards to the decision–making process and responsible decision-making authorities.

This research considers the historical analysis of urban boundaries in order to provide a better comprehension of the reasoning behind urban boundaries and whether urban boundaries are still relevant in a local context. It further questions the effectiveness of urban boundaries in relation to its set objectives.

1.2 Problem statement and substantiation

The urban boundary concept has been included in many urban planning policies and legislation to manage urban development. Anderson (1999:4-5) identified that urban boundaries were one of the most used growth management strategies across numerous countries, also in South Africa. However, the newly enacted Spatial Planning Land Use Management Act, 16 of 2013, brought a new approach to spatial planning in South Africa, where local municipalities are now required to compile wall-to-wall Land Use Schemes (LUS). The role and function of urban boundaries are questioned as part of the approach to integrated planning, especially since the delineation of urban boundaries directly relates to other legislation, such as the National Environmental Management Act, 107 of 1998 (NEMA). This research considers urban boundaries and the various intricacies thereof, in order to conclude on the role and relevance of urban boundaries in South African context.

1.3 Research questions

The focus of this research is to consider the intricacies of urban boundaries, especially from a local context, and provide answers to the following research questions:

- What role did urban boundaries play as part of urban growth models?
- How did the role and importance of urban boundaries develop and changed throughout history?
- How can the effectiveness of urban boundaries be determined?
- What is the intricacies of urban boundaries in South African urban planning context?

- What is the perception of professional planners regarding the role and importance of urban boundaries in the South African context?
- Are urban boundaries still relevant and important for contemporary Spatial Planning approaches in South Africa?

1.4 Research aims and objectives

The primary research objective is:

To consider the intricacies of urban boundaries, especially from a South African context.

The sub-objectives of this research is:

- To identify the function of urban boundaries within urban growth models.
- To identify urban boundary intricacies experienced throughout South Africa.
- To established methods to determine the effectiveness of urban boundaries.
- To compare case studies' urban boundaries and identify the cause for some urban boundaries to be more effective than others.
- To provide a comprehensive understanding of the necessity of delineating urban boundaries.

1.5 Methodology of the research

This research comprises of a theoretical and empirical investigation, to form the conclusions and recommendations of the research and to meet the objectives as stated in Section 1.3.

The literature investigation considered urban growth and urban growth models: various urban growth models were systematically reviewed to provide information on the premise that the urban form has countless possibilities and varies immensely from city to city as a result of urban growth pressure from urbanisation. As a result of the effects that urbanisation has on the urban morphology and the urban boundary, it is of importance to analyse the causes and consequences of urbanisation. Interpreting urban boundaries: the origination and development of the urban boundary are required to be reviewed to obtain a better understanding of the motive behind the delineation of an urban boundary.

The literature section aimed to provide clarity on several aspects. Firstly, to indicate whether pre-developed urban growth models are applicable planning methods as well to identify the functions of urban boundaries within said models. Secondly, it was of importance to identify causes of urban growth, especially causes that threaten the validity of urban boundaries. Thirdly, to identify the foundation of urban boundaries and how it developed over the course of time. Lastly, the South African perspective of the urban boundary was researched, it includes historical and current realities of the boundary, and how it influenced urban areas in South Africa.

Various methods to assess the effectiveness of implemented urban boundaries were also considered and used in the empirical investigation of this research.

Selected policies and legislation were considered, aiming to capture the context and related complexities of urban boundaries, now experienced by professionals in the urban planning profession. The local approach to urban boundaries is considered and discussed in the context of the new spatial planning legislation.

The empirical investigation comprised of two purposefully selected case studies within South Africa, where the effectiveness of the two case studies' urban boundaries was analysed using two methods i.e. spatial analysis and a policy and legislative analysis. A comparative analysis of the two cases was conducted in order to identify best practices regarding the use and implementation of urban boundaries in a local context.

The case study analysis was followed by a survey conducted among purposefully selected professional Planners to form an expert analysis regarding the role and importance of urban boundaries in a local context. Findings from the structured questionnaires were statistically analysed and interpreted to provide further insight into intricacies of urban boundaries.

1.6 Limitations of the research

The scope of this research is limited to considering the intricacies of urban boundaries, focussing on the local South African context. Although this research provides conclusions and planning recommendations based on the theoretical and empirical investigations, it does not attempt to provide a comprehensive approach to enforcing urban boundaries in South Africa. The research aims to capture all such intricacies and place it in context with the modern planning environment and new SPLUMA legislation. As such, this research were limited to:

- Two purposefully selected case studies, namely: Tshwane Municipality (Gauteng) and Cape Town Municipality (Western Cape).
- Policy and legislation analysis: Numerous applicable policies and legislation were analysed, however, it's acknowledged that additional policies and legislation may yield different outcomes.
- Spatial analysis: Several criteria were utilised to spatially analyse various aspects to determine the effectiveness of the case studies' urban boundaries. One criteria were limited to only households, as no applicable data exist on buildings in the case studies. However, it's acknowledged that additional data may yield different outcomes.

This research focuses on the spatial implications of urban development boundaries.

SECTION A: LITERATURE STUDY

CHAPTER 2: URBAN GROWTH AND URBAN GROWTH MODELS

2.1 Introduction

Urban morphology is constantly changing as a result of urban growth pressure. According to Long *et al.* (2007:361), urban growth pressure relates to, among other the demand for new developable areas, policies driven by politics, social development, and economic growth. However, as each urban area is different, it is difficult to create a blueprint growth model that would be able to predict where growth will occur. Various authors attempted to create, capture the urban morphology, now known as the classic urban growth models. The relevance of these models is questioned within the modern urban reality, especially in light of urban growth pressures and increasing population figures. These models initiated the understanding of the importance of urban form, and more recently the impact that urban growth has such form and morphology.

To comprehend the motive for the inadequacy of these classic urban growth models various aspects are of importance to take note of. Several models were unsuccessful as the population increased far more rapidly than expected through various processes. These models introduced the understanding of the impact that urban growth had in the form of cities.

This section aims to systematically review the three classic urban growth models, namely: the Concentric Zone Model, the Sector Model and lastly the Multiple Nuclei Model. The review's objective is to provide an in-depth understanding of what manner historical urban morphologies were dealt with.

Subsequently, a South African perspective will also be reviewed, namely, the Apartheid Model affected numerous cities' growth patterns across South Africa, the impacts of which are still being rectified. Complementary to this the current reality of urbanisation will also be considered to identify the challenges relating to urban growth and the impact thereof of urban growth models.

2.1.1 The Concentric Zone Model

The Concentric zone model was formulated by Burgess in 1925, to produce the model the city was divided into concentric circles that would expand from the inner city (Central Business District - CBD) to the surrounding suburbs of the city (Yaguang, 2011:258) this is visually represented in Figure 2.1. Burgess was influenced by various American cities one example was Chicago, it represented an integral part of the Model's development (Rodrigue *et al.* 2006:182).

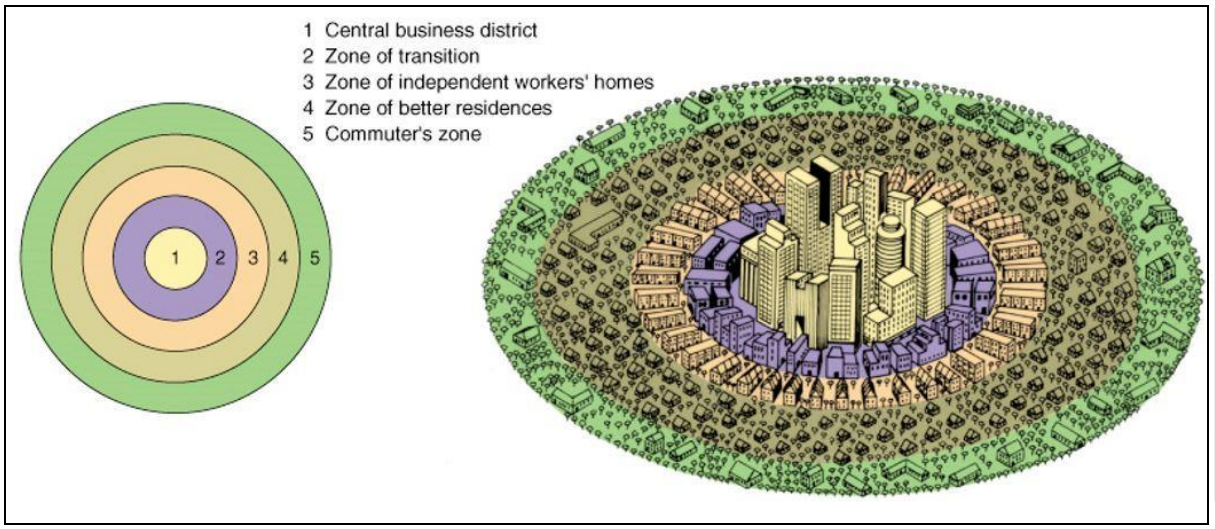


Figure 2.1: The Burgess Model
Source: Waugh (2009: 420).

Rodrigue (2017) states that the model assumes a relationship between the socio-economic statuses (mainly income) of households and also the aspects of distance from the CBD. Additionally, areas further from the CBD may experience a rise in the quality of housing as well as higher transportation costs. Thus, higher order residential areas are expected to be found on the periphery of a city, Table 2.1 provides an interpretation of all the zones.

According to Rodrigue *et al.* (2006:182), Burgess would express that urban growth is a process of expansion and reconversion of different land uses. However, Burgess stated that as the city experienced growth each zone will spread and move outward, encroaching the next creating miniature "zones of transitions" and thus creating several land-use "successions" (Klaff and Schnore, 1972:8). Hence, urban boundaries are considered as flexible, this then forces urban boundaries to expand as the city expands.

Table 2.1: Land use zones within the Burgess model

Zone 1	Central business district, identifiable where most of the economic functions are situated and where public transport nodes are at their highest.
Zone 2	Adjacent to the CBD several industrial uses are located to take advantage of nearby markets and labourers. Most transport terminals for example rail yards and port sites are situated within the central area of the model.
Zone 3	This zone is gradually being reconverted to alternative uses by increasing manufacturing/industrial activities. It contains the poorest section of the urban population with the lowest housing conditions.
Zone 4	The main residential zone is dominated by the social class. This zone has the advantage of being placed close to the most important zones of employment.
Zone 5	Represents higher quality housing coupled with higher travel costs. This zone consists of primarily high class and expensive housing in a rural, decentralised, setting.

Source: Own Compilation (2017) adapted from Rodrigue (2017); Yaguang (2011:258).

This model received several criticisms one was that it was too simple of a concept and did not include historical or cultural context, this model was developed when these cities were still in their development phases (Rodrigue, 2017). America's development of the personal transport infrastructure was the downfall of this system as all zones then had access to the inner region. Multiple spatial variations of these different terms social, ethnic and income status, there has been a low occurrence of the practical differences in land use patterns. The Concentric model assumed a spatial separation of the workplaces and also residential areas (Rodrigue, 2017).

This model relied on a set of boundaries that was later proved ineffective, the city develops past the outer zone or as Burgess indicated the "succession" of the zones. This implied that urban growth was the process of the transformation and expansion of land past the urban boundary (Rodrigue *et al.* 2006:182, Burgess and Park, 1992:50). The growth of the city, thus, affects the effectiveness of the model as increased growth proves the model as inadequate.

2.1.2 The Sector Model

The Sector model was formulated by Hoyt in 1932, who hypothesised that while cities typically have only one primary centre (CBD) it was often surrounded by sub-centres developed on a transport axis (Hoyt, 1932:18). These various land uses developed in a spoke-like fashion away from the CBD (Macintyre, 2006:23), each spoke comprised a different land use as illustrated in Figure 2.2.

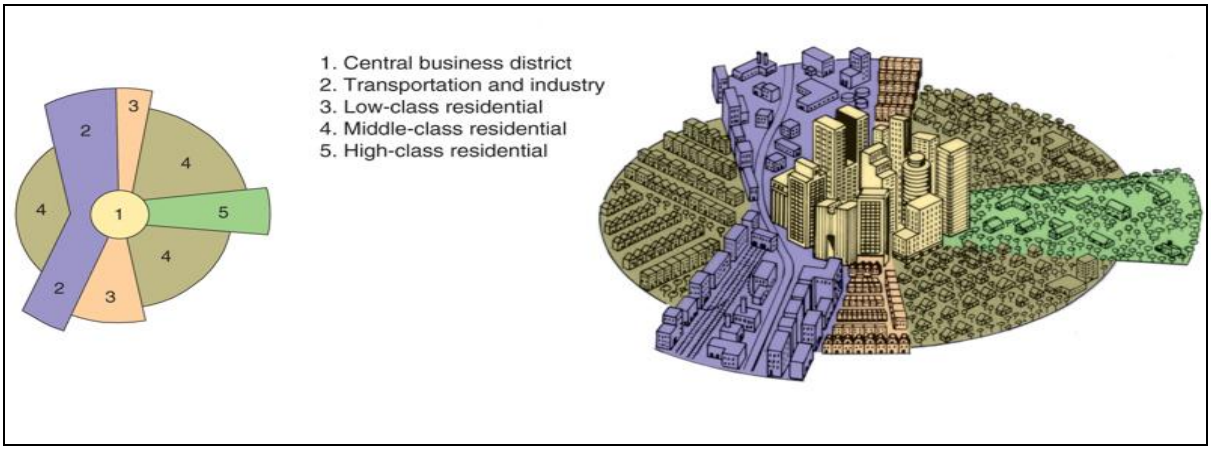


Figure 2.2: The Sector Model

Source: Waugh (2009:422).

The diversity of land uses produced a more viable urban model, these sectors that developed for a certain land use – e.g. the industrial sector only has one main aim – produced more control over the model. Furthermore, the relevance of this model may be identified that transport was of importance as the urban model identified that a corridor was required for the main transport route.

Various criticised that the model would favour the higher income inhabitants as lower income areas would divide certain land uses. The application of this particular aspect was used to implement segregation in certain cases. However, as the before mentioned model emphasises the importance of boundaries throughout the model, as it divided land uses and provide the "end" of the model.

2.1.3 The Multiple Nuclei Model

The Multiple nuclei model was first formulated in 1945 by Harris and Ullman, the model identified that a city has a series of nuclei of patterns that developed as the demand appeared (Harris and Ullman, 1945:14). The model was a more realistic representation than Burgess and Hoyt's models, it was more complex than its predecessors (Johnson, 1967:170).

It was evident that modern cities did not fit in the mould of the sector and the concentric model; they are developing at a rate that could not be predicted (Harris and Ullman, 1945:13). Certain parts of the suburbs are developing to function as small business districts, these smaller districts acted as nodes/nuclei where different land use patterns were being formed, and Figure 2.3 illustrates the above mentioned.

Consequently, Harris and Ullman (1945:13) argued that modern cities experience growth in various areas, each reacts as its own nuclei point. As a result of the increased personal transport, it altered the urban growth models and numerous theories were formed (Macintyre, 2006:25). The increased movement within and around cities allowed for numerous specialised centres to develop for example business parks, heavy industry, and retail areas.

This model may be used for larger accelerated expanding cities, the number of nuclei may develop for several different reasons. Certain functions tend to develop together and also aid one another in more efficient growth, such as residential usages or small businesses as corner shops (Harris and Ullman, 1945:15). Pacoine (2005:145) laments that the no one model may be used for all cities, this is a result of the various cultural, social and industrial differences experienced in each city.

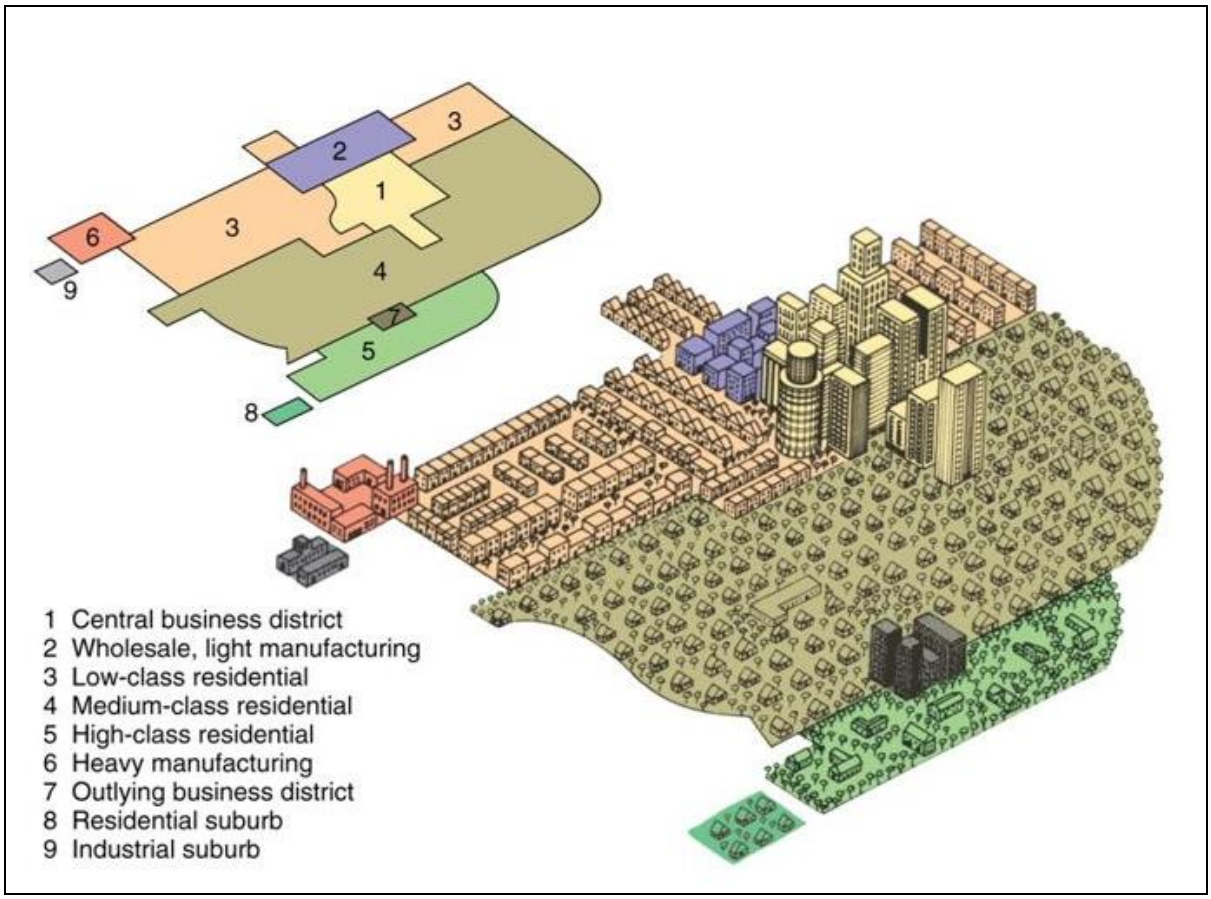


Figure 2.3: The Multiple Nuclei Model

Source: Waugh (2009:423).

The model's main contribution was the statement that it's incapable to correctly predict land uses. This then correlates to schemes that are unable to be implemented as a method to control these factors, however, various aspects are required to be taken into consideration such as the development of cultural, socio-economical and industrial sectors (Harris and Ullman, 1945:15).

This model provided clear indications that urban boundaries are less feasible in faster expanding cities, as these various growth points across the city are more difficult to predict and control. Certain nodes may develop in the periphery or beyond and this could lead to growth past the urban boundaries.

2.1.4 The Apartheid City Model

The Apartheid City Model was developed to fit the South African reality, Davies developed the model in 1981, and it was adapted from Hoyt's sector model for segregation purposes (Davies, 1981:59). Subsequently, the Apartheid model divided the public into four racial groups: "black", "white", "coloured", and "Indian" these groups were utilised as the division method for the residential areas (Maylam, 1995:23; Christopher, 1984:77).

Figure 2.4 illustrates the techniques utilised within the Apartheid City Model used to achieve segregation, the different sectors of the city are visible throughout the model (Maylam, 1995:23). In addition to segregated residential areas, the model's CBD also experienced segregation, white and coloured inhabitants had their own CBD (Christopher, 1984:77). Aspects of the Apartheid City Model may still be observed throughout South Africa, various policies and legislation have all attempted to rectify the past. Figure 2.4 visually illustrates buffer zones, these specific areas are still being rectified through the use of certain planning methods e.g. infill planning. These buffer zones created physical barriers through the use of different land uses e.g. industrial uses would have been placed on certain racial groups to ensure segregation.

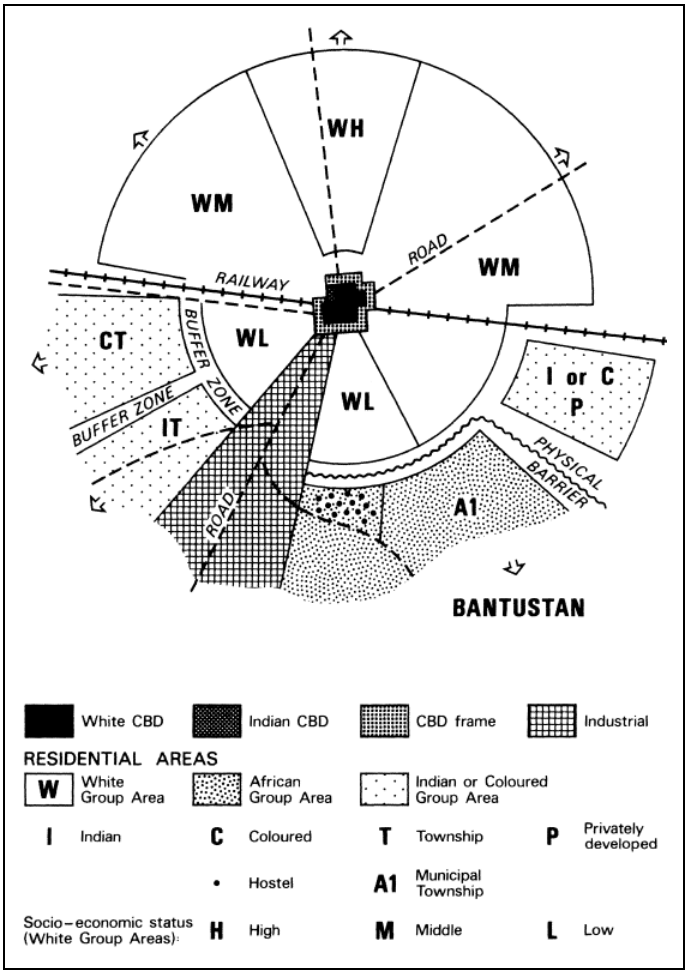


Figure 2.4: Apartheid City Model
Source: Simon (1989:192).

As a result of the poorly defined urban boundaries in this model urban sprawl occurred throughout South Africa even after 1994. The post-Apartheid era's main focus was to rectify the damages done. This created a lack of focus on the imminent issues of large-scale rural inhabitants that made the move to urban areas these influxes of the urban population profoundly affected the urban boundaries as sprawl occurred on an immense scale.

2.2 Urbanisation

These influxes in the urban population are experienced on a global scale. The world today is more urbanised than ever before (UN, 2014:4) and more than 54 per cent of the world's population is currently living in urban areas. Continually, according to the UN (2014:2), by 2050 the urban population may increase to 66 per cent with an additional 2.5 billion inhabitants.

The world's population growth rate increases approximately 1.185 per cent per annum, with the urban population increasing at 2.3 per cent (Mcgranahan and Satterthwaite, 2014:8; World Bank, 2017). The urbanisation experienced through the past century is steadily declining as illustrated in Figure 2.5.

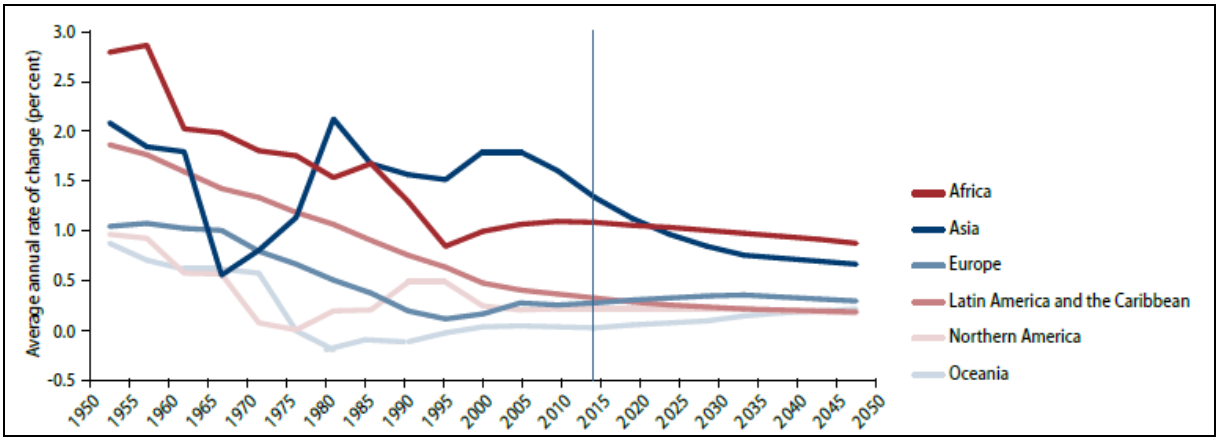


Figure 2.5: Average annual rate of urbanisation, 1950–2050
Source: United Nations (2014:9).

Nevertheless, the damage was already done the growth of cities are still experiencing physical increasing as a result of the urbanisation. Better economic development and poverty reduction in both urban and rural areas are required, as both areas are improved by higher populations (UN, 2014:3; United Nations Habitat, 2011:1; Black and Henderson, 1999:253).

A crucial link exists between rural and urban areas as stated by the UN (2014:3), traditionally the increase of urbanisation has been related to alternative social and economic transformations that have brought better geographic mobility, lower fertility, longer lifespan and greater population ageing. Urban areas are related to higher levels of education, health, social services, and increased opportunities for cultural and political participation.

Frey (2000:1) announced that the growth of a city is not solely the result of urbanisation. However, a larger degree could also be the result of the diffusion, the movement away from larger urban centres, into less inhabited and smaller populated towns around these larger urban centres. Unavoidably both population diffusion and urbanisation result in the continuous expansion of the villages, urban areas, towns and cities (Frey, 2000:1-2).

However, the growth of cities are connected to various factors, Marshall (1890:15) identified that the reason for people to gather together in cities are as a result of technological externalities. Park (1928:882) continued that cities are established as a result of various physical environmental aspects.

Davis (1955:433) continued that urbanisation has, in fact, progressed faster and reached proportions far greater in the last century than at any previous time in the world's history. Table 2.2 was used to illustrate the percentage of the population that was found in cities, unmistakably growth of the urban population is apparent.

Table 2.2: Percentage of the world's urban population.

Year	Cities of 20 000 or more	Cities of 100 000 or more
1800	2.4	1.7
1850	4.3	2.3
1900	9.2	5.5
1950	20.9	13.1

Source: Own creation adapted from Davis (1955:433).

With the urbanisation experienced throughout the years, 2007 marked the point in history that the global urban population surpassed the rural population this is illustrated by the red line in Figure 2.6. The current population trend is also illustrated in this Figure, the urban population has been increasing exponentially over the past 6 decades (UN, 2014:6). Also, with the continued growth of the urban population, with urbanisation as the leading factor, urban areas are expected to experience continued expansion (UN, 2014:7).

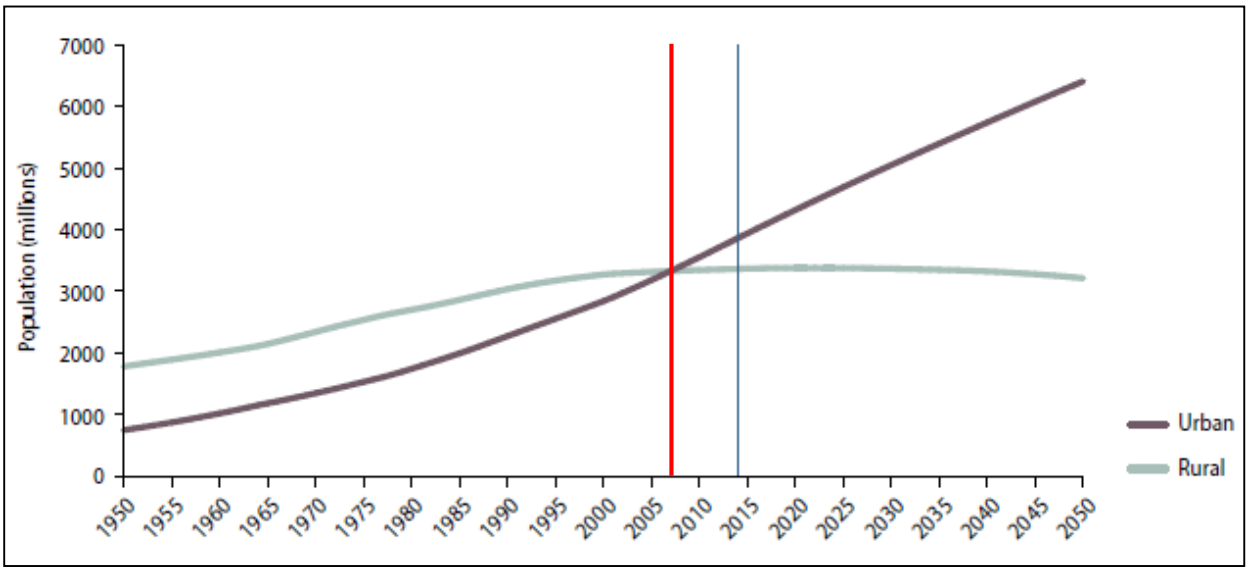


Figure 2.6: Urban and rural population of the world, 1950–2050

Source: UN (2014:7).

Furthermore, cities require an adequate area to develop as urban areas are unable to sustain the growth requirements, cities are expanding over the urban boundary into rural areas. This process is known as urban sprawl refer to Section 2.2.1 for additional detail. Urbanisation varies vastly across different areas (UN, 2014:7), more developed countries are more urbanised than less developed countries (Chen, 2007:1).

The two least urbanised continents, African and Asian, are currently experiencing the highest number of urbanisation, with these increased urbanisation rates an equalisation is imminent (UN, 2014:7; Preston, 1979:37; Chen, 2007:2). Illustrated in Figure 2.7 is the current reality of distribution of population between urban and rural throughout the different continents.

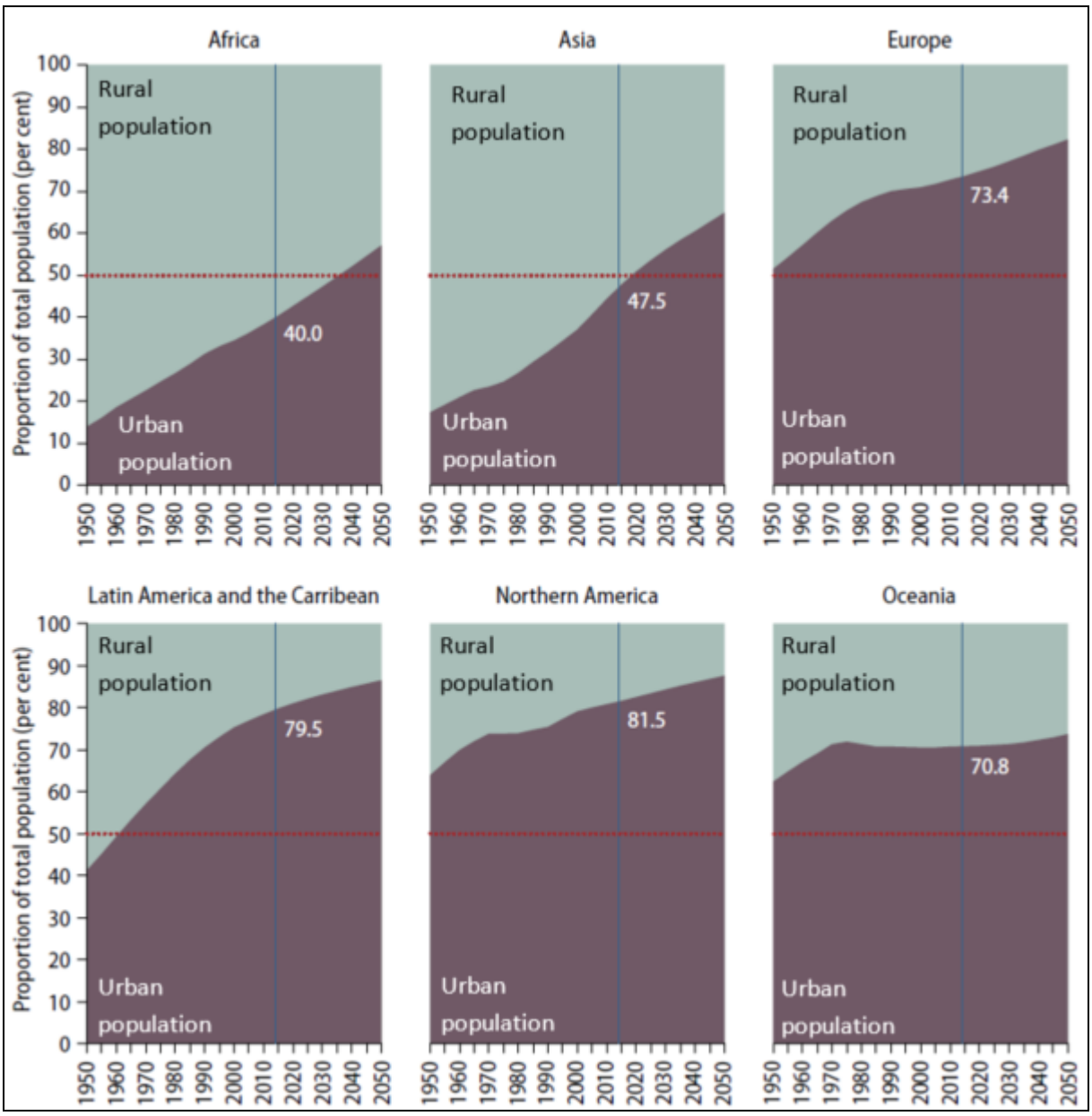


Figure 2.7: Urban and rural populations as proportion to total population. 1950 – 2050
Source: UN (2014:8).

Urbanisation is associated with numerous effects, these effects vary from positive to negative across urban to rural areas. As a result of the requirement of more development areas, it is required to predict adequate area for future developed. However, as a result of these effects, it produces complications to predict the rate of urbanisation that will occur. Another aspect to take into consideration is that of urbanisation varies from region to region.

Africa is the sole continent that is currently experiencing an increased urbanisation rate than what was experienced in the 1990s. In addition, urbanisation in developed countries has progressed more rapid through history than in developing countries, thus the correlation of economic growth and urbanisation rate is made (UN, 2014:9). Economic growth induces a higher urbanisation rate when growth reaches a plateau so does urbanisation.

Moreover, with urbanisation occurrences of population growth is evident. The effect is experienced in cities, with the population increase experienced within the city it affects classification system of the city. Figure 2.8 illustrates how cities are actively being affected through urbanisation, the first graph in the figure is focused on the expansion of cities through the past decade.

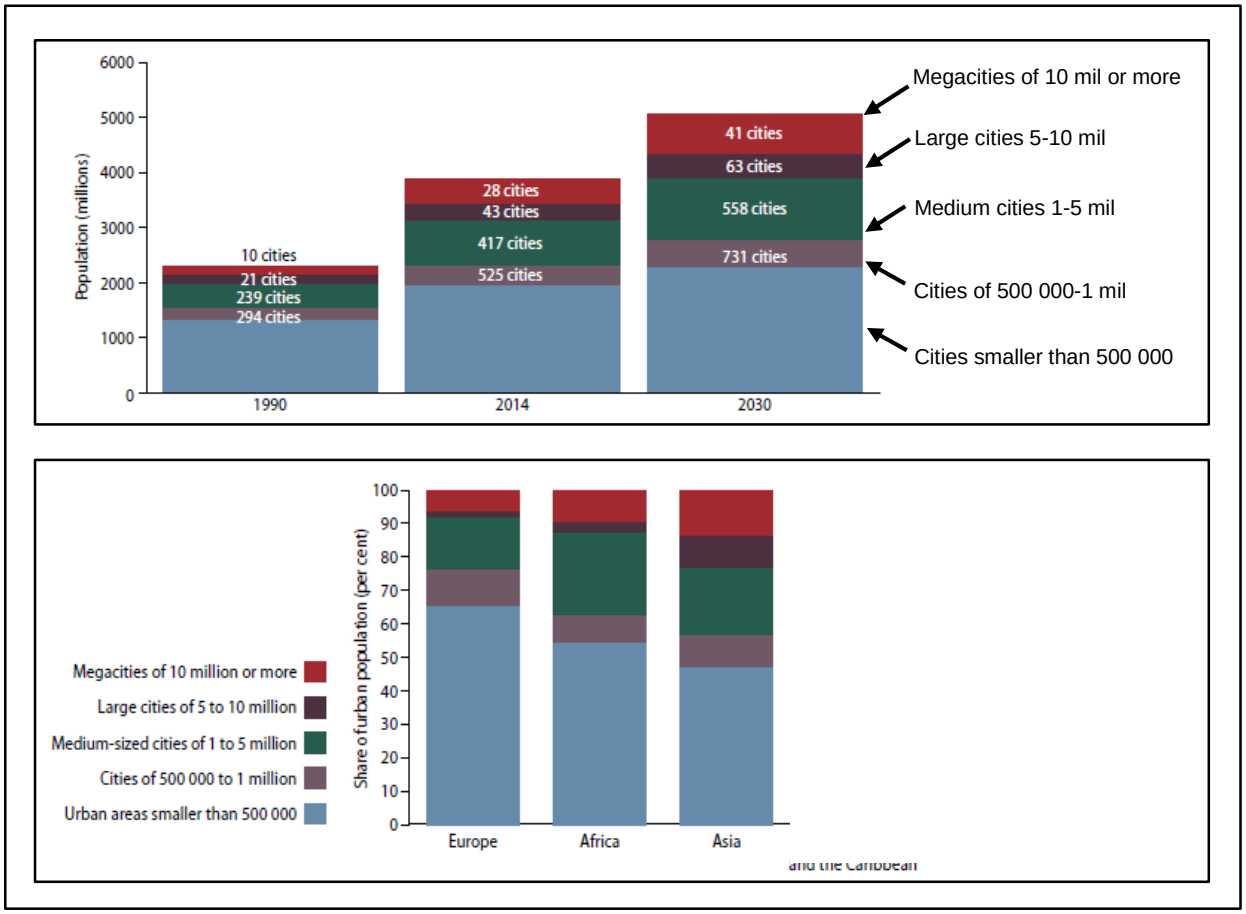


Figure 2.8: The effect of urbanisation on cities
Source: UN (2014:12).

Subsequently, larger cities require more area to develop, the more economical option is to develop on the periphery, however, urban sprawl might occur refer to Section 2.2.1 for a more detailed explanation. The more expensive and sensible option is densification within the already developed areas to ensure no loss of space are experienced. Additionally, the second graph of Figure 2.8 indicates the number of cities in each continent this correlates with the number of urbanisation experienced (UN, 2014:14).

The above previous figure contributes to how urban areas are expanding and the importance of urban boundaries, urban boundaries affect how these urban areas are developing refer to Section 0 for a complete description of urban boundaries. It is crucial to managing urban growth, in an attempt to address urban sprawl.

2.2.1 Interpreting urban sprawl and boundaries

Urban sprawl is a by-product of urbanisation, Pfister (2004:4) defined urban sprawl, as land development that occurs at a certain pace, this pace is the rate of which land is consumed for urban processes to ensure the growing population has sufficient land to develop on. Heimlich and Anderson (2000:vi) expressed the opinion that the concept of sprawl is not easily defined, it is easier identified by the concepts of “development” and “growth”.

Burchell *et al.* (1998:2) identified several aspects of urban sprawl:

- Low-density development that is dispersed and consumes a large amount of rural areas.
- Geographic separation of essential places such as work, homes, schools, and shopping.
- High dependence on automobiles for transportation.

The growth of cities affects the amount of urban sprawl experienced, with direct reference to the OECD (2009:145) “*urbanisation goes hand and hand with land consumption*”, and urban sprawl is an extent of urbanisation (Sudhira *et al*, 2003:1).

More importantly, the source of urban sprawl is considerably similar to those of urban growth. These two terms are greatly interlinked although the main concern is to ensure that the understanding is that *urban growth may occur without sprawl, while urban sprawl is still dependent on urban growth* (Bhatta, 2010:17). The main causes of urban growth will be illustrated through in Table 2.3 it is important to remark that some of these causes affect only sprawled growth or compact growth, however, both may be affected by the same cause (Bhatta, 2010:17).

Furthermore, growth is experienced through two main methods, first within the urban boundary and secondly beyond the urban boundary. The urban boundary is the demarcated outer boundary of urban areas and marks the transition between urban and rural land uses, refer to Section 0.

The urban boundary consists of various components; Urban Edge, Urban edge line, Built edge line, Urban Fringe, Urban Growth Boundary, Urban development area, Urban expansion area refer to Section 0. However, the urban boundary is not densely developed enough to be called part of the urban area usually two or fewer houses per hectare (Heimlich and Anderson, 2000:1). Low-density development causes urban areas to increase more rapidly than usual and in turn decreases the natural area (Heimlich and Anderson, 2000:1).

The second type of growth is beyond the urban boundary; this type of growth occurs farther from the urban area and is considered as rural areas. However, rural development poses a greater challenge to farmland preservation efforts than urban and suburban development Newburn and Berck (2006:1) made this statement and also how the native species of plants tend to decline while urban growth is on the rise.

These scattered single-family houses remove from the rural area in an agricultural perspective as they utilise valuable rural areas that are unable to be processed as a result of the urban area that is increasing into these areas (Heimlich and Anderson, 2000:13).

Consequently, the source of urban sprawl is considerably similar to those of urban growth, these two concepts are greatly interlinked although the main concern is to ensure that the understanding is that urban growth may occur without sprawl. On the other hand urban sprawl is still dependent on urban growth. The main causes of urban growth will be displayed in Table 2.3 it is important to remark that some of these causes affect only sprawled growth or compact growth, however, both are affected by the same cause (Bhatta, 2010:17).

However, growth still occurs within the urban boundary as well as in the rural areas. The main concern is to identify the difference between urban and rural areas, their prescribed definitions are as followed; urban areas are defined by Heimlich and Anderson (2000:10) as an area with a population larger 2500 per hectare in continuously built-up areas. An urban area may also have political boundaries or administrative criterion, for example, an area within the jurisdiction of a municipality or town committee.

Conversely, rural areas are the opposite and are areas where the population is less than 2500 inhabitants per hectare. However, the urban fringe is where the rural areas (greenfields) of metropolitan areas are found, these parts of the city are the first to be absorbed when densities rise (Heimlich and Anderson 2000:10).

2.2.2 Challenges of urban growth

Although growth can be seen as beneficial or harmful, it depends on the process of the consequences or patterns of growth; tendency occurs around the world where people tend to develop for residential areas in rural areas these new development cause considerably sprawled areas (Bhatta, 2010:17).

Table 2.3 illustrates of numerous aspects that cause urban growth a few of these will be analysed, in short, population growth has been concentrated on in depth in the previous Chapter with views on how urbanisation affects the population growth of urban areas and how it affects growth and sprawl.

Table 2.3: Causes of urban growth that could result in compact and/or sprawled growth.

Causes of urban growth	Compact growth	Sprawled growth
Population growth	●	●
Independence of decision		●
Economic growth	●	●
Industrialisation	●	●
Speculation		●
Expectations of land appreciation		●
Land hunger attitude		●
Legal disputes		●
Physical geography		●
Development and property tax		●
Living and property tax		●
Lack of affordable housing		●
Demand of more living space	●	●
Public regulation		●
Transportation	●	●
Road width		●
Single-family home		●
Nucleus family	●	●
Credit and capital market		●
Government development policies		●
Lack of proper planning policies		●
Failure to enforce planning policies		●
Country-living desire		●
Housing investment		●
Large lot size		●

Source: Own creation adapted from Bhatta (2010:18).

Another essential consideration of urban sprawl is that of the ‘independence of decision’ it consists of certain “competitors” that may be found within the government or private sector (Bhatta, 2010:20). Both hold expectations of the future and variety of development demands in certain areas, these competitors usually ensure make decisions for future expectations and developments where they themselves are most positively affected. This usually leads to independent results in uncontrolled, uncoordinated and unplanned development (Harvey and Clark, 1965:2).

Another area that when it is neglected, urban sprawl could experience increase, is government policies. Their lack of context to development needs to be focused on, these restrictive land-use policies in one jurisdiction/municipal area, this may lead development to transfer to another area

that favourably disposed toward this sort of development or is less able to control it (Barnes *et al.* 2001:5). It is of importance to ensure that all policies pertaining to this certain concept is well developed and have been implemented in all areas to ensure that the statement Barnes *et al.* made would not occur.

In addition, a concept of utter importance is the lack of proper planning policies. Bhatta (2010:26) identifies that cities that are planned through the use of zoning policies that in reality divides the urban area into different uses, for example, residential, commercial, industrial, institutional, or other land uses. However, this could cause complexities and could be the incorrect approach as it completely separates the different land uses that causes other controversies such as forcing personal vehicles to be used for transport to travel between these different areas, a mixed land-use plan could be used to fight against urban sprawl and ensure a more sustainable urban form (Jabareen, 2006:41; Bhatta, 2010:26).

Nevertheless, the best planning policies could be developed and implemented. However, when these policies are not enforced, land-use plans need to be enforced in all hierarchies of a country's planning authorities as a well-developed plan would help curb urban sprawl through all regions of a country (Bhatta, 2010:26).

Another example illustrated in Table 2.3 is the demand of more residential areas within the CBD of cities, residential living spaces near the CBD are higher in value, this has a centrifugal force on the workforce as it drives them to the periphery where residential living spaces are less expensive this encourages them to move outward into the rural areas (Anderson and West. 2006:787).

A theory was developed by Anderson (1960:150-159) in 1960, it presented land values and land uses. It's relevance to the study is the outward spatial development it proposes, the further from the CBD the land is the less expensive it is. Figure 2.9 illustrates the Bid-rent curve, it provides an indication on the amount of money the workforce is willing to pay for land.

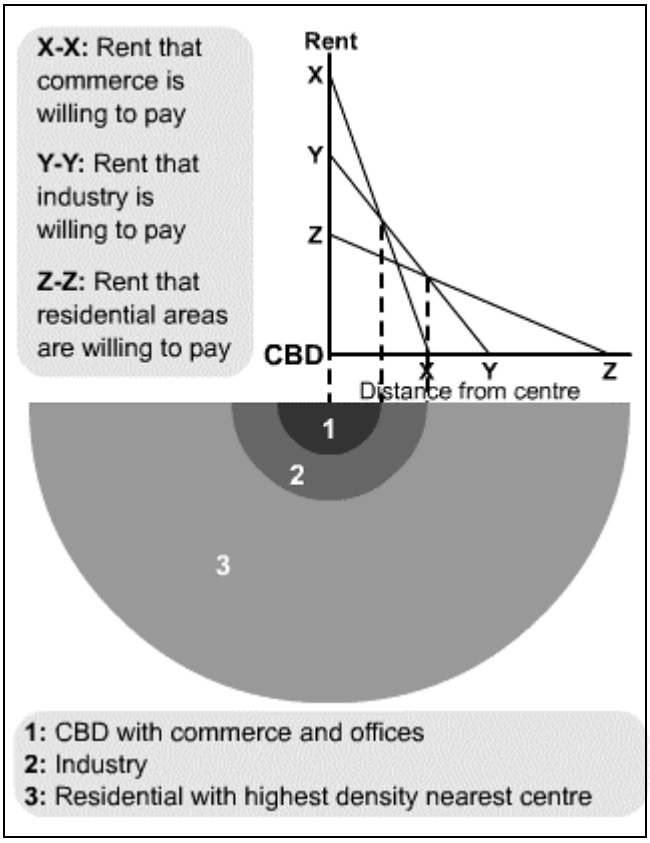


Figure 2.9: Bid-rent curve

Source: Martin (2001:1308) adapted from Alonso (1960:153).

On the other hand, even though the more inexpensive properties are found on the periphery or in the rural areas it may not always cause urban sprawl (Bhatta, 2010:27; Anderson and West. 2006:787). On the contrary, as a result of the higher travel time it's seen as a negative aspect and signifies another aspect that combats urban sprawl – densification – many urban areas develop further and provide new residential living areas. This sustainable compact city approach is being implemented more and more throughout the world to combat urban sprawl (Haaland and Van den Bosch, 2015:1). According to Acioly and Davidson (1996:8) cities in developed countries are three or more times as dense as those in developing countries.

All of these affects both urban growth and urban sprawl, the aforementioned paragraphs are important to remark as it indicates that when there are no policies or enforcement of these policies may cause "uncontrolled, uncoordinated and unplanned development" (Harvey and Clark, 1965:2) especially when resources for enforcement is not provided. In addition, to the number of cities being affected by urban sprawl and urbanisation, environmental aspects are also being affected.

However, cities have a large effect on the surrounding rural environment; according to OECD (2009:145) methods that a city uses to develop has effects on greenhouse gas emission levels, the climate change vulnerability and also environmental damages. In addition cities across the

world are also the primary of power consumer and also the primary CO_2 contributor (World Bank, 2010:4-16). Although, climate change does not only affect the rural environment it also has effects on the cities itself with threats such as, rising coastal water, severe storms and also the urban heat island effect, all of which could damage different aspects of the city (OECD, 2009:145).

Furthermore, urban areas of the present day are required to ensure that it addresses methods to decrease emissions within its boundaries. The OECD (2009:145) identified a direct correlation between urban densities and CO_2 emissions, continually urbanisation is indicated as a contributor to densification. Densification is one of the methods to ensure less growth occurs, even though in this case it has a negative effect to provide a more compact urban area. Various urbanisation processes are required to be analysed to ensure numerous environmental aspects are addressed, assuming that urbanisation is controlled climate change may only change minimally (OECD, 2009:145).

An example of the effects that urbanisation has on the urban area, is the urban heat island phenomenon as defined by Rodriguez and Bonilla (2014:60) it is an elevated temperature dome that may be observed over urban areas. As urbanisation increases in urban areas so will the urban heat island phenomenon this is illustrated in Figure 2.10.

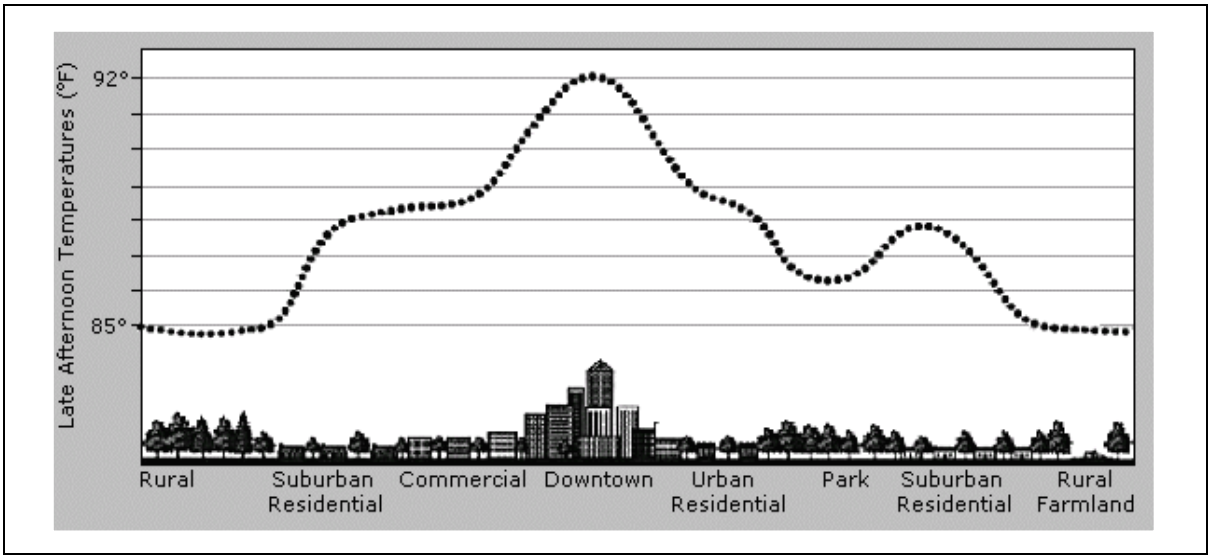


Figure 2.10: Urban heat island profile is shown.

Source: Rodriguez and Bonilla (2014:61).

However, the OECD (2009:145) made the statement that "*urbanisation goes hand and hand with land consumption*" and continues that when Shanghai was used in an experiment through which it was analysed through time series imagery its growth that was experienced was over 350 per cent from 1988 to 2002. Whereas the urban sprawl is affected by urbanisation and it affects the rural and urban areas negatively. This substantiates the importance of sustainable development for urban planning (OECD 2009:145).

On the contrary, fast and unintended urban growth threatens the sustainability of development, implications arise as the necessary infrastructure isn't available for the new developments (UN, 2014:7). In some cities, unplanned or inadequately managed urban expansion results in rapid sprawl, pollution, and environmental degradation, in conjunction with unsustainable production and consumption patterns (UN, 2014:7; Loughman *et al.* 2011:1).

2.3 Conclusion

Urban boundaries can be linked back to the development of the first urban growth models which employed boundaries to demarcate specific land-uses. These growth models present valuable information regarding urban boundaries, when considered from a spatial planning perspective. Table 2.4 captures the interpretation of urban growth models in relation to urban boundaries.

Table 2.4: Interpretation of urban growth models in relation to urban boundaries

Concentric Zone Model			
Positive aspects	Criticisms	Opinions	Relevance
Well defined uses, with the expansion of the city occurring from one point (the centre).	The model was developed for modern cities (Maretto *et al.* 2010:4), this made it obsolete for historical cities. Boundaries were practically irrelevant, as the land uses to expand into other circles.	The United States would benefit most as it was developed in the United States. Cities have usually more than one main growth point.	Boundaries were implemented as growth zones, however, development pressure would need to be considered.
Sector Model			
Positive aspects	Criticisms	Opinions	Relevance
The model identified transport corridors to accommodate rapid growth.	Not all cities were shaped in the same way and physical features could limit the growth of cities in certain sectors.	Fragmentation is enhanced in this model.	The role of boundaries to divide sectors are evident but should be considered in light of integrated planning approaches.

Multiple Nuclei Model			
Positive aspects	Criticisms	Opinions	Relevance
Cities have many different areas that experience growth and growth occurs at a different pace across the entire city and this was identified by the model. Certain land uses are better placed together, this creates growth points.	Not all resources, transportation costs and densities are evenly distributed across the entire city.	This model was the first to represent the mixed land uses in urban areas, this creates less of a chance for sprawl.	This model provided clear indications that urban boundaries are less feasible in faster expanding cities, as these various growth points across the city are more difficult to predict and control.
Apartheid City Model			
Positive aspects	Criticisms	Opinions	Relevance
How effective boundaries may be if properly enforced	Division amongst racial groups are at present still rectified	The model identified alternative objective of an boundary i.e. segregation	Urban boundaries are required to be well planned as a method to enhance integration.

Source: Own creation (2017).

It's evident that the urban boundary was utilised extensively throughout these urban models, specifically to demarcate specific land-uses. Theoretically boundaries are an essential part to guide urban form (as evident from the urban models), however, the current reality pose more challenges relating to the role and relevance of urban boundaries, especially in developing countries such as South Africa where urban growth is an integral part of the urban landscape. Chapter 3 will accordingly consider the concept of urban boundaries in more detail, focus on the role thereof, different interpretations thereof and the effectiveness thereof.

CHAPTER 3: INTERPRETING URBAN BOUNDARIES

3.1 Introduction

For centuries urban boundaries have been utilised in various countries and cities to primarily contain urban growth. However, the interpretation of the role of the urban boundary posed several challenges throughout history. A boundary's primary function is to demarcate areas and to manage the exchange between these areas, in a sense, managing competition between different areas (Richter and Peitgen, 1985:572) and different land-uses.

As identified by Richter and Peitgen (1985:572), boundaries are areas that portrays transition zones between changing differences, e.g. areas, systems, regimes; however, not much different than a city's boundary that divides urban and rural areas. Throughout this chapter, the different interpretations of urban boundaries will be considered in order to provide an understanding of the role and importance of urban boundaries, and how this notion changed over time.

3.2 Contextualising Urban boundaries

The first planning theory referring to the concept of the urban boundary was the Garden City Movement (Howard, 1902:20-45), illustrating a green belt as a planning tool which divided the city from the rural area (Coetzer, 2009:1-2). The vision of Ebenezer Howard was that cities would have been enclosed within the green belt in order to 1) inhibit further growth of the city and 2) to ensure the city has sustainable agricultural and sufficient rural areas (Howard, 1902:20-45). Illustrated in Figure 3.1 captures the garden city concept in context within the greater region.

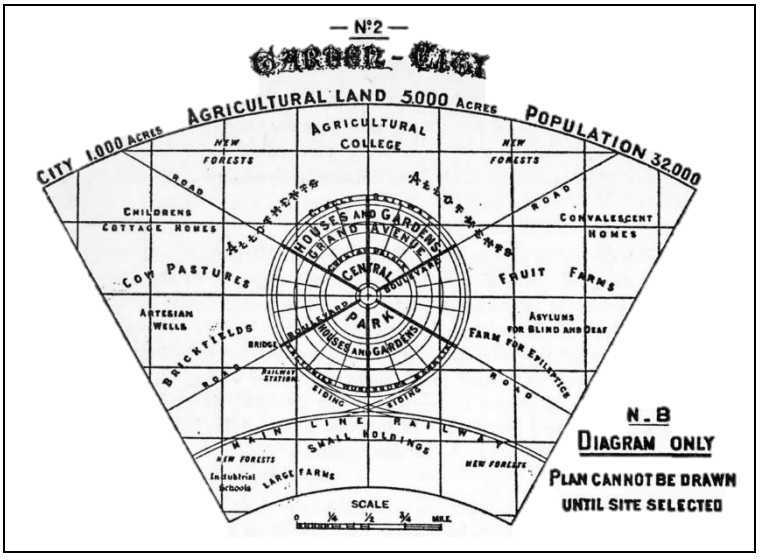


Figure 3.1: Garden city concept

Source: Howard (1902:22).

Various other concepts were developed as a result of the garden city, for example as Merlin (1980:77) stated the new towns movement that was developed by F.J. Osborn was based on the concept. The new town movement provided an alternative to the overcrowded, polluted chaotic and miserable industrial cities. The movement spurred new development policies for decentralisation and deconcentration of industries in the 1940's (Merlin, 1980:78).

The main impact of the green belt concept was the realisation of the importance of rural area protection. According to Merlin (1980:78), urban areas benefit the most from green belt implementation, in terms of managed form to support development. The concept was intended by (Howard, 1902:20-45) to be a growth management tool that controls, contains direct growth in order to promote more compact urban development and to protect the rural areas outside of the urban boundary. Since Howard the urban boundaries identify the physical edge of a city, and as such defines the size and shape of the demarcated urban area.

The use of the green belt persisted throughout the 19th-century urban planning strategies seeing that it successfully addressed obstinate problems. The theory identified problems that still affect contemporary cities, e.g. cities are encroaching rural areas, the large rural population that is migrating to urban areas (urbanisation) (Parnell, 1993:473-478). The above-mentioned problems are still relevant in many countries, especially in terms of urbanisation as explained in Section 2.2. Howard's concept gained popularity across the world, and garden cities were developed in the United States, green belts were implemented in Radburn and Sunnyvale and more recently South Africa also implemented developments based on the Garden City concept in the suburbs of Pinelands in the Western Cape (Parnell, 1993:477; Merlin, 1980:78). Canada also implemented a green belt in 2005 in Ontario with the main objective to protect environmentally sensitive areas as well as farmlands from urban development (Ontario, 2017).

The increasing delineation of the urban boundary in different countries and cities across the globe led to complexities in defining a specific role relating to urban boundaries, and this has been a challenging task for many professionals (Tannier *et al.,* 2011:211) considering the complex urban environments and the continuum between urban and rural areas. The implementation of urban boundaries within the wide disparities and different context are further complicating the issue, especially when rural areas are at the one end of the continuum.

As previously mentioned these various iterations of the urban boundary produces intricacies within the planning profession as it's hard to differentiate amongst these terms. Urban boundaries have many synonyms and such often entail different interpretation, further complicating the understanding and universal application of urban boundaries. The most common used descriptions are that of the 'urban edge concept' and the "urban development boundary'. Table 3.1 provides a comprehensive assembly of different terms referring to the urban boundary concepts, as applied in different countries and contexts.

Table 3.1: Different terms relating to the urban boundary concept

Green belt	The concept is a policy or growth management strategy used to land preserve areas of largely undeveloped, wild, or rural land surrounding or adjacent to urban areas (Howard, 1902:20-45).
Urban edge	It is a planning tool that demarcates a line to manage, direct and control the outer limits of development (Western Cape Department of environment and cultural affairs and sport, 2002b:3; (MLH Architects and Planners, 2004:7).
Built edge line	The built edge line defines the outer boundary of the existing built-up area and will always be contained by, or coincide with, the Urban Edge (MLH Architects and Planners, 2004:7).
Urban fringe	The urban fringe is the area located between the Urban Edge Line and the Built edge line (MLH Architects and Planners, 2004:7).
Urban development boundary (UDB)/ Urban growth boundary (UGB)	The UDB/UGB objective is to create a boundary for the city beyond where no further development will be allowed (Ekurhuleni MSDF (Section C), 2015b:32).
Urban development area (UDA)	The UDA may be identified as the whole area where urban development may occur, between the built edge line and the UDB (Goldstein, 2008:1; Miami-dade, 2012:18).
Urban expansion area (UEA)	The UEA is a planning tool that is positioned outside the UDB where urban development is “most likely to occur” (Goldstein, 2008:1; Miami-dade, 2012:18).
Urban service area	Dividing the area into two regions, one being rural areas where minimal to no services are delivered and the other areas where services are provided, the latter being where development will occur (Anderson, 1999:11)
Coastal edge	The coastal edge is utilised to demarcate areas around the coast. Its main objective is to protect valuable coastal resources and to avoid financial and hazards risks pertaining to areas at risk of flooding (South Africa, 2012b:6).

Source: Own Compilation (2017).

Throughout history, several renditions of the urban boundary have existed, the main objective aimed to preserve rural environments. However, many other functions exist, namely: (Georgia Planning, 2008:7; Ekurhuleni MSDF (Section B), 2015a:36; Ekurhuleni MSDF (Section C) 2015b:34-35; Anderson, 1999:4)

- Prevent unrestricted urban sprawl.
- Prevent neighbouring cities/towns to merge with one another.
- Safeguard the rural areas from encroachment.
- Preserve the character of historic cities.
- Also to assist with urban regeneration by encouraging densification.
- Prevent urban decay.
- Delineated area for servicing

The role of the urban boundary (or related terms) could possibly be a result of the context in which the need of such boundary originated. Accordingly specific consideration will be given to the concepts of a) the urban development boundary and b) the urban edge, as most prominent synonyms employed for the urban boundary concept.

3.2.1 Urban development boundary

The urban development boundary (UDB) is a growth management strategy that is currently being implemented across the world. The main purpose of the UDB is to create a boundary for the city beyond where no further development will be allowed, this is done to achieve a sustainable compact city with the main interest point for the city's inhabitants (Ekurhuleni MSDF (Section C), 2015b:32).

The urban edge and UDB both have the same objectives, however, both coexist in the same urban area, the implementation of these growth management strategies are producing intricacies. The UDB continues on the methods set out by Abercrombie it is a demarcated cadastral line indicated where it is to be implemented.

To elaborate, the UDB also has several functions as identified within the Ekurhuleni Municipal Spatial Development Framework (MSDF) (Section C) (2015b:34-35), however, similarities appear to the function of the urban boundary:

- more accurate growth management strategies;
- increase in all land values – both rural and urban land;
- suitable servicing standards may be applied;
- possible sustainable long-term plans; and lastly
- protection of agricultural areas and receiving of urban support.

The UGB's roots lay with the urban edge concept's, through the developments done by Abercrombie this concept was also developed. As mentioned in section 0 London was one of the earliest documented cities to implement growth boundaries.

However, the first identified UDB in the United States occurred in Lexington, Kentucky, in 1958, when the city of Fayette County and Lexington strategically decided to dictate where new investments would occur to improve urban development (Anderson, 1999:1). In comparison to Lexington, Oregon was the first to implement a mandatory UDB in the United States in 1973 (Macpherson and Paulus, 1973:416-420). The bill established a department, the Department of land conservation and development, it was responsible for the establishment of a state-wide land use planning goals and guidelines, assuring inhabitant involvement and lastly to coordinate the planning efforts of state agencies.

However, the UDB has two components, the “urban development area” and the “urban expansion area” (Goldstein, 2008:1; Miami-dade, 2012:18): Firstly, the urban development area (UDA) is identified as the whole area where urban development may occur. Moreover, the UDA lies between the built edge line and the UDB, thus, urban development may occur between these two boundaries. The new development will expand the built edge line closer to the UDB.

Secondly, the urban expansion area (UEA) may be defined as the area outside the UDB where urban development “most likely to occur” (Miami-dade, 2012:64). Additionally, this identifies the areas where the built edge line is encroaching the UDB and might cause urban sprawl, thus, specifies the areas under pressure with an alternative area to develop into the “ultimate boundary” and supplying an alternative to uncontrolled urban sprawl. This meant urban sprawl is still contained, however, urban sprawl still has occurred, rural areas are being transformed into new urban areas. As Miami-dade (2012:64) declared the UEA is a very valuable planning tool, nonetheless is underused and unknown to most professionals.

The UDB is therefore not the furthest point that urban development could occur, the underused component UEA’s boundary is. Figure 3.2 illustrates the connection between all of these components discussed, however, it is important to note that the UEA is only implemented in areas where development pressures are highest.

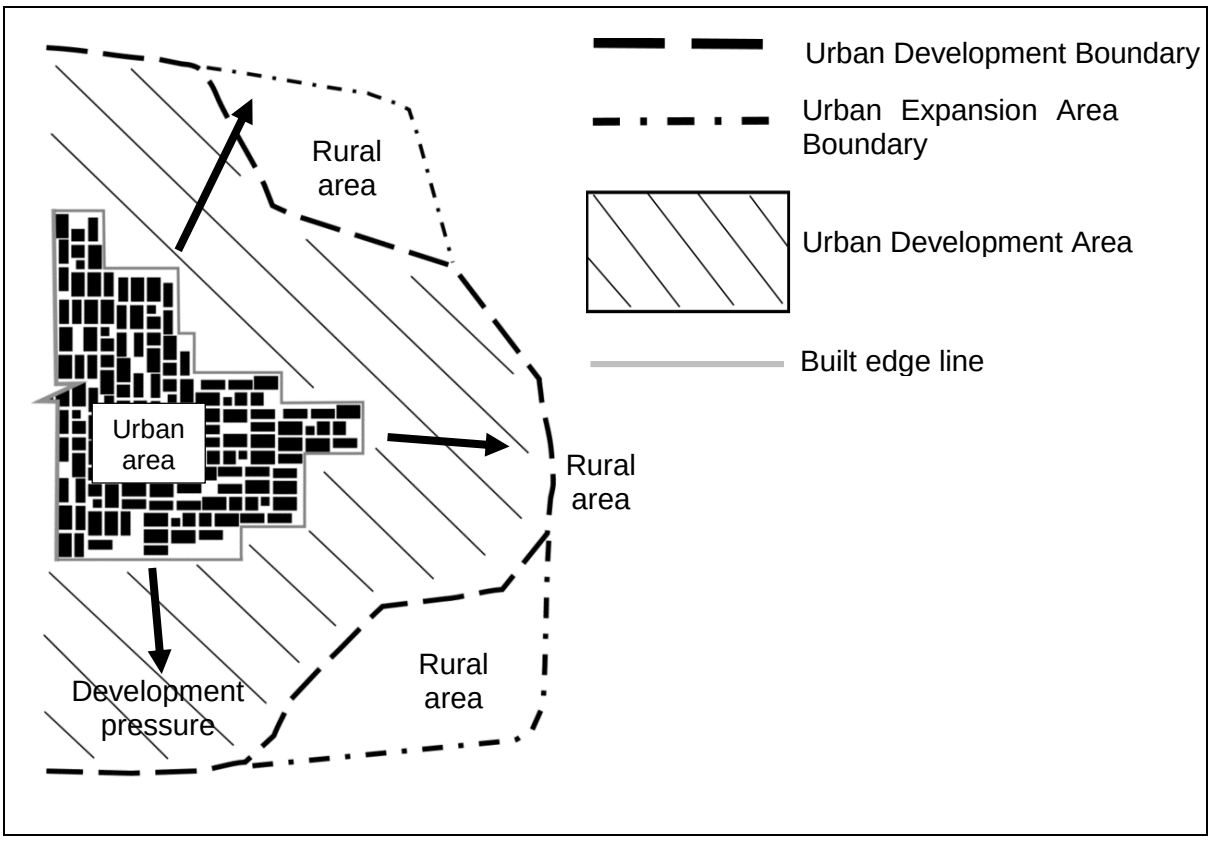


Figure 3.2: Concept of the urban development boundary

Source: Own Creation (2017).

The argumentation for a UDB has many incentives, however, the main may be to ensure rural areas are protected through growth management (IDP, 2004:219; Goldstein, 2008:1; Miami-dade, 2012:1). Furthermore, the UDB is just a line on a map, without proper enforcement after implementation, urban development pressure will sprawl uncontrollably, thus, the importance is enforcement, not implementation. However, the understanding that the UDB will receive pressure and an integrated approach has to be pursued, this will ensure adequate decisions are made when development pressure rises.

3.2.2 Urban edge concept

The development of urban edges have occurred for many centuries, ancient Greece utilised urban edges to divide the land between town and country (Boyd and Jameson, 1981: 327). However, throughout history, the urban edge has been defined and the method of implementation resemble those used by Abercrombie, to indicate the data cadastral has been the norm for many decades.

The urban edge is defined as “a demarcated line to manage, direct and control the outer limits of development. The intention of the urban edge is to establish limits beyond which urban development should not be permitted” (Western Cape Department of environment and cultural affairs and sport, 2002b:3).

The adoption of the urban edge concept has occurred in South African spatial planning legislation, various local sphere governments implement these urban edges to ensure more compact cities. The urban edge concept is a demarcated outer boundary of urban areas and marks the transition between urban and rural land uses. It consists of the following components:

Urban Edge Line: The Urban Edge Line is the demarcated outer boundary within which urban expansion may be accommodated within a defined period of time.

Built edge line: The Built edge line defines the outer boundary of the existing built-up area and will always be contained by, or coincide with, the Urban Edge Line.

Urban Fringe: The Urban Fringe is the area located between the Urban Edge Line and the Built edge line. (MLH Architects and Planners, 2004:7).

All of the above-mentioned components are visually illustrated in Figure 3.3, all of which has a vital role in the urban edge concept. The urban edge is identified as an instrument to regulate development and simultaneously protect environmental aspects, agricultural areas and rural resources (MLH Architects and Planners, 2004:7).

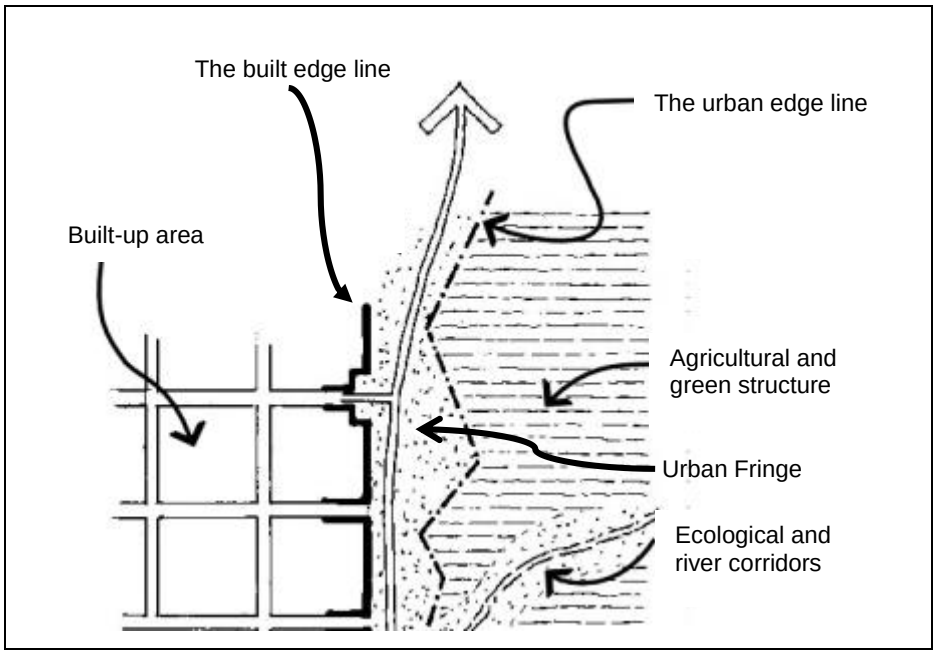


Figure 3.3: Urban edge concept

Source: MLH Architects and Planners (2004:17).

The MSDF of Ekurhuleni provided the functions of the urban edge, however, once again correlation amongst the previous mentioned strategies' functions are made (Ekurhuleni MSDF (Section B), 2015a:36; Southworth and Owens, 1993:284; Western Cape Department of Environmental Affairs and Development Planning, 2006:28-38):

- Conserve environmental resources;

- Prevention of urban decay;
- Promotion of opportunities for redevelopment, infill development and densification.
- Creating affordable cities for residents - shorter travelling distances (costs) and efficient use of infrastructure;
- Upgrading/re-use of infrastructure rather than expansion;
- Restructuring of the Apartheid city – growing Gauteng into a global city region, which is internally coherent and externally competitive; and
- Develop a sustainable urban region through promoting equitable access to basic services, the protection of natural and cultural resources, and an urban form that supports greater efficiencies in land use and service provision as contemplated in the Gauteng Spatial Development Perspective.
- Decreased fragmentation of communities.
- Preserve biodiversity/heritage areas identified by the South African Heritage Resources Agency (SAHRA).

In comparison, the above-mentioned corresponds with the aims of the green belt - *to inhibit further growth of the city and to ensure the city has sustainable agricultural/rural areas.* Also, various problems experienced by Howard in the 20th century are still relevant in the present day as stated by Parnell (1993:473-478).

3.3 Defining urban boundaries

Throughout the world urban boundaries are being identified as one of the most effective growth management tools (Anderson, 1999:4-5). However, from the above discussions on the development of the green belt, the urban development boundary and the urban edge, it is evident that part of the complexities regarding development boundaries, is the definition thereof, relating to the function and role of such within the urban environments.

For purposes of this research, the term “urban boundary” will be used to contextualise the urban boundaries. The concept urban boundary, therefore, implies it’s a demarcated line that aims to inhibit further growth of the city through the management and control of the outer limits of development. The urban boundary identifies where development may occur and predict future growth patterns to ensure an alternative to uncontrolled sprawl, while conserving the city’s rural areas (Howard, 1902:20-45; Goldstein, 2008:1; Western Cape Department of environment and cultural affairs and sport, 2002b:3; Miami-dade, 2012:18).

Relating to function inclusive of preserving the rural area, curb urban sprawl, create an evident divide between rural and urban areas, conserve environmental resources, produce more dense urban areas, prevent of urban decay, increase all land values – both rural and urban land, delineated area for servicing, suitable servicing standards within the urban boundary, prevent

neighbouring cities to merge with one another, preserve the character of historic cities, also to assist with urban regeneration by encouraging densification (Southworth and Owens, 1993:284; Anderson, 1999:4; Western Cape Department of Environmental Affairs and Development Planning, 2006:28-38; Georgia Planning, 2008:7; Ekurhuleni MSDF (Section B), 2015a:36; Ekurhuleni MSDF (Section C), 2015b:34-35).

Accordingly, the effectiveness of urban boundaries will be explored in this context, investigation the complexities and challenges thereof, in order to consider the feasibility and future role of urban boundaries.

3.4 Effectiveness of urban boundaries

Studies of the effectiveness of urban boundaries are uncommon (Long *et al.,* 2015:77) as the strategies to evaluate the implementation thereof is flawed, and thus infrequently attracts adequate attention from the planning profession. The reason of its limited application in planning practices may be connected to several factors, includes the absence of information, resilient evaluation theories and methodologies, as well as the linkages between practice and theory (Brody *et al.,* 2006:75; Long *et al.,* 2015:77).

The effectiveness of urban boundaries is also affected by several negative aspects. Even though, various advantages of urban boundaries exists, an equal number of criticisms coexist together, Staley *et al.* (1991:1) identified them as:

- The implementation evaluation process receives less consideration throughout the urban boundary process.
- Property prices may increase due to a reduced number of undeveloped areas.
- The housing demand will increase faster than supplied housing options.
- Political manipulation by antigrowth interest groups.
- An inferior planning tool to lower infrastructure costs.

Whether an urban boundary is effective is largely related to the impact on the whole environment (urban and rural) if the abovementioned criticisms negatively affect an area, its support of an urban boundary may be decreased.

3.4.1 Methods to determine the effectiveness of an urban boundary

Through the utilisation of the small number of studies on the effectiveness of urban boundaries several methods were obtained as to determine this effectiveness. Long *et al.* (2015:77) recognised that most urban boundary studies only consider the physical aspects of an urban boundary to determine its effectiveness and may overlook various long-term concerns. Moreover, Bengston and Youn (2006:1-3) stated that an urban boundary's objective is not intended to be

static, as it is required to be amended as a method to accommodate new growth patterns as the demand would require it, in most cases that means every 10–20 years an amendment is required.

To evaluate urban boundaries as successful is challenging as most boundaries lack an explicit objective (Bengston *et al.*, 2004:280; Bengston and Youn, 2006:1-3). Throughout the previous sections, the main objective of the few growth management strategies analysed was equal to one another, 'to divide urban and rural areas while preserving the environment', these aims are not sufficient to derive explicit assessment criteria (Gennaio *et al.*, 2009:225).

However, Gennaio *et al.* (2009:225) continued that urban boundaries vary immensely throughout different areas/regions. As a result of the uniqueness of the information received this increases the difficulty of a comparative analysis as amongst international growth containment strategies. Variations may also occur amongst cities within the same country.

The lack of information, robust evaluation theories and methodologies, as well as the linkages between theory and practice are among some of the major reasons that limit the application of an urban boundary within planning practices (Laurian *et al.*, 2004:472-475; Brody *et al.,* 2006:75; Oliveira and Pinho, 2010:343).

Additionally, as stated above Long *et al.* (2015:77) these physical aspects of the urban boundary that are commonly analysed were identified as, namely: The developed land, Number of buildings inside and outside the urban boundary, Whether expansion occurred, etc. while these physical aspects may identify a successful boundary, more in-depth analysis of the policies and legislation that guide the urban boundary may provide a different outcome. Additional methods are required to measure the effectiveness of an urban boundary, for example, it may be beneficial as to compare one country that implemented urban boundaries to another country where urban boundaries were not implemented (Gennaio *et al.,* 2009:225).

Continually, Gennaio *et al.* (2009:225) emphasises that the analysis of the entire area is required to achieve a compressive analysis on the effectiveness. Kasanko *et al.* (2006:112-113) classified urban development into several criteria "built-up and non-built-up areas, residential land-use expansion, land consumption for urban expansion, and population density change", however, it did not compare urban development in- and outside of the urban boundary.

According to Jun (2004:1346-1347), the amount of management that is provided to an urban boundary also impacts the effectiveness, it is of importance to recognise that accommodation has to be provided for the 20-year growth and this only occurs with consistent management (Bengston and Youn, 2006:1-3). However, a strict focus on the management of the urban boundary may also have negative effects such as leapfrog development and inner-city densification on an immense scale, the main objective of the urban boundary might be successful with negative consequences (Bae and Jun, 2003:380; Jun, 2004:1347).

One aspect that is always included to identify whether an urban boundary is effective was “time”; long-term evaluation is required to be applied to have somewhat of a chance to evaluate the effectiveness of an urban boundary (Bengston and Youn, 2004:280; Gennaio *et al.*, 2009:225). These extended time periods of analysis are crucial as a result of the considerable periods of time between application of policy strategies and manifestation of their expected effect (Bengston *et al.*, 2004:280).

Gennaio *et al.* (2009:225) stated that to analyse an urban boundary the objective of the urban boundary is required. An example of this is if an urban boundary’s objective was to “Prevent urban sprawl” the analysis of the urban boundary would contain if the urban boundary achieved its objective. Urban boundary’s objectives could then could be evaluated over time through consistent analysis or through historical data.

Various components (6) are available to evaluate the effectiveness of an urban boundary, Gennaio *et al.* (2009:225) and Huang *et al.* (2007:3) provided exact aspects that a spatial analysis may aim to analyse:

- Urban boundary development.
- Number of building throughout the area, inside and outside the urban boundary.
- The population density in the urban boundary.
- The porosity of the area. (Ratio of open space to urban area)
- The complexity of the urban area.
- The centrality of the urban area.

These aspects are to be analysed through various analyses over the course of a long-term evaluation of purposeful sampling and data collection. The long-term analysis would provide an indication whether the urban boundary’s objectives were successfully obtained and, if so the urban boundary would be classified as effective. Figure 3.4 illustrated these aspects.

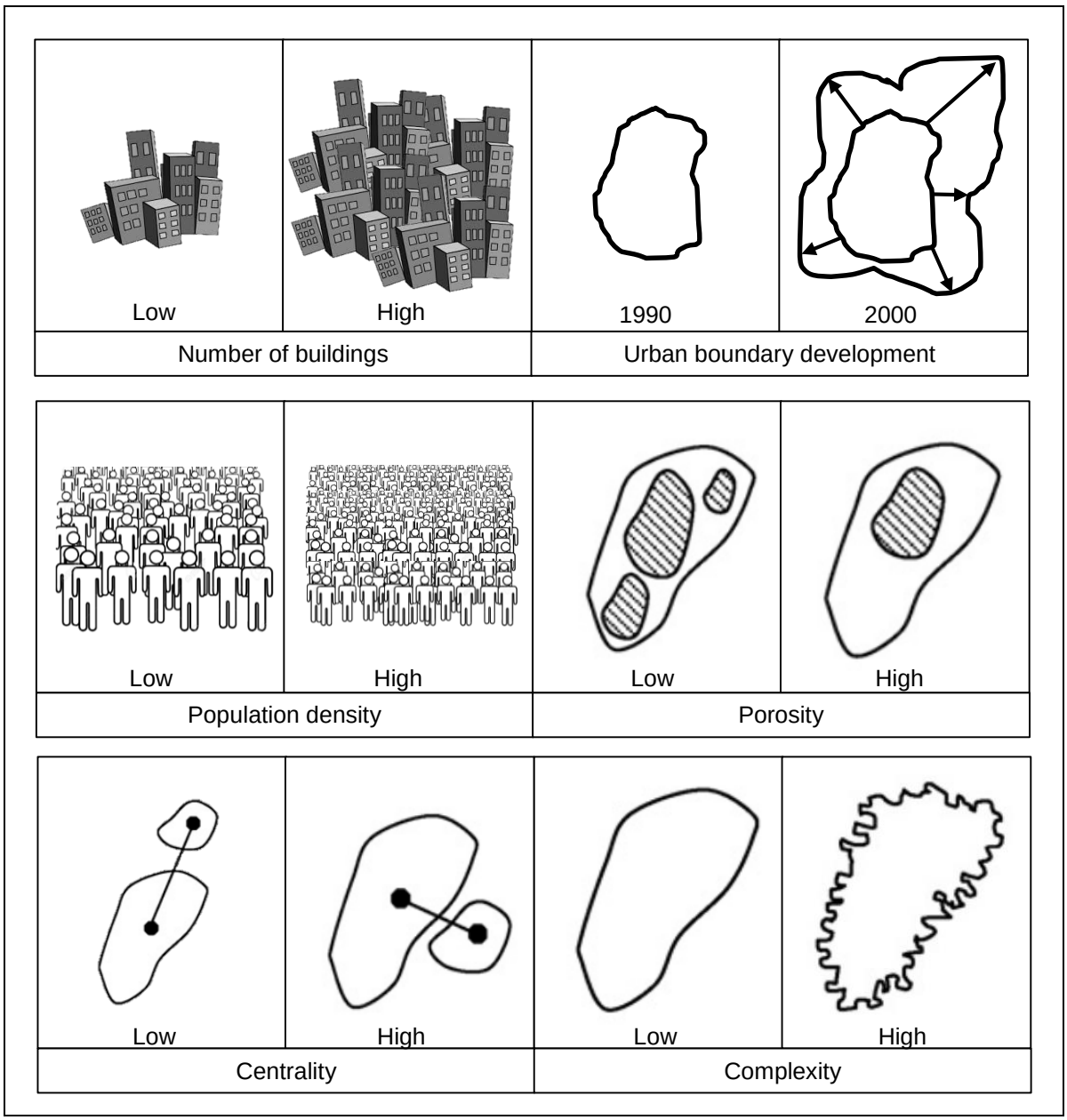


Figure 3.4: Aspects to analyse urban boundaries

Source: Own compilation partially adapted from Huang *et al.,* (2007:3).

3.5 Conclusion

The concept 'urban boundary' is often defined by various terms (refer to Table 3.1) that are used interchangeably. Table 3.1 identified several examples of the interpretation of the urban boundary concept that exist and form part of the intricate system of the 'urban boundary'. This wide array of definitions and terms contribute to the intricacies of the urban boundary. It is crucial to define the concept of urban boundaries in this sense and to comprehend the uniqueness and role of an urban boundary, as such might lead to better delineation and as Richter and Peitgen (1985:572) stated to connect and divide at a similar time.

The chapter indicated the importance of the urban boundary as a spatial planning tool, since the initial theory of the green belt, the vision of Howard was to end the mindless rural decay for urban development. Since the development of the green belt, hundreds if not thousands of cities utilised the advantages of a growth management strategy, whether it was a green belt, urban development boundary, urban edge or any other.

Even though the main objective of numerous urban boundaries are to conserve the rural environment, various functions exist and coexist to aid one another to be successful. Every urban boundary is unique as Gennaio *et al.* (2009:225) stated an urban boundary may vary in terms of function between countries and between different cities, with each urban boundary adapting to its environment and local context.

This chapter emphasised that urban boundaries are, theoretically, identified as the main growth management strategy globally (Anderson, 1999:4-5). Chapter 4 considered the South African reality and perspective regarding urban boundaries, explaining the development of urban boundaries over time and how spatial planning legislation and policies impacted on the role of urban boundaries.

CHAPTER 4: SOUTH AFRICAN PERSPECTIVE ON URBAN BOUNDARIES

4.1 Introduction

The role of urban boundaries in terms of growth management and sustainable urban form is deemed significant based on the literature captured in previous chapter. Throughout the previous chapter, the intricacies of urban boundaries were considered, also referring to the advantages of implementation of urban boundaries. The role and relevance of the urban boundary are increasingly questioned, especially in light of recent planning approaches in favour of integrated planning. This is also true in South Africa, where the newly enacted Spatial Planning Land Use Management Act, Act 16 of 2013 (SPLUMA) now calls for wall-to-wall LUS.

This chapter considers the development of the urban boundary concept in South Africa in terms of policies and legislation that impacted on the role, function and successful implementation thereof in a local context. To better comprehend the local context, the development of urban planning in South Africa is briefly explained as point of departure.

4.2 Development of urban planning in South Africa

The history of urban planning in South Africa is commonly divided into the pre- and post-Apartheid eras. Both are deemed assets, since the urban boundary was introduced in early South African spatial planning practices, as will be explained accordingly.

4.2.1 Pre-Apartheid urban planning

During the time that Ebenezer Howard was developing his work on garden cities and the concept of greenbelts in 1989, South Africa and the colonies were entering the second Anglo Boere War that finally led to the unification of the country (Wylie, 2016:19). During this time of war, the government was the influential authority of urban planning (Mabin and Smit, 1997:194).

There were two major motives for the government to direct, influence and control urban planning at the turn of the eighteenth century. These motives were to dictate and restrict the pattern of non-white settlements in urban environments and to regulate the private subdivision of land for specific urban uses (Mabin and Smit, 1997:194).

The ‘recognition of townships’ law in 1894, influenced the Orange Free State republic to become the first state in Southern Africa to establish an apparatus dedicated to controlling urban form (Marks and Trapido, 1979:70). In addition, in 1902, before the Treaty of Vereeniging was signed several republics signed a British regime to establish new local authorities with the intent to re-create the urban environment (Mabin and Smit, 1997:195).

The above-mentioned regime was successfully implemented in Johannesburg; it extended the city's boundary to appropriate areas, laid foundations for an electric tram system and successfully removed and redevelop unsanitary areas (Mabin and Smit, 1997:195). The redevelopment of these unsanitary areas was characterised with the removal of 'natives' in an area, and were re-established elsewhere, beyond of the city boundary.

British regimes greatly influenced the urban planning system of South Africa, various South African local spheres of government accepted any assistance with reference to urban planning (Wylie, 2016:21). South Africa produced 'The Housing Act of 1920' and 'The Public Health Act of 1919' both were established through the foundations provided by 'The British Housing, Town Planning Etc. Act of 1909' that contained comparable provisions in the resolutions adopted at the 1920 Allied Housing and Town Planning Congress that was held in Paris (Wylie, 2016:21; Parnell, 1993:472).

The British legislation that influenced South African systems addressed difficulties including overcrowding, slum removal and funding for housing developments. However, South Africa would adopt this legislation to be more suitable for its own planning objectives i.e. segregation policies. Most countries in this era developed policies to address the needs of public health and to limit the spread of diseases, where South Africa's practically always had a racial perspective (Parnell, 1993:479). An example of this occurred in both 1901 and 1918 in Cape Town when disease outbreaks occurred and Cape Town's local authority used the opportunity to justify forced removal of numerous non-white communities to outside of the city's periphery (Wylie, 2016:21).

To elaborate, Cape Town established a committee in 1917 to address housing issues throughout the city, urban planning was utilised as a method to improve the living conditions (Mabin and Smit, 1997:197). The importance of urban planning as a tool to aid city development was gaining momentum, in the late 1910s, several urban planning councils would be established in Durban, Johannesburg and in the Transvaal (Mabin and Smit, 1997:198).

With the movement of urban planning, the first garden city was established with reference to Section 0, however, the motive behind these numerous planning movements was largely driven by segregation objectives. As Mabin and Smit (1997:197) confirmed South Africa prepared layout plans without the appropriate number of housing for non-white inhabitants to necessitate a move to cheaper housing areas on the periphery of the city. The urban planning movement was utilised as tool to forward the 'war' on segregation and would assist in excluding the non-whites from the greater plan. During this era, several well-known segregated communities were established, namely, 'District six' in Cape Town and 'Diepkloof' in Johannesburg. Both areas were used to house non-white South Africans (Mabin, 1992:413).

Throughout the 1920s and 30s, the government prescribed the responsibility of urban planning matters to the local authorities and took over the role of decisive authority from the government (Mabin and Smit, 1997:200-201). The 1930s also indicated the start of increased urban populations (urbanisation). Urbanisation increased dramatically and would experience a reduced rate from the 1950s refer to Table 2.3 (Mabin, 1992:413). However, no specific department of government had the authority to address urban growth that led to an influx of urban residents and loss of rural areas (Mabin, 1992:413).

As the needs for certain governmental departments grew between the 1940s and the 70s, it sparked the implementation of numerous national planning institutions. The Social and Economic Planning Council was one of these institutions who advised the government by means of reports on matters of urbanisation, segregation and planning concerns (Wylie, 2016:23). In 1948 the "*Herenigde Nasionale Party*" (Reunited National Party) came into power, Mabin and Smit (1997:205) identified it was clear that the aim of the party was to implement urban segregation. In addition, "people should be deprived of tenure rights and be forced to move out of any 'mixed' areas they occupied" (Mabin, 1992:420).

These alterations required municipalities to follow several urban development guidelines, one was being implemented by the Land Tenure Advisory Board (LTAB) that promulgated the Group Areas Act of the 1950s. The LTAB enforced racial zoning and the master zoning plans of the province; all of which had to be correctly implemented by the local authorities (Wylie, 2016:23; Mabin and Smit, 1997:206).

During this era, the urban boundary was not being implemented for conservation purposes, however, it may have been implemented for division between different districts as well as a segregation tool. The National Department of Planning was established in the mid-sixties, it would take over the responsibilities of the LTAB as well as the Group Areas Board (developer of the Group Areas Act) (Mabin and Smit, 1997:206).

The National Planning Department developed the 'Physical Planning and Utilisation of Resources Act, 88 of 1967' to provide guidance on plans being developed for different areas. However, several authorities started to follow the above-mentioned act when it was amended, and renamed as the Physical Planning Act of 1975 (PPA) (Wylie, 2016:23).

The PPA was the first act stating that an urban development plan must include guidelines for future spatial development of the prescribed areas; also to illustrate how future boundaries were determined spatially (Wylie, 2016:24). In the 1980s the regional approach to planning was receiving interest as many of the independent regions were being included in the government's plans as these regions were not economically viable on their own (Mabin and Smit, 1997:211). The independent regions were a consequence of the former regime to enforce ethnical

segregation by forcing ethnical groups in so called “Home Lands”, most of which later became independent. Despite their restricted financial restriction to exist as separate states.

Throughout the Apartheid city’s existence, urbanisation was increasing rapidly, whether in the city or on the periphery where non-white communities were mostly established see Figure 2.4. The government realised the latter distorted settlements and developed the ‘white paper on urbanisation’ in 1986 to address the problem. This policy altered the view on urbanisation, and that it was inevitable, however, it was also implemented to develop a strategy to control urbanisation orderly (Mabin and Smit, 1997:212).

Moreover, Mabin and Smit (1997:212-213) confirmed that urban planning during this time was controlled in terms of amendment schemes; all driven by racial consideration. As a result of this satellite towns appeared around urban areas as residential areas for non-white residents seemed to be reduced (Mabin and Smit, 1997:212-213). There were many that fought the Apartheid regime as being heartless and inappropriate. The party that would finally restore urban planning by addressing the actual problems of segregation was the African National Congress (ANC) in 1994.

4.2.2 Post-Apartheid urban planning

The 1990s were recognised as the era aiming at altering a legacy of wrongs by the president, F.W. de Klerk, strongly promoting a democratic nation. The isolation from international markets, economic stagnation and growing dissatisfaction from the public contributed to the change (Mabin and Smit, 1997:214). F.W. de Klerk repealed a large number discriminating act during his presidency, several having a direct impacts on urban planning, namely the Group Areas Act, the Black Land Acts of 1913 and 1936, the Abolition of Racially Based Land Measures Act, No 208 of 1991, the successor of the Natives Urban Areas Act of 1923, partially the Black Communities Development Act of 1984 (Mabin and Smit, 1997:214). Within 1994 the first democratic election was dominated by the ANC, who could now radically influenced various aspects within the urban planning system.

Their policies liberated urban planning from its commitment to racially divided space, however, its past and severe consequences were established in urban areas and required immediate rectification. The democratic era supplied the urban planning system with several acts aimed at rectifying Apartheid’s influences in urban areas. The Less Formal Township Establishment Act of 1991 was seen as one of these efforts. This legislation had at its core an emphasis on fast tracing township establishment processes, especially in areas where an urgent need was apparent. Also, it aimed at formalising informal areas. Both approaches, however, signalled a strong emphasis on permanent tenure and land ownership, as it was neglected by pre-Apartheid legislation. It was

also used to obtain the finance to provide services to the lowest income areas across South Africa, hundreds of thousands were positively affected (Mabin and Smit, 1997:214).

The World Bank identified South African cities as some of the most inefficient in the world and it was required to be restructured to achieve more compact and higher densities. Although urban reconstruction was a necessity, the cities required a plan that could be implemented across South Africa. Consensus is required on the methods that would be utilised to achieve urban reconstruction should, however, it should not be assumed (Mabin and Smit, 1997:215). However, some influences such as the World Bank and the Urban Foundation agreed that functional and efficient compact cities should be strived for. However, the emphasis on subsidies to improve the housing supply caused a large number of site-and-service schemes on the urban periphery (Mabin and Smit, 1997:215).

The government passed the first planning legislation of the post-Apartheid era in 1994, the Reconstruction and Development Programme (RDP). The next year the offices of the RDP then developed the Development Facilitation Act, it permits the bypassing of old planning mechanisms and indicates that it is required by all authorities to indicate all future land development objectives and that a Commission is responsible for any further change in planning.

The following section considers the contributions that urban planning had on the function of urban boundaries in South Africa. The role of urban boundaries was enhanced through the use of segregation techniques that forced non-whites to move outside of the urban boundary, urban planning of the pre-1994 era focused on these specifics when a city was being developed.

4.3 The history of urban boundaries in South Africa

Dewar (2000:210) argued that cities in South Africa have a specific form and structure that were influenced by a modernistic approach in other countries, namely, the United Kingdom, Europe and the United States. However, several modernistic tendencies appear throughout South Africa's cities; some having direct effects on the urban boundary. An example of this is single free-standing structures with a private space surrounding it, deemed by Dewar (2000:201) as a waste of developable space. Dewar (2000:201) continue by adding that another modernistic aspect was the separation of that, in turn, supported the increase of vehicular movement throughout the cities. Informal settlements on the urban periphery and its continuous expansion are cause for concern, as Wylie (2016:27) indicated the incremental loss of rural land occurred at these areas.

Urban boundaries were implemented with racial segregation as the main objective. To ensure non-white inhabitants were kept out of urban areas. An example that Wylie (2016:30) provided to demonstrate the complexity of the situation, was Cape Town. Cape Town consisted of approximately 50 management bodies that existed between 1988 and 2000, all of which had to

be incorporated into one local municipality – the City of Cape Town Municipality. However, each management body had a boundary of some sort mainly to support or enforce racial segregation and all these urban areas were required to be amended, to ensure, that a comprehensive urban boundary was developed for the integrated region. The need for urban reconstruction attracted several University of Cape Town (UCT) academics to aid in the process of achieving the objective (Thodes, 2006:52). Opinions made in the 1980's and 1990's by these academics were highly influential in numerous urban spatial policies.

Although several academics formed part of the team, most notable were David Dewar, Roelof Uytenbogaardt and Vanessa Watson (Sim *et al.* 2016:38; Harrison *et al.* 2008:120). The academics used the older 'organic' areas to develop a set of normative design and planning principles. The main concept was that controlling land use through schemes and zoning was an incorrect approach (Thodes, 2006:52). The team identified the difficulties of South African cities, and how the inefficiencies and inequitableness of the spatial structures could be addressed. The apparent cause for these inefficiencies was both urban sprawl and Apartheid, Apartheid intensified unemployment and poverty, and this negatively impacted the rural areas on or close to the urban boundary (Watson, 2002:34). As previously identified the World Bank recommended more compact cities to allow for a higher threshold for public facilities, services, more economic activities and better public transportation (Thodes, 2006:52).

The 'compact city' would ensure better control over urban sprawl and in effect limit rural land degradation. The urban boundary would play a significant role in this regard, limiting urban development, enhancing densification and infill planning approaches (Sim *et al.* 2016:39), restricting urban sprawl and conserving rural areas as well as valuable resources (Watson, 2002:64; Harrison *et al.* 2008:119-122).

As observed by Sim *et al.* (2016:39), these spatial concepts became popular methods to address the spatial integration. Several of these spatial concepts were implemented into policies and legislation, i.e. the 1994 Housing White Paper, the 1995 Development Facilitation Act (Act 67 of 1995) (DFA) and also the 1994 Reconstruction and Development Programme (RDP).

The City of Cape Town Municipality was the first to redelineate its integrated urban boundary in 1998. Its aim was to inhibit urban sprawl, encourage densification, conserve rural areas and protects the natural resources. The initiative comprised four distinct components (Britz and Meyer, 2006:209):

- To demarcate a cadastral defined urban boundary line.
- Identifying management zones on both or either side of this line.
- Developing management policies to manage these zones.

- Pursuing city approval of these proposals to guarantee compliance results for the urban boundary.

In 2002 the City of Cape Town Municipality's Spatial Development Framework (SDF) was published. The prolonged implementation was a result of further studies required by the Provincial Government of the Western Cape containing references to the urban boundary (Wylie, 2016:25). According to Britz and Meyer (2006:209), the studies contained the intention to achieve a better understanding on decision-making consistency relating to the urban boundary. Sim *et al.* (2016:39) affirms that both the SDF and the urban boundary were also implemented to achieve a more democratic vision by, almost other, altering the spatial form of Cape Town.

The Department of Environmental Affairs and Development Planning developed the 'Provincial urban edge guideline' in 2005. The main objective of the guidelines were to establish and implement a consistent approach to deal with urban growth, infill and consolidation alongside the urban boundary (South Africa, 2005:6). The City of Cape Town therefore inspired other areas to pursue a functional urban boundary. The Gauteng province attempted to delineate a regional urban boundary, however, it was difficult to receive support from the involved local authorities (Britz and Meyer, 2006:209; Horn, 2009:95).

Local authorities submitted their official amendments for the Gauteng regional urban boundary that were obtained through the external and internal participation of the respective local authorities (Horn, 2009:95). However, Horn (2009:95) additionally indicated the unsuccessful implementation of these amendments by the Gauteng Provincial Government was the cause for confusion for many in the Gauteng planning community. Three of the involved local authorities consequently selected to manage their own urban boundary, independently from the guidelines set out by the Gauteng regional urban boundary. The urban boundary was, however, not repealed (Horn, 2009:95).

The Gauteng Department of Agriculture, Conservation and Environment was the only governmental body applying the Gauteng urban boundary to evaluate land development applications (Horn, 2009:95-96). The practicality of the urban boundary in South Africa is where most of the intricacies occur. Numerous disputes occur throughout the decision-making processes of land use applications as a result of the uncertainty of the jurisdiction of the various involved local authorities (Horn, 2009:95-96).

The historical course of implementing urban boundaries illustrates a complex and integrated approach ranging from a strong segregation emphasis in the past, to several initiatives to currently ensure the spatial integration of formerly segregated areas. Apart from the integration efforts by the metropolitan municipalities, emphasise was also placed on the functionality and controlling

measures established by urban boundaries. It resulted in the adoption of several additional criteria upon identification of the urban boundary, while ensuring its cadastral accuracy.

4.3.1 Legal aspects of the urban boundary in South Africa

The 1994 election results altered the view of urban planning dramatically as a consequence of the country's new democratic status. Horn (2009:55) identified that the South African government's focus shifted from segregation, superiority of races, classes to an emphasis on integration amongst classes and racial areas. Additionally, the importance shifted to ensure poverty alleviation with better economic growth, and environmentally sustainable development (Horn, 2009:55).

With the shift, various laws, policies, frameworks and guidelines were developed to ensure these objectives are successfully achieved. Several legislation influenced the development of the urban boundary. As previously mentioned numerous legislation were developed through the recommendations of University of Cape Town (UCT) academics. However, the most significant piece of legislation in South Africa is the Constitution (Act 108 of 1996), the broad purpose of the Constitution is (South Africa, 1996a:3):

- "Heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights;
- Lay the foundations for a democratic and open society in which government is based on the will of the people and in which every citizen is equally protected by law;
- Improve the quality of life of all citizens and free the potential of each person; and lastly
- Build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations."

In the ensuing section applicable legislation and policies that contributed to development of urban boundaries in South Africa, will be analysed. Also a short overview of these policies and legislation will also be provided. However, all applicable legislation and policies were developed in context with the Constitution of South Africa.

The Figure **4.1** additionally illustrates the importance of the policies and legislation in the development in urban boundaries. Most of the policy and legislation discussed, were a direct consequence of the newly prepared constitution. Figure 4.1 aims to indicate planning legislation deemed most significant for the purpose of this research and should not be interpreted as an exhaustive representation of all possible contributing policies and legislation from all sectors. It was previously argued that the listed policies and legislation were substantive in influencing the contents of the Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs), where the mentioning of urban boundaries, was first depicted.

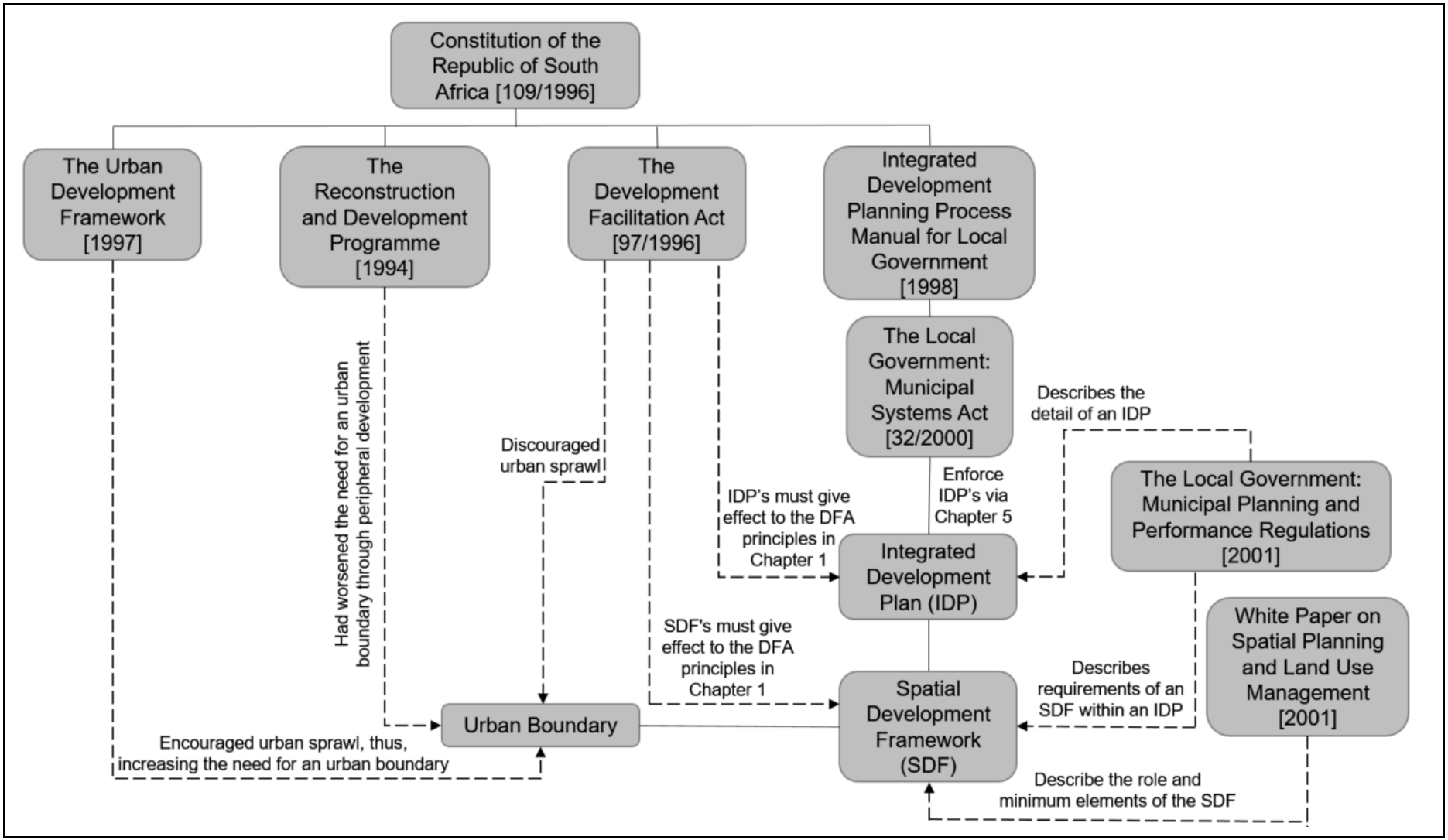


Figure 4.1: Post-Apartheid legislation and policies that influenced urban boundaries

Source: Own compilation (2017).

The first policy, developed in 1994, the Reconstruction and Development Programme, Act 7 of 1994, was one of the policies introduced to attain urban reconstruction and spatial integration. The objective of the RDP was mainly used to assist planning authorities as a policy framework to achieve integrated socio-economic advancement for all people of South Africa and to eradicate amongst others, spatially distorted urban areas established in the country.

The RDP was based on 5 main programme objectives (South Africa, 1994a:11):

- meeting basic needs;
- developing human resources;
- building the economy;
- democratising the state and society, and lastly
- implementing the RDP.

The National Government developed these broad objectives and required all spheres of government to collaborate in achieving the objectives. Local and provincial governments were required to develop regulatory frameworks and policies to do so (South Africa, 1994b:12-16). The white paper also identified the responsibilities of all three levels of government spheres. It was the first policy that implemented this approach and was deemed a revolutionary new time for spatial planning and governance in general.

Various spatial challenges across the country would be addressed by the RDP, and as Horn (2009:57) affirmed the housing backlog a key aspects that was addressed. The broad objectives led the RDP to widely address and improve several aspects across South Africa, from improving democracy to an increase in economic development, as well as better human resources and the provision of housing to for various South Africans (Horn, 2009:57). Subsequently, the only observable remnants of the RDP after 1996 were the delivery of housing, however, these housing systems have further caused concern for urban sprawl as it supplied housing on the periphery of the urban boundary (Horn, 2009:57).

The successive act that was introduced, aiding in the future of land development across South Africa was the Development Facilitation Act, Act 67 of 1995. The principles that were identified herein, were of importance to support the implementation of urban boundaries, particularly section 3(1)(c) stating an objective to promote integrated and efficient land development (Wylie, 2016:30; South Africa, 1995:6-7). The main objective of the DFA was to accelerate up the implementation of the RDP while paving the way for the governing principles of land development (Horn, 2009:57; Wylie, 2016:31). The DFA provided compulsory principles for land development in Chapter 1. A direct correlation between certain principles and the implementation of urban boundaries are noticeable.

These principles are found in section 3(1)(c)(South Africa, 1995:6-7):

> "i) promote the integration of the social, economic, institutional and physical aspects of land development;
>
> ii) Promote integrated land development in rural and urban areas in support of each other;
>
> vi) Discourage the phenomenon of "urban sprawl" in urban areas and contribute to the development of more compact towns and cities;
>
> viii) Encourage environmentally sustainable land development practices and processes".

According to Horn (2009:58), local authorities were allowed to accelerate land development, with special provision being made for servicing land for low-cost housing. The DFA became a fundamental Act as it served as the basis for various other planning policies and frameworks after 1995, the clear-cut promotion of more compact cities became a crucial component of urban planning (Horn, 2009:58; Wylie, 2016:31). Following 1995, various sectors of national legislation also referenced the terms 'development edge' and 'urban edge', according to Wylie (2016:31), including:

- National Environmental Management Act;
- National Environmental Management Biodiversity Act and lastly
- National Environmental Management: Integrated Coastal Management Act.

During 1997 the Urban Development Framework (UDF) was developed as replacement of the RDP. The aim of the UDF was to improve the RDP and specifically relating to restructuring of spatial distortions in urban areas, and to address the dysfunctional developments that occurred. The four key programmes of the UDF were the following (South Africa, 1997:v):

- Integrating the city;
- improving housing and infrastructure;
- promoting urban economic development; and lastly
- creating institutions for delivery.

The DFA suggested that to address the ineffective spatial development, methods of urban densification could be implemented, supporting the World Banks's requirements (South Africa, 1997:8). However, contradictory to the principles of the DFA the UDF strongly argued that "rural agricultural land will inevitably also be a source of land for rapid urban development" (South Africa, 1997:13).

The IDP process manual for local government was developed by the Council for Scientific and Industrial Research (CSIR) in 1998 and consisted of four main sections (Krige and Donalson, 1999): the South African planning context, towards a new system of integrated development planning, the planning process at a glance and the integrated development planning process: a step by step approach. The manual addressed a wide range of themes and aims for a comprehensive growth framework and development at local municipal level. The main aim of IDP was set to integrate the development and management of local municipal areas (Krige and Donalson, 1999). It includes several aspects such as, social and economic realities that is required as well as assessing available resources. The Integrated Development Planning Process Manual for Local Government indicated the transition of new age legislation and policies, the following legislation was affected through initiatives indicated within the manual.

The above manual was the first of several to follow, as various departments aimed at enhancing the manual to ensure aligned IDPs, comprising of several sector plans of which the SDF is one. Although later addressed a recent SDF manual was prepared by the Department of Rural Land Reform (DRDLR) to ensure the Spatial Planning and Land Use Management Act, 16 of 2013 (SPLUMA) aligned SDFs.

Although emphasis was placed on the comprehensive IDP process manual, the following guidelines were prepared since 1995:

- CSIR: IDP Process Manual (1995)
- CSIR IDP Guide Packs (Providing for SDF as a Sector Plan)
- DRDLR: Guidelines for the development of SDFs
- 2013 South Africa Local Government Association: Guidelines to assist municipalities with the formulation of SDFs
- 2014 DRDLR: Guidelines for the development of SDFs

The following applicable legislation is the Local Government: Municipal Systems Act, Act 32 of 2000 (LGMSA), developed “to provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment, and ensure all South African have access to essential services that are affordable to all” (South Africa, 2000:2). The main contribution of the LGMSA was section 25 stating that it is required of municipalities to develop IDP (South Africa, 2000:36). An IDP is intended to provide strategic direction and operational planning for the city (South Africa, 2017c:1). Section 26(e) of the act was the official indication of the requirements of a SDF (South Africa, 2000:38).

However, as required by the LGMSA’s section 35(1)(a) the IDP must be a principal strategic planning instrument that guides and informs all planning, development and decision-making processes with regard to planning, management and development in the municipality (South

Africa, 2000:44). The Local Government: Municipal Planning and Performance Regulations (LGMPPR) were developed in 2001. As the name suggests it provides regulative context to the LGMSA. Section 2 provides more detailed descriptions of IDPs as well as a comprehensive explanation of the requirements to be displayed in a SDF. The municipality's SDF must reflect the following (South Africa, 2001:4):

(i) provide a visual representation of the desired spatial form of the municipality, which representation:

> (i) "must indicate where public and private land development and infrastructure investment should take place;
>
> (ii) must indicate desired or undesired utilisation of space in a particular area;
>
> (iii) may delineate the urban edge;
>
> (iv) must identify areas where strategic intervention is required; and
>
> (v) must indicate areas where priority spending is required.

The LGMPPR are an essential factor in the development of the municipal IDP and SDF process and the necessary guidelines to ensure successful development and implementation of the IDP in the local authority (Cilliers, 2010:57). However, another important aspect is the use of the word "may" in Section 2(4)(i)(iii) as it doesn't mark the delineation of the urban edge as mandatory. The SDF is therefore indicated as a physical plan that contains authorisation to delineate the 'urban edge', even though it's not mandatory (Wylie, 2016:34).

In closing, the White Paper on Spatial Planning and Land Use Management (WPSPLM) of 2001 was developed to minimise the number of planning legislation in South Africa. It was developed by the Department of Agriculture and Land Affairs (Cilliers, 2010:59). The main objective was to provide a uniform, effective and efficient framework for land use management as well as spatial planning in general while supporting the rural areas (South Africa, 2001b:3).

The WPSPLM was based on the 'Green Paper on Development and Planning of 1999' as well as the LGMSA. Five new essential elements of spatial planning and land use management the new system was proposed by the WPSPLM, these included (South Africa, 2001b:3):

- Principles: The principles and norms are directed at achieving equality, sustainability, fairness, efficiency and improved governance in spatial planning and land use management. All decision-making process pertaining to spatial planning has to be aligned with the principles and norms.
- Land use regulators: These regulators provide decisions pertaining to spatial planning and land use management. These local municipal regulators include, land use and

appeal tribunals in specific cases, however, the Minister will act as national land use regulator where national planning principles and norms were in violation.

- IDP-based local spatial planning: For example, in the SDF of local municipalities, the WPSPLM outlines minimum elements to be provided within these SDFs. It provides clarity on the important role that IDPs play in equitable and sustainable development and growth and emphasises the role SDFs play.
- Uniform set of procedures for land development approvals: To instigate the correct regulators where proposed developments are not permissible in terms of the prevailing land use scheme. WPSPLM proposed a uniform procedure for the entire country, the execution of this eliminated the situation where various procedures exist across provincial borders.
- National spatial planning frameworks: To achieve added coordination and integration of public finances as new national spatial frameworks are developed around certain

The WPSPLM identified that the main purpose of an SDF is to provide the spatial development goals of the local municipality South Africa (2001b:16). The SDF should not be perceived as a comprehensive planning tool, rather is should be viewed as a flexible and strategic planning tool to assist local municipalities on the use, development and the planning of land (Cilliers, 2010:61). Table 4.1 provides a summary of the policies and legislation that were developed after 1994 and provides the influences it had on the development of urban boundaries.

Table 4.1: Summary of post – Apartheid policies and legislation.

Relevant Policy/Legislation	Relevance to Urban Boundaries
The Constitution of the Republic of South Africa (108 of 1996)	All relevant laws are subject to the constitution. Planning legislation and policy have to be aligned with its principles. The broad purpose of the constitution has been provided and the objective is to promote sustainable development and through the use of IDPs/SDFs.
Reconstruction and Development Programme (1994)	Provide the importance of cooperation between all government spheres. Increases the need for urban boundaries through the development of RDP housing project on the periphery of cities and increasing urban sprawl.
Development Facilitation Act (67 of 1995)	Increase the implementation of the RDP, while providing compulsory governing principles for land development. Also, provides principles in section 3(1)(c) for the implementation of urban boundaries. Urban sprawl should

	be discouraged. In addition, lDPs and SDFs of local government must give effect to the principles contained in Chapter 1 of the DFA.
Urban Development Framework (1997)	Increased the necessity of an urban boundary stating that rural agricultural land will inevitably also be a source of land for rapid urban development.
Integrated Development Planning Process Manual for Local Government (1998)	The manual was the first to reference IDPs and the base of SDFs other manual followed since.
Local Government: Municipal Systems Act (32 of 2000)	Provide local government with core principles, mechanisms and processes to the planning processes. In addition, the implementation of lDPs are enforced through Section 25 (SDFs are also indicated as a sector plan within the IDP). Also, requires planning to be sustainable development orientated.
Local Government: Municipal Planning and Performance Regulations (2001)	Provide further information on lDPs and provide a complete explanation of the requirements of SDFs. The requirements were the first reference on how to implement urban boundaries.
White Paper on Spatial Planning and Land Use Management (2001)	Provide the role that local governments have in the use, development and planning of land. Also, the importance of SDFs in the sustainable development of land and provide minimum required elements of the SDF.

Source: Own compilation (2017).

Table 4.2 chronology arranges the certain aspect of the urban planning history of South Africa as well as the events that influenced the development of urban boundaries in South Africa.

Table 4.2: Chronology of urban planning and influential events on the urban boundary

Date	Occurrence
1894	Development of the “recognition of townships” law
1895	Orange Free established an apparatus to control the urban form
1902	Treaty of Vereeniging signed: Establish new local authorities Johannesburg implemented new local authority
1917	Increase popularity of urban planning (Several cities established councils)
1919-1920	‘The Housing Act of 1920’ and ‘the Public Health Act of 1919’ were developed, influenced by British regimes
1920’s	Increasing support to segregate non-white inhabitants from cities Local government took control of urban planning matters
1930’s	Increased urbanisation

1948	The "*Herenigde Nasionale Party*" (HNP – "Reunited National Party") came into power Segregation/Apartheid were supported by the HNP
1950's	Municipalities were required to follow several urban planning schemes Group Areas Act of the 1950's Land Tenure Advisory Board implemented; Master zoning plans to segregate non-whites
1965	National Department of Planning was established
1967	Physical Planning and Utilisation of Resources Act, 88 of 1967 was developed
1975	'Physical Planning Act' was amended and was the first to require plans to include future spatial developments
1981	Apartheid city urban form model was formulated
1986	The 'White paper on urbanisation' was prepared
1990's	African National Congress (ANC) fought against the Apartheid era. F.W. de Klerk (former president) proposed a democratic election/nation.
1991	Less Formal Township Establishment Act was develop to correct damage done to urban areas (Segregation) and fast track tenure.
1990-1994	De Klerk repealed several acts that undermined non-whites
1994	Democratic election and the ANC took control
1994	'Housing White Paper' and 'Reconstruction and Development Programme' were developed
1995	'Development Facilitation Act' was developed to accelerate the reconstruction of urban areas
1996	The 'Constitution of the Republic of South Africa' was developed.
1997	'Urban Development Framework' was developed and required rural land to be utilised for urban development
1998	First official delineated urban boundary (Cape Town) Integrated Development Planning Process Manual for Local Government was developed and bridged the gap between old and new legislation Several guidelines were prepared
2000	'Local Government: Municipal Systems Act' was developed and enforced IDP the basis of SDFs and the urban boundary in legislation
2001	'Local Government: Municipal Planning and Performance Regulations' were developed and contained requirements of the SDF 'White Paper on Spatial Planning and Land Use Management' was developed and provided the role of local governments in land use, development and planning
2005	Gauteng delineated a regional urban boundary (Not supported by all local authorities)
2010	Constitutional court identified two invalid chapters in the DFA and ordered rectification or new spatial planning legislation
2013	'Spatial Planning and Land Use Management Act' was prepared and suggested the repeal of several urban planning acts
2015	'Spatial Planning and Land Use Management Act' was enacted

Source: Own Compilation (2017).

4.4 Urban Planning in South Africa: The current reality

South Africa experienced comprehensive transformation throughout the past 20 years, impacting on, especially the political and legislative sectors. The previous section provided an overview of the planning legislation and political reality in South Africa. The Constitutional Court influenced planning legislation, with reference to the case of Johannesburg Metropolitan Municipality v Gauteng Development Tribunal (2010) relating to the roles of deciding authorities pertained in the DFA. The Constitutional Court identified two chapters within the DFA to be invalid and ordered the rectification of the DFA or alternatively the introduction of new spatial planning legislation (Van Wyk and Oranje, 2014:356). On the 5th of August 2013, the SPLUMA was prepared and enacted during 2015 (South Africa, 2013a:1).

The commencement of the SPLUMA required the repeal legislation that aided in creating a fragmented planning system, such as the Removal Of Restrictions Act, PPA, Less Formal Township Establishment Act and lastly the DFA (South Africa, 2013a:72).

4.4.1 The Spatial Planning Land Use Management Act, 16 of 2013

According to Nel (2015:2), SPLUMA was the first legislation to provide a system for spatial planning and land use management to be implemented across the entire country and indicates the roles for all government spheres. According to Oranje and Berrisford (2012:58) the WPSPLM attempted function as the new spatial planning legislation for around a decade, however, it was turned down on several occasions as it was seen as unconstitutional. It was mainly founded on the division of functions and powers between the spheres of government in South Africa.

With the newly enacted SPLUMA, nine similar provincial spatial planning acts will have to be promulgated, the objective of the new legislation is to address all spatial imbalances and create a more integrated planning system that has more inclusive and coherent approaches to land and development of land in local municipalities (Van Wyk and Oranje, 2014:357). The DRDLR outlined that SPLUMA has produced seven fundamental changes (South African City Network, 2015:19):

- “Reiteration of the sole mandate of municipalities where municipal planning (land development and land use management) is concerned, placing municipalities as authorities of first instance invalidating inconsistent parallel mechanisms, parallel systems and measures or institutions that existed to deal with land development applications
- Establishment and composition of Municipal Planning Tribunals (MPTs) and appeal structures by municipalities to determine, and decide on, land development applications.
- Development of a single and inclusive land use scheme for the entire municipality with special emphasis on a municipal differentiated approach.
- Preparation of respective SDFs by all three spheres of government, based on norms and standards and guided by development principles.

- Preparation of Regional SDFs as may be required.
- Strengthened intergovernmental support through enforcement, compliance and monitoring processes.
- Alignment of authorisation processes where necessary on policies and legislation impacting land development applications and decision-making processes."

In contrast to the Apartheid regime legislation, the new spatial planning system is decidedly normative, the emphasis is positioned on to amend problems that occurred before 1994, namely, inclusion and equity, social justice, community participation and transparent decision making processes and create awareness on the part that housing, property and environmental management have in producing more sustainable, functional and efficient cities (Van Wyk and Oranje, 2014:357-358; South Africa, 2013a:20).

Chapter 2(7) of the SPLUMA introduced its development principles. These principles are aligned with the above-mentioned problems that require amendment applicable to spatial planning, land development, and land use management, based on the principles of: a) spatial justice, b) spatial sustainability, c) spatial resilience, d) efficiency and e) good administration (South Africa, 2013a:18).

SPLUMA introduced specific perspectives to spatial planning instruments prescribed in the LGMSA (IDPs and SDFs). According to Joscelyne (2015:43) IDPs that are governed by the LGMSA are set to remain as the core planning tools available to local municipalities. However, prior to SPLUMA, SDFs formed part of IDPs, as sector plans that are governed by the LGMSA and were primarily developed in the local sphere of government. SDFs will now be directed by the SPLUMA (Joscelyne, 2015:43). SPLUMA requires all spheres of government (National, provincial and local municipalities) have a SDF. It may also be provided at a regional level (South Africa, 2013a:24), especially where cross boundary developments impact on more than one municipality.

The main objective of all SDFs are to facilitate and inform guidance in terms of the decision-making process and also the authorities' discretion, with reference to SPLUMA or any other legislation relating to land use and development (Joscelyne, 2015:46; Harrison and Thodes, 2001:69; South Africa, 2013a:26).

According to South African Cities Network (2015:35), all levels of SDFs are required to be consistent and aligned with one another. The National SDF provides the broadest and highest level of land use guidance while fulfilling a coordinating role. In terms of the Provincial SDF, the emphasis was placed on a coordinating role in the plan, in terms of sectors, spheres and local municipalities (South African Cities Network, 2015:35). The Provincial SDF must be consistent with the principles set out by the National SDF, and with Section 16 in SPLUMA that includes

specific requirements such as delineating areas, not to be developed with certain land uses (South African Cities Network, 2015:36).

Significant planning therefore occurs at municipal level, justifying the details provided for municipal planning in the SPLUMA. However, local municipalities are also establish MPTs and prepare integrated zoning schemes and planning by-laws (South Africa, 2013a:34-57). Chapter 4 provides more guidance on how to prepare, amongst others, SDFs and all necessary information that is required from each government sphere to improve and aid development. Section 21 in the SPLUMA provides local municipalities with details on the contents of its SDFs (South Africa, 2013a:32).

In addition, the National Planning Commission (2012) developed the National Development Plan 2030: Our Future – Make it Work (NDP), and the SDFs will aid the NDP by providing spatial expression (Van Wyk and Oranje, 2014:357). At the national level of government the SDF will aid in the coordination and integration of policies. However, the Provincial SDFs will provide spatial expression agendas of the NDP for policies such as the Growth and Development Strategies (Joscelyne, 2015:46).

The SPLUMA supplemented the DFA's development principles with norms and standards in Section 8, these are developed through the national sphere of government and it will affect planning activities through district and municipal spheres.

4.4.2 Controversies of SPLUMA on urban boundary delineation

The SPLUMA comprises various controversies in considering urban boundary delineation, summarised as follows.

i) Intergovernmental relation complexities:

South African City Networks (2015:62) identified that neither SPLUMA nor other legislation with regard to human settlement and transport planning or any other sector authorised the IDP, SDF or any sector plan a role of taking precedence above other plans.

The hierarchy of plans or lack thereof indicates that all governmental spheres must reach a consensus on the alignment of information on policies, strategies, projects and plans. South African cities network (2015:62) obtained information through interviews with officials that certain provincial sectors insisted on possessing the concluding decision in spatial planning relating to their functions.

ii) Capacity constraints:

One of the SPLUMA's focuses was to ensure that new responsibilities are placed on municipalities, some municipalities have never had responsibilities relating to spatial planning decisions (De Visser and Poswa, 2017:6).

Simultaneously, local municipalities have previously experienced capacity problems (De Visser and Poswa, 2017:6). In assigning significant tasks to local government by the new spatial planning system, capacity problems increased. However, the inclusion of Section 34, and with reference to MPTs that may assist in land use applications, capacity constraints could be alleviated (South Africa, 2013a:44).

iii) Decision-making:

Three spheres of government are required to coexist and be coherent with one another, with the same requirements are enforced by their legislation, the SPLUMA requires (Section 3(e)) a cooperative government and intergovernmental relations amongst the national, provincial and local spheres of government (South Africa, 2013a:14).

National legislation is developed to support other spheres of government this includes provincial and local governments. According to the SPLUMA in section 33(1) the local municipality is the authority of the first instance of all land development applications where it may be passed off to an MPT for decision (South Africa, 2013a:44). However, SPLUMA determines that a land use application affects national interest it must, after being evaluated by the relevant municipality, be discussed with the Minister of Rural Development and Land Reform to obtain a contributing input to the decision making process.

Letuka (2016:29) indicated that the above may be interpreted as an apparent duplication of functions as well as an infiltration of the municipal planning functions by involving the Minister of Rural Development and Land Reform for administrative issues, applicable on municipal land use level.

iv) Lack of reference to urban boundaries:

SPLUMA does not specifically reference urban boundaries as a required spatial planning. The most relevant reference to urban boundaries are depicted in Section 21(b)-(c), requiring (South Africa, 2013a:32):

> “b) include written and spatial representation of a five-year spatial development plan for the spatial form of the municipality;
>
> c) include a longer term spatial development vision statement for the municipality area which indicates a desired spatial growth and development pattern for the next 10 to 20 years”.

However, no further guidance is provided in the act on methods to achieve these spatial representations or how to control or influence growth/development patterns. Local municipalities therefore have their own interpretation of the Act, causing further intricacies.

As a result of the limited and less detailed reference to urban boundaries, it's assumed that the Act produced various intricacies. Various decision-making authorities are reliant on the urban boundary. Below several authorities and its legislation that require the delineation of the urban boundary.

4.4.3 Wall-to-wall Land Use Schemes

The enactment of SPLUMA brought a new approach, where local municipalities are now required to compile wall-to-wall LUS thereby including all land parcels in its demarcated area. As a consequence, land formerly resorting under the Department of Agriculture, Forestry and Fisheries (DAFF), is inevitably now controlled by the local municipalities through their LUS. However, the DAFF does not support this, the reason is that the DAFF is of opinion that they should be the deciding agricultural authority on rural/agricultural land. The DAFF argued that municipalities are not competent on agricultural land use applications.

DAFF governed agricultural land through the Subdivision of Agricultural Land Act, 70 of 1970 (SALA), and was the deciding authority of any land not proclaimed by a township (Mve, 2015:1). By its very nature, proclamation of townships strongly suggests an urban boundary, clearly differentiating amongst urban and agricultural land.

The SPLUMA defined 'agricultural purposes' i.e. agricultural land as the following South Africa (2013a:68):

> "purposes normally or otherwise reasonably associated with the use of land for agricultural activities, including the use of land for structures, buildings and dwelling units reasonably necessary for or related to the use of the land for agricultural activities"

Letuka (2016:28) stated that the above-mentioned definition confers authority to municipalities, however, according to SALA the power to authorise applications are the responsibility of the DAFF Minister. SALA has been accused to have numerous shortfalls, e.g. lengthy applications. In 2013 DAFF prepared a new Draft Preservation and Development of Agricultural Land Framework Bill (PDALFA).

PDALFA was largely prepared to repeal the entire SALA while implementing a "framework of national agricultural policy, norms and standards, and promoting economic and social development and food security" (Section 3(3)) (South Africa, 2013b:27). PDALFA was a more complex and detailed document that restricted subdivisions and rezoning of agricultural land. Mve (2015:1) confirmed that the DAFF aspired that the PDALFA will emphasise their mandate to conserve and develop agricultural land where SALA's shortfalls, failed to do so.

It is therefore conclude that, through a coherent demarcated urban boundary, that provides an unmistakable division between agricultural and urban land, the DAFF could potentially reclaim authorisation over agricultural land while the municipalities/MPTs are relieved of the duty of decision making on rural land use applications where development is envisaged on land of agricultural significance.

4.4.4 Legal requirements for urban boundaries

4.4.4.1 National Environmental Management Act

The National Environmental Management Act, 107 of 1998 (NEMA), identifies the significance of the urban boundary. Although the Act does not directly refer to urban boundaries, the listing notices (1, 2 and 3) refer to an 'urban area' defined as "areas situated within the urban boundary (as defined or adopted by the competent authority)" (South Africa, 1998a:84).

Said listing notices determine the level of assessment a land use application requires. A basic Environmental Impact Assessment (EIA) is required for developments inside of the urban boundary, or has a low environmental impact (Listing notice 1). A full EIA is required where a development occurs outside the urban boundary and may have a larger environmental impact (Listing notice 2).

The listing notices were developed in accordance with sections 24(2) and 24D of NEMA and both refer to urban areas and urban boundaries (South Africa, 1998a). The relevance to identify and demarcate an urban boundary is a necessity (Wylie, 2016:43).

4.4.4.2 Mineral and Petroleum Resources Development Act

The Mineral and Petroleum Resources Development Act, 2002 (MPRDA) was prepared to provide for equitable access and sustainable development of the nation's mineral and petroleum resources (South Africa, 2002a:1). The main objective of the MPRDA was also to provide clarity on the subject of mineral and petroleum resources in South Africa, however, references to protecting the rural environment are contrived (South Africa, 2002a:1). To achieve environmental sustainability (South Africa, 2002a:1) an EIA is required to be performed as per the listing notices of NEMA ("within a framework of national environmental policy") pending the level of mining authorisation i.e. a mining right or a permit. The NEMA indicated the importance of an urban boundary within the EIA requirement system.

4.4.4.3 Local Government: Municipal Demarcation Act

The Local Government: Municipal Demarcation Act (LGMDA) was established to provide criteria and procedures for the determination of municipal boundaries by an independent authority; and to provide for matters connected thereto (South Africa, 1998b:1). The importance of urban boundary delineation is provided in the Act. Reference is made to rural land/communities without

a demarcated urban boundary, it's up to personal interpretation on whether or not an area is urban or rural land (South Africa, 1998b:11). To demarcate a municipal boundary has a significant impact on the affected communities. If any intricacies occur and errors arise in the decision on where to place these municipal boundaries various communities may be affected.

Take note the Wall-to-wall Land Use Schemes that are discussed above also forms part of the legal requirements of urban boundaries.

4.5 Conclusion

The role and function of urban boundaries changed over time, in accordance with the urban planning reality in South Africa. Following 1994, the focus of the South African urban planning shifted to emphases integration spatially distorted urban forms. Racial segregation, to address poverty alleviation with better economic growth, and environmentally sustainable development (Horn, 2009:55).

With the change in political dispensation new laws, policies, frameworks and guidelines were developed to ensure that the objectives of integration are appropriately met. The urban boundary was acknowledged within SDFs as an additional tool that may be utilised for integrative planning, however, it was never enforced (Refer to Section 2(4)(i)(iii) within the LGMPPR). The concept of an urban boundary was enhanced through the democratic era and was developed as a method to ensure that urban growth occurred within areas. Also, it intercepted urban sprawl especially where rural resources were of higher importance or required protection. The enactment of the SPLUMA initiated a new era of spatial planning in South Africa, however, with the lack of specific reference to the urban boundary. The relevance and implementation of an urban boundary is mostly now in the hands of local government and its perception of what the act entail of a short and long term spatial vision and spatial representation. Intricacies therefore occurred as a result of the uncertainty of the role of urban boundaries. SPLUMA provided further controversies in terms of the relevance of urban boundaries in South Africa as disputes between the local authorities (Wall-to-Wall LUS) and other organs of the state seems to be evident.

The following section of the research will include the empirical investigation where various analyses was completed on case studies to consider how urban boundaries were implemented in South Africa and to provide insight on the challenges faced in planning with regard to urban boundary role and effectiveness.

SECTION B: EMPIRICAL INVESTIGATION
CHAPTER 5: CASE STUDY ANALYSES

5.1 Introduction

The empirical investigation consists of case study analyses conducted in two metropolitan areas. Purposeful sampling was employed in selecting these case studies, as it presents information-rich cases with a large amount of relevant information (Weare *et al.* 2004: 129). A comparative analysis of these two cases was conducted by means of:

A) Policy and legislative analysis: Evaluating the policies and legislation that provide guidance to local municipalities on matters such as guiding urban growth and containment, urban boundaries, urban densification, urban regeneration, land uses, etc. Then, the driving forces behind these policies and legislation (e.g. natural, political, community) will also be included, all of the above-mentioned analyses will be applicable with regards to the selected case studies.

B) Spatial analysis: Various methods are projected to be utilised, web-based data (5 - 15 year old historical google earth imagery) and Geographic Information System (GIS) maps will be utilised to capture a visual representation of aspect on the effectiveness of the urban boundaries. However, additional methods such as statistical equations are utilised to depict several spatial aspects of the case studies.

The case study analyses were followed by an expert analysis where structured questionnaires were compiled by professionals within the planning profession. Questions were captured to provide an understanding of current reality and complexities of urban boundaries, from a planning perspective. Based on the findings of the comparative analysis, a conclusion will be drawn on the role and function of urban boundaries, the applicability thereof within modern planning approaches and the implication thereof in terms of the new SPLUMA.

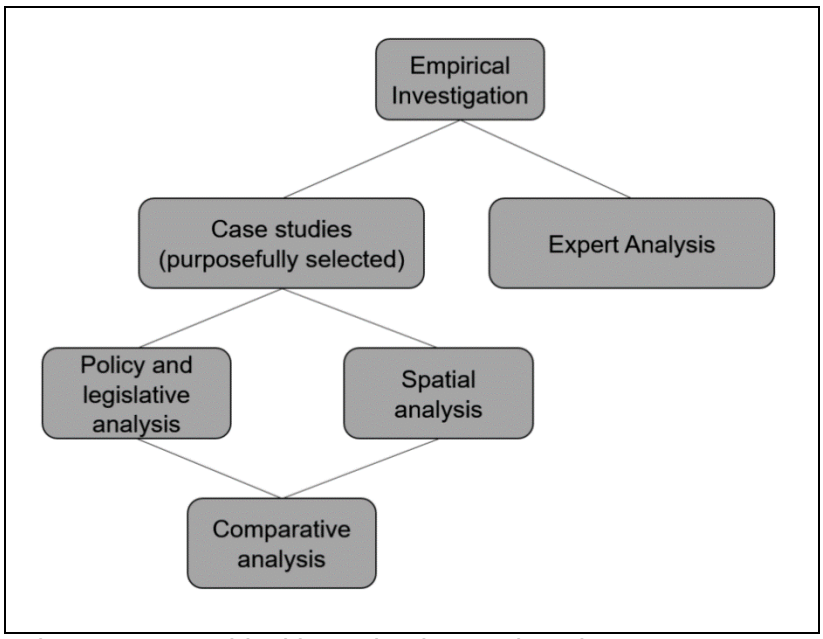


Figure 5.1: Empirical investigation explanation
Source: Own Compilation (2017).

5.2 Research methodology

The section provides details of the research methodology employed throughout the empirical investigation.

5.2.1 Case study methodologies

Case studies are considered as qualitative research, that is defined as data that describes attributes or properties of an object, the information may then categorised into numerical values, however, no significance is projected onto the data values themselves as it represents the information of case (UNECE, 2000:2). Through purposeful sampling applicable case studies were selected, purposeful sampling is used widely in qualitative research. Palinkas *et al.* (2015.533) stated that purposeful sampling is utilised to identify and select information-rich cases that relate to the phenomenon of interest.

The use of case studies within the empirical section is also of notable importance, Yin (1984:23) defined case study research "*as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.*"

Furthermore, Yin (1984:26) elaborates that case study research has 3 categories: exploratory case studies, descriptive case studies and lastly explanatory case studies. The exploratory case study research method was utilised within the research, the rationale behind the decision was as Yin (1984:26) stated the case study is set out to explore any occurrence in the data that serves as a point of interest for the researcher.

Another essential point used within the empirical investigation is the external validity tactic, the purpose of a tactic is to ensure the quality of research the research. The external validity tactic is employed to ensure that the study's findings are correctly generalised beyond the immediate case studies (Yin, 1984:36).

In addition, Yin (1984:37) continues that case studies generalise analytical information, for example, it's an incorrect statement when a researcher considers one case study may be directly correlated to another, however, it's correct to generalise information of one case study to examine another. An applicable example of this is identifying theoretical problems of an urban boundary that may be tested in various urban areas.

5.3 Case Studies

Through the use of purposeful sampling, two case studies were selected based on metropolitan status – different geographical locations – one evident of successful boundary delineation and one evident of urban sprawl.

Section 3.4 identified the methods to determine the effectiveness of urban boundaries, it is of importance to analyse the case studies' urban boundaries as to identify the reason for some urban boundaries to be effective while others are less so. Therefore, the purposefully selected case studies will have urban boundaries that are effective and ineffective, however, the analysis will reveal whether they are truly effective or ineffective.

5.3.1 Analyses methodologies

Several analyses will be utilised on the selected case studies' urban boundaries. Firstly, **policies and legislation** are set out to be analysed, as stated by Long *et al.* (2015:77) it's of importance to not only analyse physical aspects of an urban boundary.

This analysis was conducted qualitatively, information compiled through the analysis will assist in the understanding of the urban boundaries of the selected case studies, such as the purpose of the urban boundary, objectives that the urban boundary is attempting to achieve, the effectiveness of the urban boundary is determined through the analysis etc.

Based on the information obtained throughout the above-mentioned analysis, even though adequate policies and legislation are in place to guide the planning and implementation of urban boundaries within the – case studies, the effectiveness varies. A spatial analysis was conducted to investigate the current reality and effectiveness of the urban boundary within this case studies.

Spatial analyses of the case studies provided physical characteristics of the urban boundary. Through the use of various methods these characteristics may be obtained, these methods

included web-based data (10 – 15-year-old historical google earth imagery) and GIS maps, as well as statistical equations, are utilised to depict several spatial aspects of the case studies.

As previously mentioned by Long *et al.* (2015:77) both physical and legal aspects are required to be analysed to analyse the effectiveness of an urban boundary entirely. More importantly, certain aspects are required to be analysis physically, refer to section 3.4 for 4 criteria that determine the effectiveness of an urban boundary, namely (Gennaio *et al.*, 2009:225; Huang *et al.*, 2007:3):

- Urban boundary development.
- Number of households throughout the area.
- The population density in the Municipal area.
- The porosity of the area. (Open space within the urban boundary).

To identify whether the case studies' urban boundary is effective these criteria shall serve as aspects to measure the Municipality's urban boundary. Refer to Table 5.1 for a summary of the criteria, it provides the negative and positive result of each criteria.

Table 5.1: Summary of criteria for the empirical investigation

Criteria	Result	Clarification
Urban boundary development.	Positive	The urban boundary has not changed over time/ little to no adjustments were made.
	Negative	The urban boundary has changed over time/ several adjustments were made.
Number of households throughout the area.	Positive	The building number inside the urban boundary increased.
	Negative	The building number outside the urban boundary increased.
The population density in the Municipal area.	Positive	The population density increased inside the urban boundary.
	Negative	The population density decreased inside the urban boundary.
The porosity of the area. (Open space within the urban boundary).	Positive	Whether the open space was protected within the urban boundary
	Negative	Loss of open spaces were experienced.

Source: Own Compilation (2017).

To evaluate the effectiveness of the urban boundaries a scale is required, Peter and Facione (2012:1-2) produced a 'Holistic Critical Thinking Scoring Rubric'. Critical thinking is defined as a process of making purposeful, reflective and fair-minded judgments about certain aspects (Peter and Facione, 2012:1). Table 5.2 indicates the scoring rubric to assess the case studies' urban boundaries.

Table 5.2: Scoring rubric for criteria.

	Rating Scale				
Criteria	Very Negative (1)	Negative (2)	Neutral (3)	Positive (4)	Very Positive (5)

Source: Own Compilation (2017) adapted from Peter and Facione (2012:1).

The analyses accordingly employed a comparative analysis to compare the numerical values that were obtained through the scoring rubric in Table 5.2. This was done to provide an indication on the effectiveness of the delineated urban boundaries.

5.4 Case Study Analysis 1: City of Cape Town Metropolitan Municipality

The City of Cape Town Metropolitan Municipality is a coastal municipality of South Africa, it is Cape Town is the capital and primate city of the Western Cape Province. Cape Town is famous for its harbour and the Cape Floristic Region, with recognised landmarks such as Table Mountain and Cape Point. Figure 5.2 illustrates the locality of Cape Town.

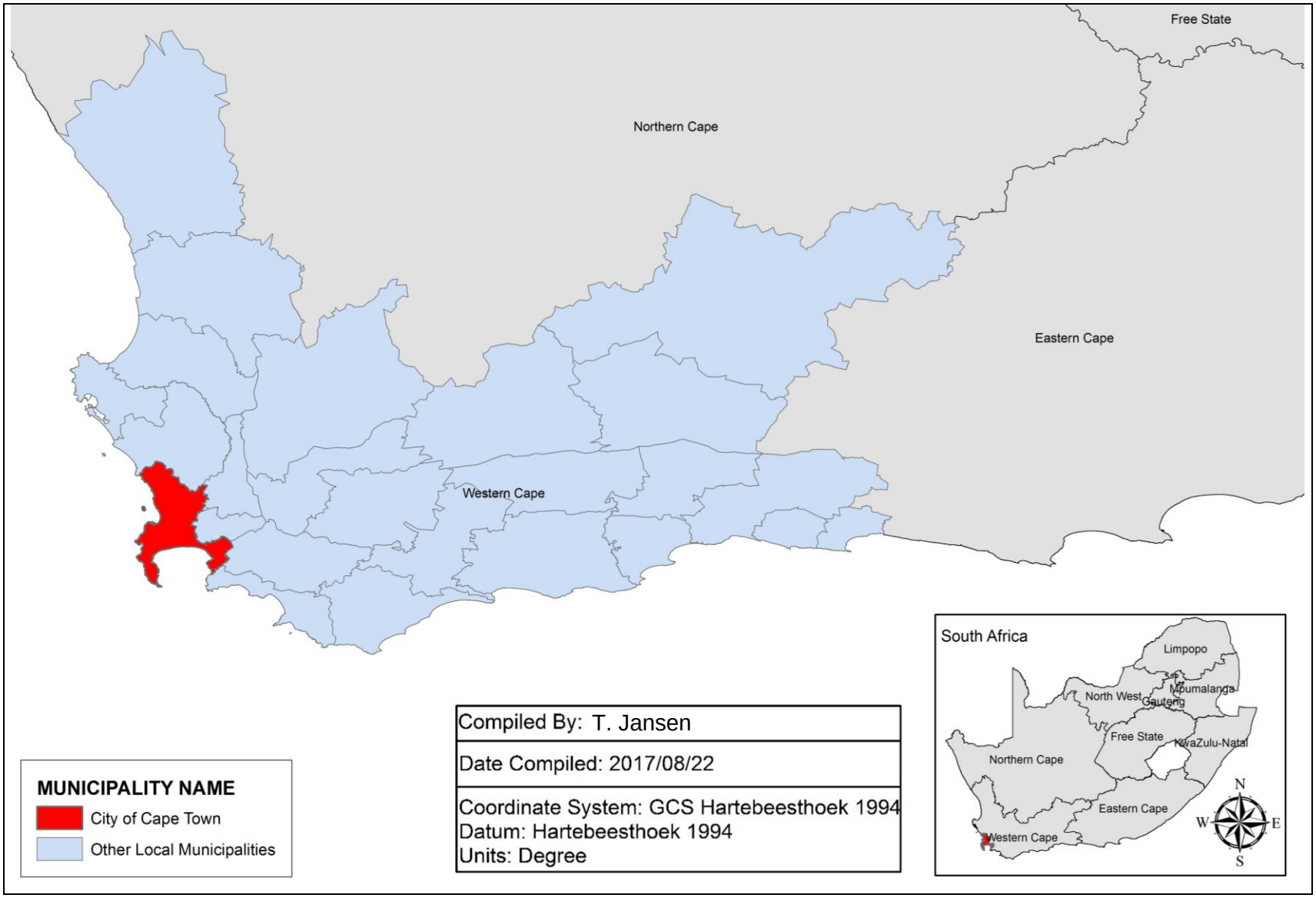


Figure 5.2: Locality map of City of Cape Town Metropolitan Municipality
Source: Own Creation (2017).

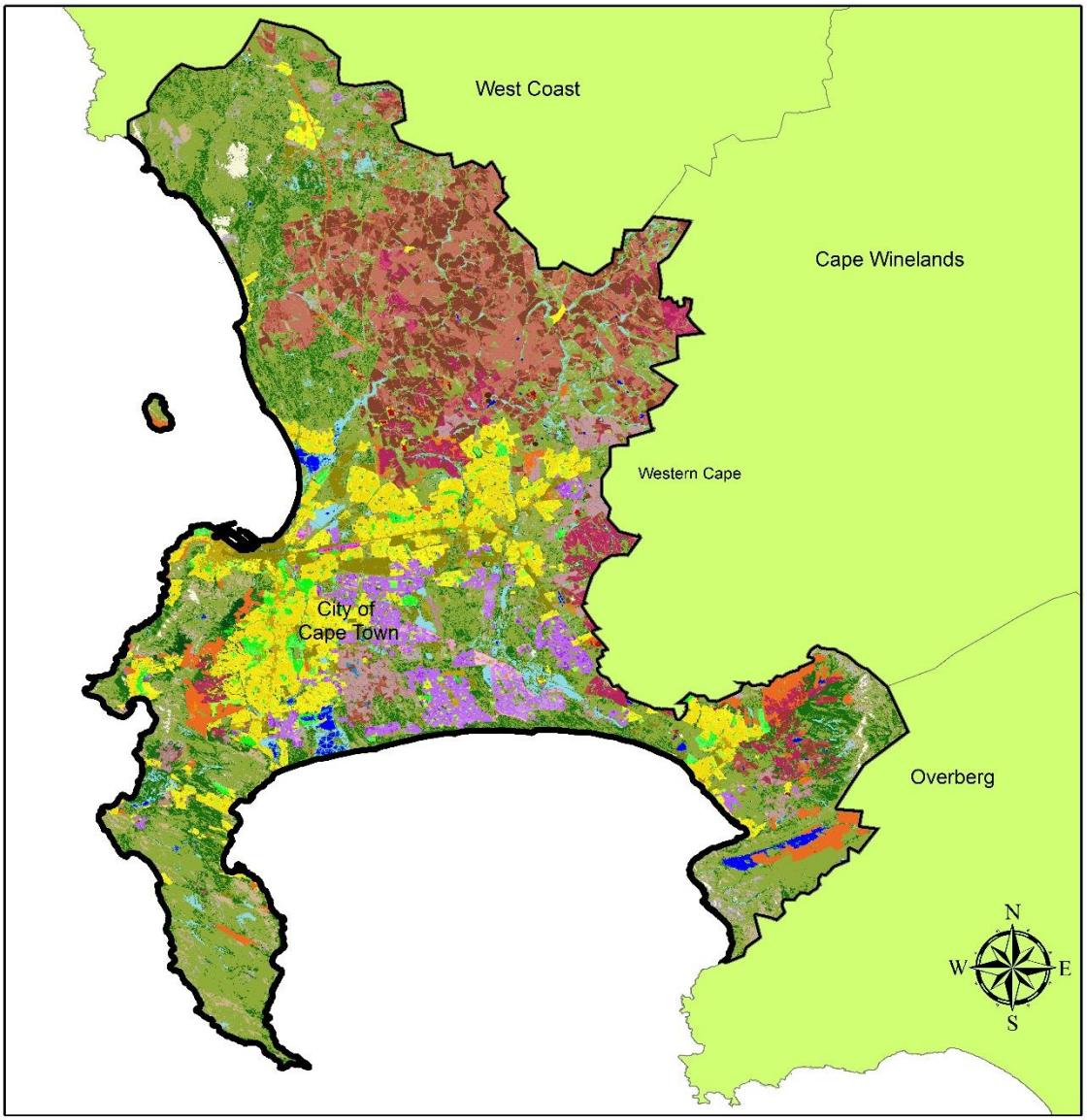
Through the utilisation of 2011 census data that were provided through StatsSA (2017a), it identified the City of Cape Town as the second largest populated area in South Africa with an estimated population of 3,740,026 (Most up to date census data). The City of Cape Town Metropolitan Municipality is estimated to contain 65% of the entire Western Cape Province's population. Table 5.3 identifies that the City of Cape Town Metropolitan Municipality experiences constant growth, however, even with the population growth the urban boundary has experienced little to no growth. Take notice a variance of population data consists of the UN's data and the census data obtained through StatsSA. Through the various analyses, the effectiveness of the Cape Town urban boundary will be established and the explanations for the effectiveness/ ineffectiveness will be identified.

Table 5.3: Estimate projections of Cape Town Metropolitan Municipality Population

Year	Population	Growth Rate (%)	Growth
1950	618,000	0.00%	0
1955	705,000	14.10%	87,000
1960	803,000	13.90%	98,000
1965	945,000	17.70%	142,000
1970	1,114,000	17.90%	169,000
1975	1,339,000	20.20%	225,000
1980	1,609,000	20.20%	270,000
1985	1,925,000	19.60%	316,000
1990	2,155,000	11.90%	230,000
1995	2,394,000	11.10%	239,000
2000	2,715,000	13.40%	321,000
2005	3,026,000	11.50%	311,000
2010	3,345,000	10.50%	319,000
2015	3,660,000	9.40%	315,000
2017	3,736,000	2.10%	76,000
2020	3,860,000	3.30%	124,000
2025	4,091,000	6.00%	231,000
2030	4,322,000	5.60%	231,000

Source: Own compilation (2017) adapted from United Nations (2014:343)

In addition to Table 5.3, Figure 5.3 and Figure 5.4 illustrates the land cover of Cape Town Municipality of 1990 and 2013 respectively. As observed within these Figures several alteration of the land cover have been experienced over the course of time progression. Refer to Figure 5.5 for a legend of the 1990 land cover map.



Compiled By: G. Havenga
Date Compiled: 2017/08/22
Coordinate System: GCS Hartebeesthoek 1994 Datum: Hartebeesthoek 1994 Units: Degree

Figure 5.3: Land Cover: Cape Town 1990
Source: Havenga (2017).

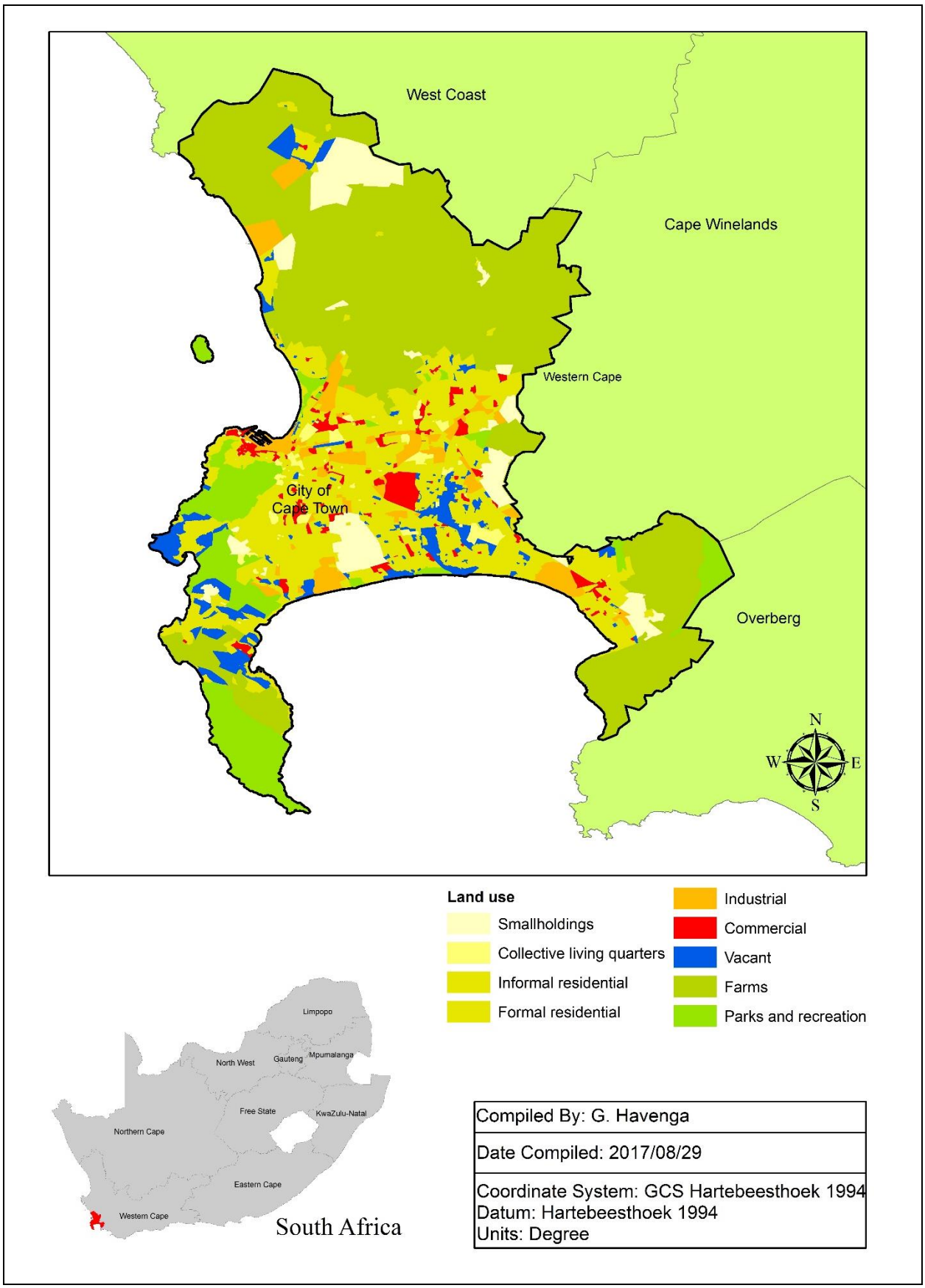


Figure 5.4: Land Cover: Cape Town 2013
Source: Havenga (2017).

Figure 5.5: Land use table for Cape Town and Tshwane 1990
Source: Havenga (2017).

5.4.1 Policy and legislative analysis - Cape Town Metropolitan Municipality

The Cape Town Metropolitan Municipality was one of the most complex cities to delineate a municipal boundary, as previously mentioned by Wylie (2016:30) approximately 50 management bodies existed between 1988 and 2000. Complexities were experienced as the outer municipal boundary was required to be created, all management bodies were required to approve, Watson (2002:113) identified that certain areas of the delineated municipal boundary was required to be moved inwards, to coincide with certain administrative boundaries.

Subsequently, the city of Cape Town was first to delineate an official urban boundary, refer to Section 4.3. In 1998 the urban boundary was implemented (Britz and Meyer, 2006:209), the policy behind the implementation of the urban boundary was the Metropolitan SDF: Technical report (MSDF), it was developed by the Cape Metropolitan Council (CMC) (MCA Africa, 2006:2-4).

The MSDF was an idealistic plan, it was developed to transform the Cape Town Metropolitan Region into a more democratic city (MCA Africa, 2006: 2). The vacant land that was used for Apartheid buffer strips were to be utilised through development. The MSDF was comprised through four basic structuring elements it included the Metropolitan Urban Nodes; Metropolitan Activity Corridors; a Metropolitan Open Space System (MOSS); and lastly, Urban boundaries (MCA Africa, 2006:10).

South Africa (1996b:57) identified the intention behind the implementation of the urban boundary was to protect agricultural and ecological land values while countering urban sprawl. Sim *et al.* (2016:39) added that it also altered the spatial form of Cape Town. Figure 5.6 illustrated within the MSDF of 1996 identifies the first rendition of the urban boundary, as well as the urban boundary study areas.

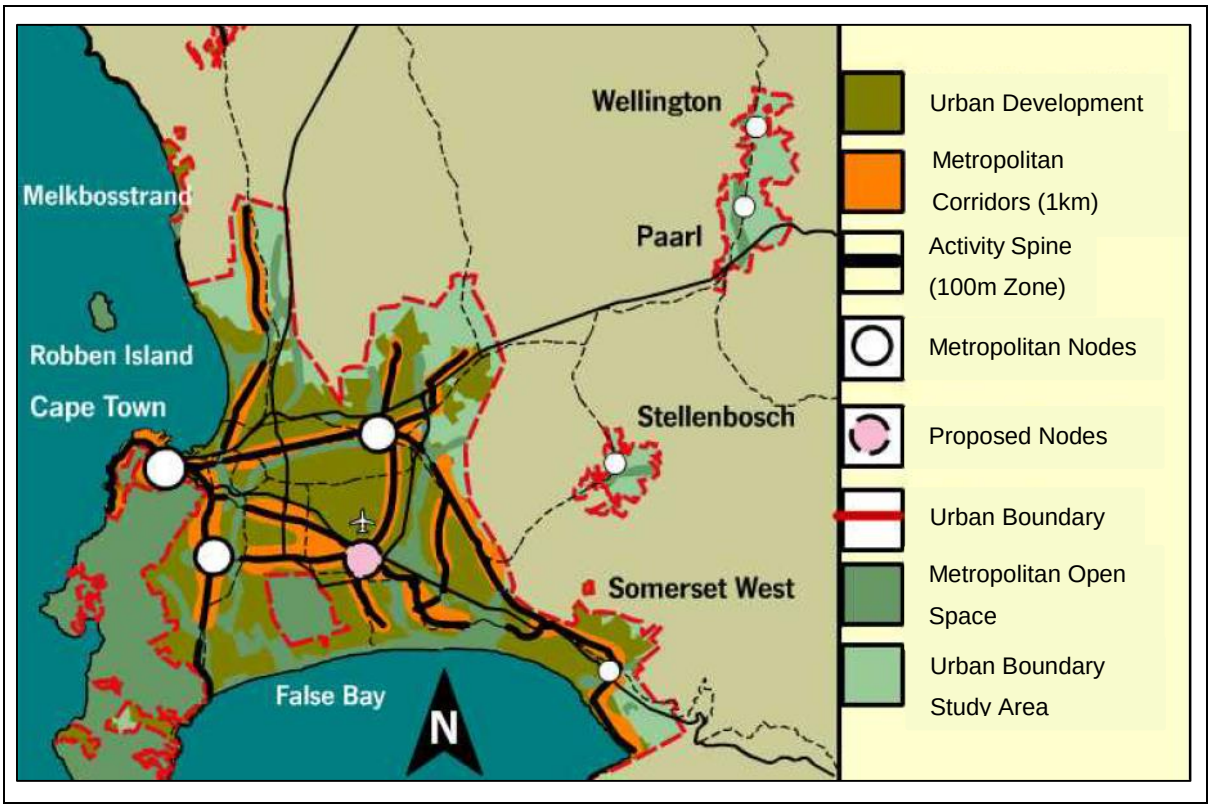


Figure 5.6: Metropolitan Spatial development Framework (1996)

Source: MCA Africa (2006:11).

The demarcation of these urban boundaries were based on existing structure plans and urban development rights of the time, services in place, water features, protective environmental

designations, cultural and historic precincts and agricultural areas (South Africa, 1996b:59-60). In 1996 urban boundary studies were carried out to ensure a well delineated urban boundary. Cape Town utilises two methods to contain the urban area, refer to Figure 5.7 to differentiate amongst the methods. Take notice, both methods are correspond with the definition of an urban boundary in Section 3.3.

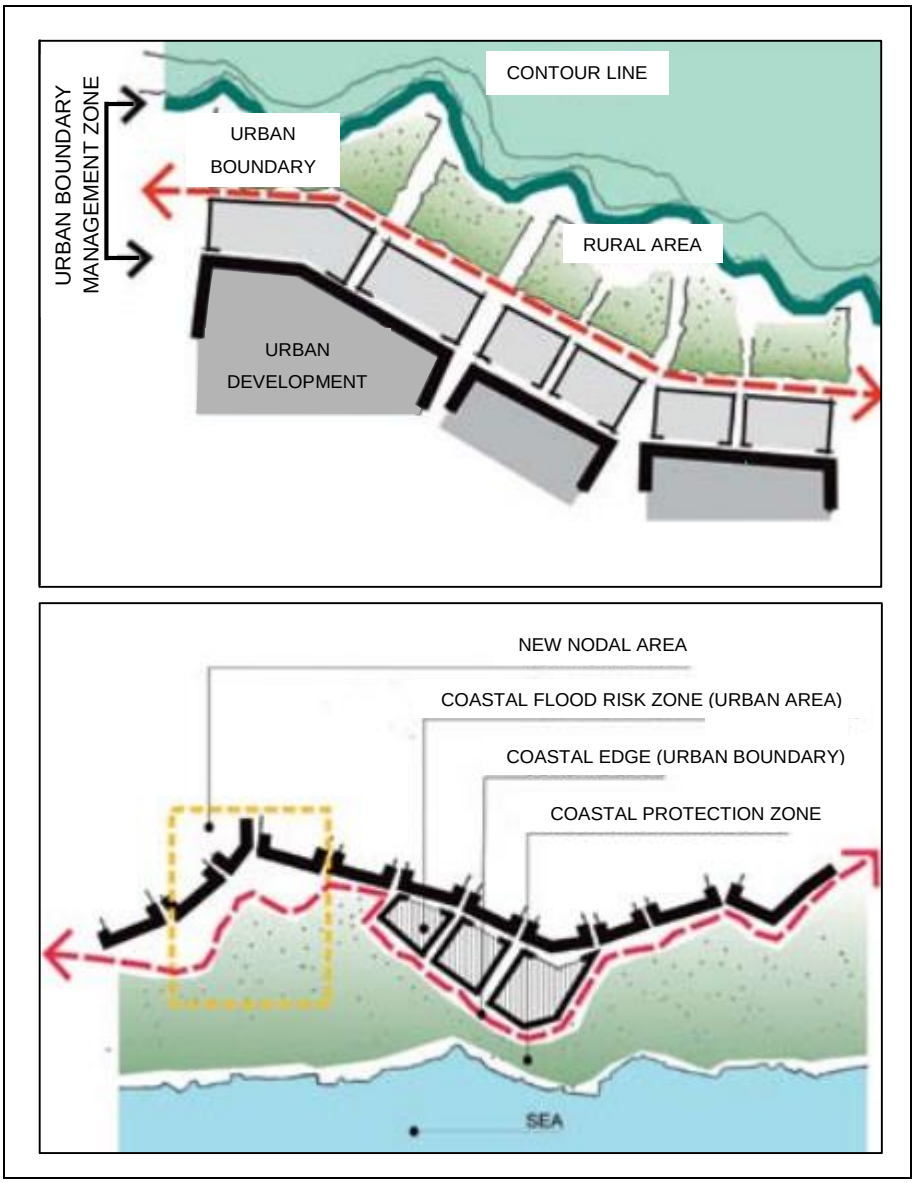


Figure 5.7: Urban boundaries utilised by the city of Cape Town

Source: MCA Africa (2006:11).

The Cape Town Metropolitan Municipality face large scale development, and according to South Africa (2015c:1212) the city of Cape Town grew by 40% in developed-land area between 1985 and 2005.

More recently, the municipality has been developing at an average rate of 1230 hectares per year, and as a result of Cape Town's unique geography with mountains and long coastline, the number of developable land is limited, and with certain land uses (hazardous – Nuclear, noise generating

– airport location) it is even decreased more so (South Africa, 2015c:1212). This makes it essential to ensure all development inside the urban boundary is effective and efficient.

Currently, the Cape Town Metropolitan Municipality utilises all three spheres of government policies and legislation to manage and substantiate the delineation of the urban boundary, as explained accordingly:

National sphere government policies and legislation are utilised, firstly the Constitution of the Republic South Africa (Act 108 of 1996) which supports densification to develop the built environment, for the efficient provision of services, social and economic development and environmental sustainability. Secondly, the National Environmental Management: Integrated Coastal Management (Act 24 of 2008), which focuses on regulating human activities within, or that affect the 'coastal protection zone' (Cape Town, 2009:3).

According to Cape Town (2009:3) the restricting or controlling developments in these areas are essential to ensure the dynamic nature of the coast is protected, in addition to this it is implemented to protect people and property from harm due to natural causes such as coastline erosion and flooding, or new threats like sea level rise as a consequence of global warming. Another national sphere legislation adhered to is NEMA, the Act aids in the delineation of an urban boundary, as previously mentioned it requires the urban boundary to determine whether an EIA is necessary for a certain development application.

Lastly, as was previously mentioned in Section 0, the SPLUMA now requires the national government to develop an SDF, as Section 12(1)(e) of the SPLUMA identified the National SDF (NSDF) must guide the provincial and local departments' SDFs while ensuring integration occurs between all governmental spheres (RSA, 2013a:24). However, the government has until 2020 to develop this policy.

On the **Provincial sphere of government,** various legislation and policies were developed to assist in the development of the urban boundary within Cape Town. The Western Cape PSDF of 2009 supports the usage of an urban boundary and higher densities, it proposed an average density of 25 dwelling units per hectare (Cape Town, 2012a:8). The importance of the urban boundary is identified at least eight times in the 2014 rendition of the Western Cape PSDF (RSA, 2014). The Western Cape PSDF of 2014 contained guiding principles these five are namely (Wylie, 2016:37; RSA, 2014:22): 'liveability and quality', 'sustainability and resilience', 'spatial efficiency', 'accessibility' and lastly 'spatial justice'. These guiding principles correspond with the development principles found within section 7 of SPLUMA.

In 2005 the Department of Environmental Affairs and Development Planning released the Provincial Urban Edge Guideline, the main objective of the guidelines were to establish and

implement a consistent approach to deal with urban growth, infill and consolidation alongside the urban boundary (South Africa, 2005a:6).

The Provincial Urban Edge Guideline provided guidance in terms of planning and management of urban boundaries throughout the entire Western Cape. It identified the issues, challenges and opportunities of the urban boundary and also aided in assessing urban boundary related applications, while providing guidance on the management and establishment of urban boundaries.

In Section 4(4.1) of the Guideline detailed information and factors that are to be taken into consideration when the urban boundary delineation process occurred were included, namely (RSA, 2005a:23):

- Prominent landform and character areas;
- Valuable soils;
- Hydrology (surface and ground water features);
- Ecological resources (aquatic and terrestrial);
- Protected areas (conservation sites);
- High intensity/potential and significant agricultural resources;
- Services infrastructure (barrier effect);
- Services infrastructure (capacity and reach);
- Vacant/underutilised land in an urban area;
- Higher order roads, access routes and transport infrastructure;
- Cadastral boundaries of adjoining land units;
- Availability of developable land in urban area;
- Growth requirements over predetermined period;
- Land use implications for new development;
- Visual impact;
- Cultural/heritage resource areas;
- Ownership of land and existing land use rights;
- Informal settlements;
- Urban agriculture and small-scale farming;
- Bio-regional spatial planning categories (core and buffer); and
- A density policy for residential development in rural towns.

The PSDF identified critical biodiversity areas that were needed to conserve, and required SDFs to delineate the urban boundaries to divert urban growth patterns accordingly. As the Western Province hosts various protected and critical bio-diverse areas exist (RSA, 2014:40), the

enforcement of the urban boundary was strict over the course of its existence, refer to Figure 5.8 that illustrates the Biodiversity and Ecosystems of the Western Cape Province.

The Southern District plan for Cape Town identified new urban development inside of the urban boundary that may potentially impact areas of high biodiversity importance should only be considered under exceptional circumstances or where social and economic imperatives merit consideration of development in parts. These developments should be sensitive to biodiversity considerations affecting these areas.

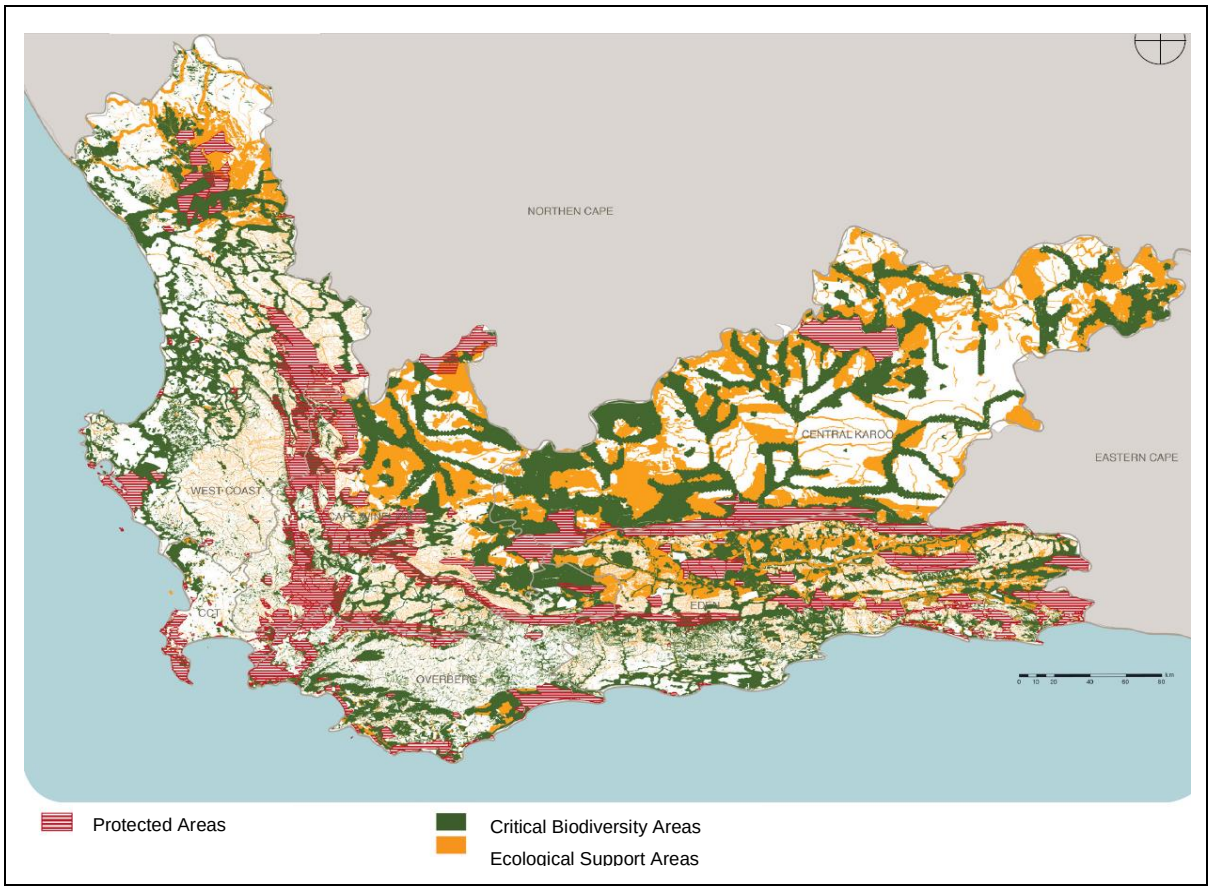


Figure 5.8: Western Cape Province - Biodiversity And Ecosystems

Source: South Africa (2014:40).

On the **Local sphere of government** policies and legislation were developed to address the management of the urban boundary. The Cape Town Metropolitan Municipality has a main metropolitan area where a majority of the economic and agglomeration influence occur, namely the city of Cape Town. Cape Town is surrounded by several satellite towns that are dependent on the larger metropolitan area, the local government sphere's emphasis will thus be placed on Cape Town.

With the enactment of the LGMSA in 2000, the local government was required to develop an IDP every 5 years and be reviewed annually. These documents address are developed every lustrum to aid in various aspects within the municipality, one aspect is the SDF.

The Cape Town Metropolitan Municipality developed the 2017 – 2022 IDP, it identified three spatial priorities: 1 - Build an inclusive, integrated, vibrant city, 2 - Manage urban growth, and create a balance between urban development and environmental protection, 3 - Plan for employment, and improve accessibility as well as access to economic opportunities (South Africa, 2017a:51-52). These priorities are directly connected to the function of the urban boundary that was identified in Section 3.3.

The city of Cape Town Metropolitan Municipality produced the 'Cape Town Densification policy' in 2012. The policy was developed to manage the densification of Cape Town, and the policy's main objective was to achieve more efficient development of increasingly scarce areas (Cape Town, 2012a:5). In addition to the local government's SDFs, there are eight integrated district spatial development plans/ environmental management frameworks that seek to translate the Cape Town SDF at a sub-metropolitan scale (Cape Town, 2017). One plan has been compiled for each of the planning districts of the City of Cape Town, these districts are namely: Table Bay District, Blaauwberg District, Northern District, Tygerberg District, Helderberg District, Khayelitsha/Mitchell's Plain Greater Blue Downs District, Cape Flats District and lastly Southern District.

These district plans are guided by the SDF and aim to (Cape Town, 2017):

- Provide direction to the desired nature and form of development in the district.
- Assist in providing a guide to land use and environmental decision-making processes.
- Provide a spatial informant to strategic public and private investment initiatives.
- Inform the development of priorities for more detailed local area planning.

Through these implemented district plans various components refer to environmental and rural protection. Various key objectives of the plans aim to provide guidelines on methods to obtain these environmental and rural protection. Based on the information contained throughout this section, adequate policies and legislation are in place to guide the planning and implementation of urban boundaries within the - Cape Town Metropolitan Municipality. Accordingly, a spatial analysis was conducted to investigate the current reality and effectiveness of the urban boundary within this case study.

5.4.2 Spatial analysis - Cape Town Metropolitan Municipality

To determine whether Cape Town Metropolitan Municipality adheres to the 4 criteria previously mentioned within Section 3.4.1 the urban areas and urban boundary were analysed. At the finale criteria, the Peter and Facione scoring rubric was considered to rate the Municipality. The 4 criteria that were included as part of the initial spatial analysis of the urban boundary in the Cape Town Metropolitan Municipality are (Gennaio *et al.*, 2009:225; Huang *et al.*, 2007:3):

- Urban boundary development.
- Number of building throughout the area, inside and outside the urban boundary.
- The population density in the Municipal area.
- The porosity of the area. (Open space within the urban boundary)

5.4.2.1 Urban boundary development: Cape Town Metropolitan Municipality

To determine whether the urban boundary experienced growth, all relative documentation were utilised to identify areas of development around the urban boundary.

Refer to Figure 5.9 for an illustration provided by Cape Town Metropolitan Municipality as to where they intend to develop. The Municipality identified regions for development that has the least impact on the environment, by implementing these growth zones the urban boundary may be controlled through amendments as it's required.

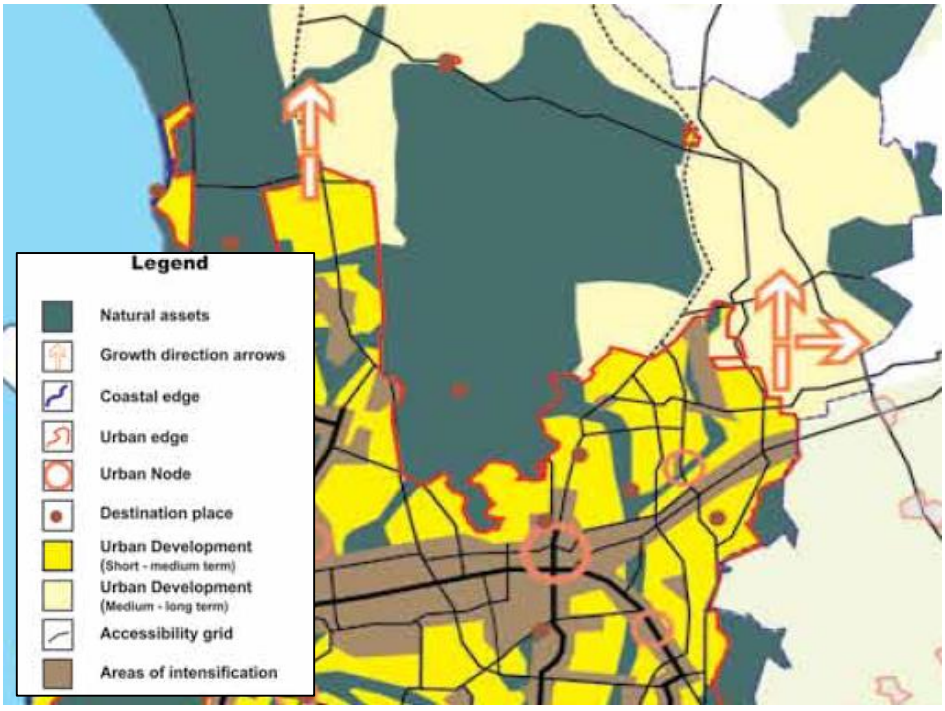


Figure 5.9: Future conceptual development zones

Source: South Africa (2012b:37).

Figure 5.6 was developed in 1996 in comparison to Figure 5.10 which was developed in 2012. Several minor amendments are perceived. Even though Figure 5.6 is less detailed numerous alterations of the urban boundary is perceived. Red circles on Figure 5.10 represent areas that experienced urban boundary alterations. The comparison between Figure 5.10 and Figure 5.11 illustrates how the urban boundary was amended since 2012. The red circles indicate areas where the urban boundary was amended. Even though these areas have been demarcated for urban development, no such developments have occurred as it was not yet required.

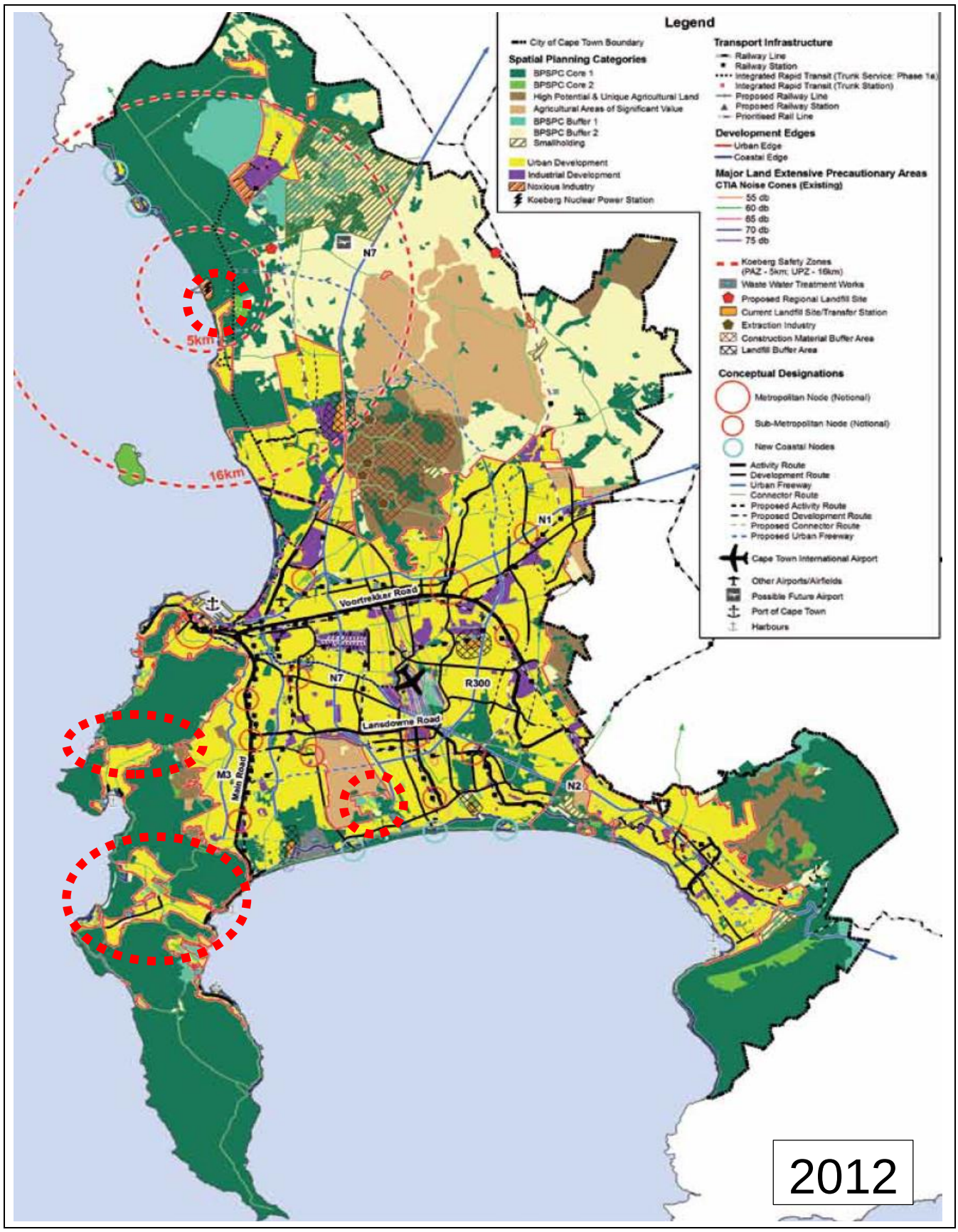


Figure 5.10: Cape Town Spatial Development Framework - 2012

Source: South Africa (2012b:37).

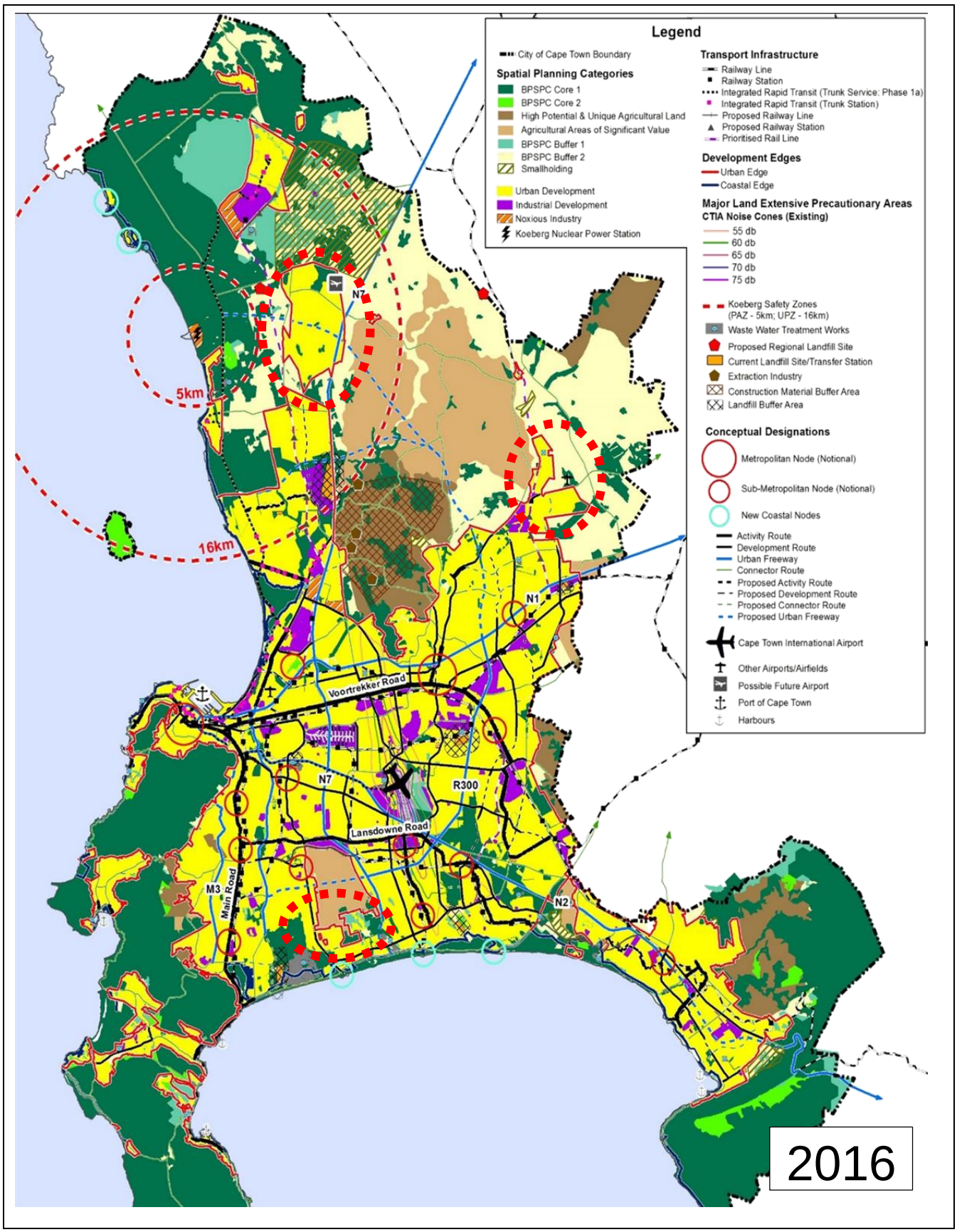


Figure 5.11: Cape Town Spatial Development Framework - 2016

Source: South Africa (2016).

5.4.2.2 Number of households: Cape Town Metropolitan Municipality

To determine the second criteria, several aspects were utilised. Firstly, Statistics South Africa was used to obtain data on the amount of households within the municipal area (StatsSA, 2017a). Take notice it is acknowledged that other buildings exist throughout the municipality, however, no database exists that has exact numbers on building numbers thus the only data available (Households) are to be utilised. According to StatsSA (2017), a household may be defined as a group of persons who live together and provide themselves jointly with food or other essentials for living, or a single person who lives alone.

Census data was collected within 2001 and again in 2011, in 2001 the amount of households were 759,485 and within 2011 the amount of households increase to 1,068,573 (StatsSA:2017a). Refer to Table 5.4 as it contains above mentioned.

Furthermore, 2011 census data provided that 34,383 of the household were agricultural household whereas 2001 does not indicated this data (StatsSA:2017a). However, the buildings outside of the urban boundary primarily exist as a result of an agricultural purpose.

Table 5.4: Cape Town Municipality Households - 2001 Census, 2011 Census and 2016 Data

Cape Town	2001 Census	2011 Census	2016 Community Survey
Households	759,485	1,068,573	1,264,849

Source: Own Compilation (2017) adapted from StatsSA (2017a); South Africa (2017a:6).

Cape Town Metropolitan Municipality experienced an increase of 40.7% from 2001 to 2011 (309,088). Since 2011, an additional 196,276 household was established within the Cape Town border increasing by 18.4% in 5 years (South Africa, 2017a:6). However, even though the amount of households increase the urban boundary experienced little to no expansion.

5.4.2.3 The population density: Cape Town Metropolitan Municipality

To determine the population density, the population of the Municipality in 1996, 2001 and 2011 was divided by the area of the Municipality (2444km) (StatsSA:2017a). Table 5.5 provides the population densities, take notice that the entire municipal area was used to calculate the population density, the reason for this is that the population number consists of both urban and rural residents.

Table 5.5: Cape Town Municipality population density – 1996, 2001 and 2011 Census and 2016 data

Census Year	Population	Municipal Area	Population density
1996	2,563,095	2444km	1049 persons/km^2
2001	2,892,243	2444km	1183 persons/km^2
2011	3,740,026	2444km	1530 persons/km^2
2016	4,004,793	2444km	1639 persons/km^2

Source: Own Compilation adapted from StatSA (2017a).

The population density inconsistently increased over the course of 15 years. However, the largest occurred among the 2001 and 2011 census years. Figure 5.12 illustrates Table 5.5's results visually. According to the trend line, the increase between the 2001 and 2011 was above average.

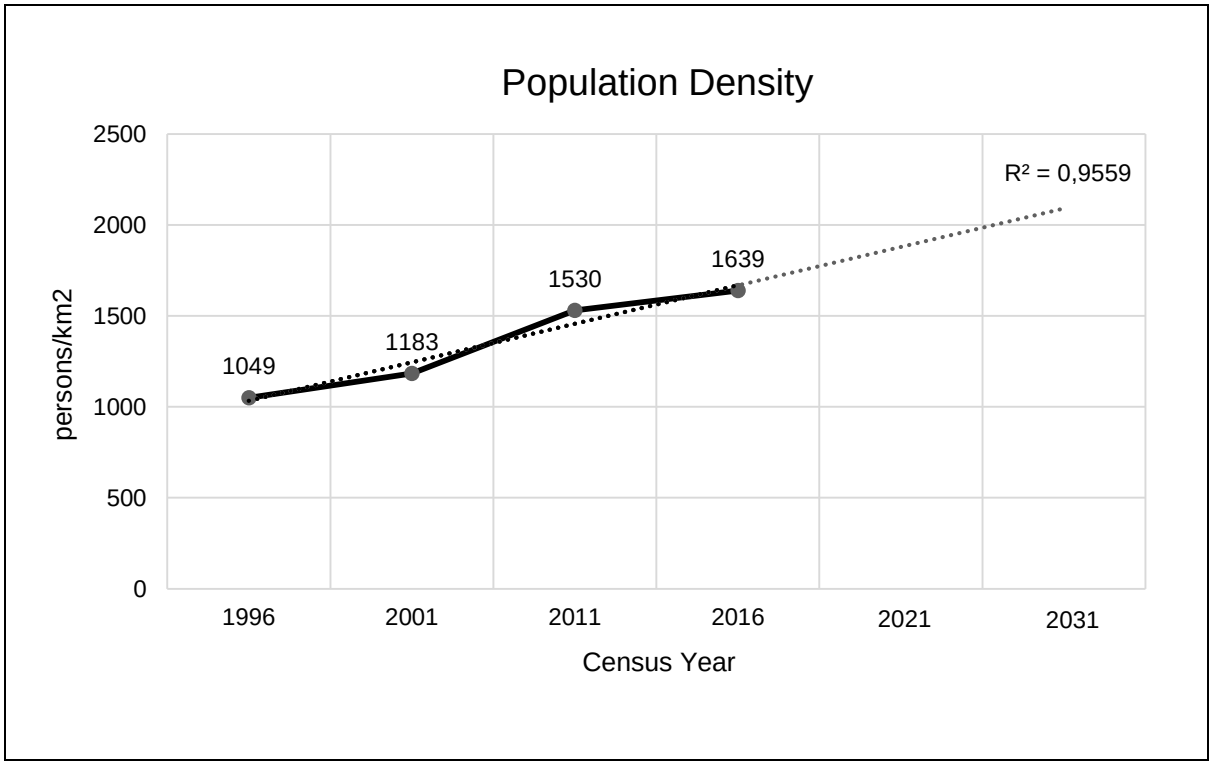


Figure 5.12: Cape Town Municipality population density – 1996, 2001 and 2011 Census
Source: Own Compilation adapted from StatSA (2017a).

Figure 5.11 illustrates that if the trend of growth continues the 2041 population density shall be approximately 2100 persons/km^2 within Cape Town Municipality. As the population increases the urban boundary should be expanded accordingly, if not, unplanned expansions over the course of time will be experienced.

5.4.2.4 The porosity of the area: Cape Town Metropolitan Municipality

Huang *et al*. (2007:3) emphasises that open spaces are a crucial element as an amenity, as well as to ensure the sustainability of cities. To determine the open space within the urban boundary delineation and whether the urban area sprawls into green field areas, a comparative visual

analysis between Figure 5.10 and Figure 5.11 were initiated. The aim was to identify open spaces within Figure 5.10 and comparing these open space to correspondingly located open spaces within Figure 5.11.

Within Cape Town Metropolitan Municipality exclusive legislation exist on the importance of the natural spaces, refer to Figure 5.13 for an illustration of the natural assets of the municipal region. South Africa (2012b:30) identified that Cape Town's natural assets and biological diversity form part of what the city represents, it also identified that it is what makes the city unique. Continually, South Africa (2012b:30) requires urban development to respect the presence, role and function of the natural assets.

Figure 5.13: Cape Town Municipality natural assets.
Source: South Africa (2012b:29).

These natural assets illustrated in Figure 5.13 provide crucial connections to natural areas throughout the entire Municipal area. Through the utilisation of the method described above no loss of open spaces were identified within the urban boundary between 2012 and 2016. However, due to the lack of data, these areas may have been affected in the past.

5.4.3 Spatial analysis scoring rubric: Cape Town Metropolitan Municipality

Section 5.3.1 identified Peter and Facione's 'Holistic Critical Thinking Scoring Rubric'. The four criteria included in the spatial analysis (from 5.4.2.1 to 5.4.2.4) were scored on a scale of 1 to 5. According to the model, the higher the total value, the more effective the urban boundary was perceived to be.

Table 5.6: Scoring rubric: Cape Town Metropolitan Municipality

	Rating Scale				
Criteria	Very Negative (1)	Negative (2)	Neutral (3)	Positive (4)	Very Positive (5)
Urban boundary development.				X	
Number of households throughout the area.				X	
The population density on the Municipal area.				X	
The porosity of the area. (Open space within the urban boundary)					X

Source: Own Compilation (2017) adapted from Peter and Facione (2012:1).

5.4.2.1 Urban boundary development: Cape Town Metropolitan Municipality

Throughout the history of the urban boundary within Cape Town, only planned amendments were made thus, obtaining a numerical value of 4 for this criteria.

5.4.2.2 Number of households: Cape Town Metropolitan Municipality

However, even though the number of households increase the urban boundary experienced little to no expansion thus, obtaining a numerical value of 4 for this criteria.

5.4.2.3 The population density: Cape Town Metropolitan Municipality

The density of the municipal area increased without any expansion of the urban boundary thus, obtaining a numerical value of 4 for this criteria.

5.4.2.4 The porosity of the area: Cape Town Metropolitan Municipality

Throughout Cape Town all visible green areas were preserved obtaining a numerical value of 5 as a result of preservation. Cape Town Metropolitan Municipality's obtained a total of 17 on the Scoring Rubric developed by Peter and Facione.

5.5 Case Study Analysis 2: City of Tshwane Metropolitan Municipality

The City of Tshwane Metropolitan Municipality is located in the northern part of Gauteng Province, South Africa. The city of Tshwane is the centre of the municipality's metropolitan area, it's surrounded by smaller surrounding towns. Tshwane is one of the three capital cities of South

Africa with the executive branch of government locate herein, Cape Town and Bloemfontein being the other two capitals. Figure 5.14 illustrates locality of the Municipality.

According to StatsSA (2017b), the census data of 2011 identified the City of Tshwane as the fifth largest populated area in South Africa with an estimated population of 2,921,488 (Most up to date census data). Table 5.7 comprises of the population data of Tshwane since the 1950 and estimates the growth rate until 2030:

Table 5.7: Estimate projections of Tshwane Population 1950 - 2030

Year	Population	Growth Rate (%)	Growth
1950	275,000	0.00%	0
1955	340,000	23.60%	65,000
1960	419,000	23.20%	79,000
1965	488,000	16.50%	69,000
1970	565,000	15.80%	77,000
1975	624,000	10.40%	59,000
1980	688,000	10.30%	64,000
1985	763,000	10.90%	75,000
1990	911,000	19.40%	148,000
1995	951,000	4.40%	40,000
2000	1,084,000	14.00%	133,000
2005	1,334,000	23.10%	250,000
2010	1,666,000	24.90%	332,000
2015	2,059,000	23.60%	393,000
2017	2,189,000	6.30%	130,000
2020	2,352,000	7.40%	163,000
2025	2,546,000	8.20%	194,000
2030	2,701,000	6.10%	155,000

Source: Own compilation (2017) adapted from United Nations (2014:343).

Table 5.7 identifies that the Tshwane Metropolitan Municipality experiences constant growth, however, with the population growing 117% between 1995 and 2015 the urban boundary has experienced consistent expansion as a result of this growth. Take notice a variance of population data consists of the UN's data and the census data obtained through StatsSA. Through the various analyses, the effectiveness of the Tshwane urban boundary will be established and the explanations for the effectiveness/ineffectiveness will be identified.

Compiled By: G. Havenga
Date Compiled: 2017/08/08
Coordinate System: GCS Hartebeesthoek 1994 Datum: Hartebeesthoek 1994 Units: Degree

Figure 5.14: Locality map of Tshwane Metropolitan Municipality

Source: Havenga (2017).

In addition to Table 5.7, Figure 5.15 and Figure 5.16 illustrates the land cover of Tshwane Municipality of 1990 and 2013 respectively. As observed within these Figures several alteration of the land cover have been experienced over the course of time. Refer to Figure 5.5 for a legend for the land cover of 1990.

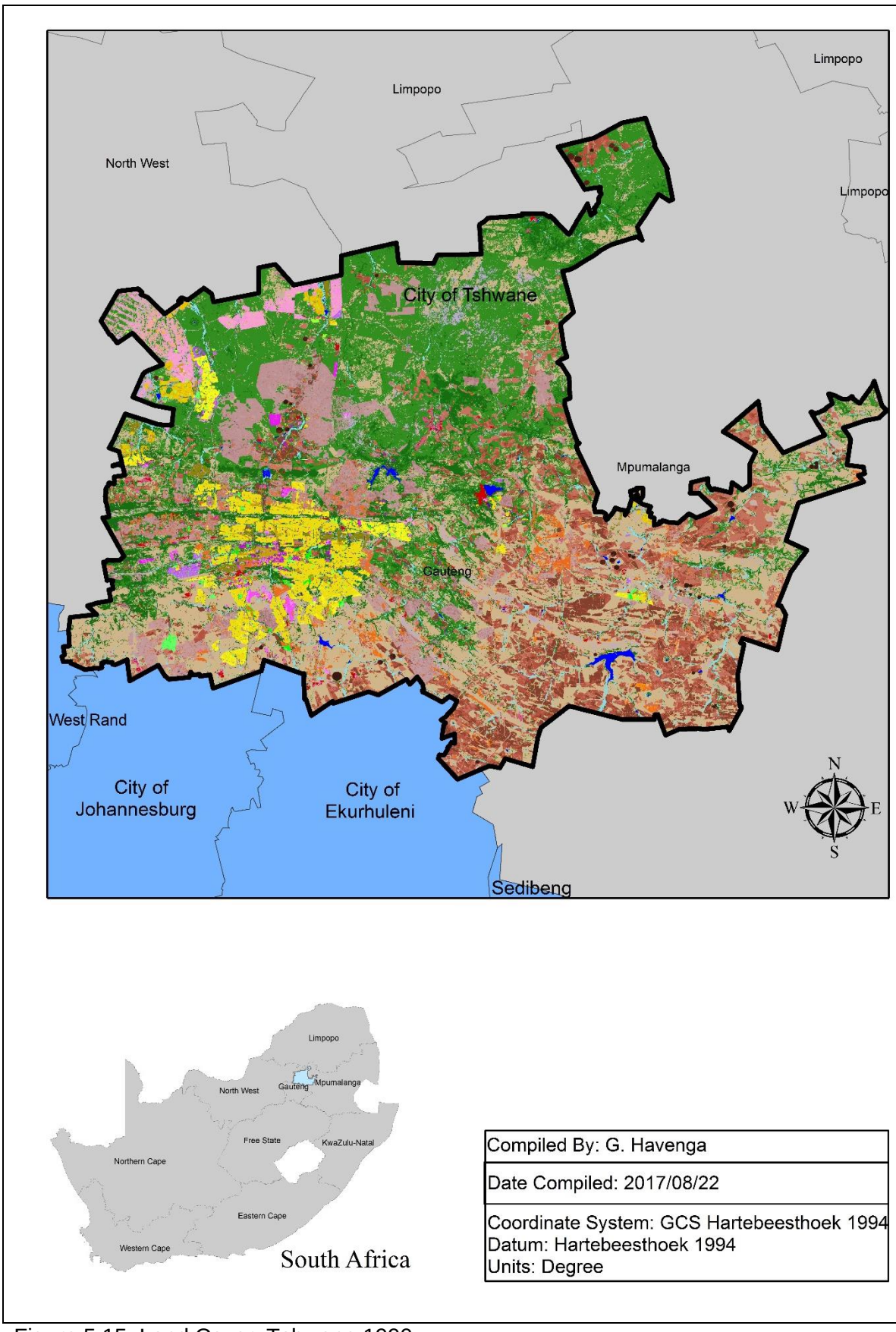


Figure 5.15: Land Cover: Tshwane 1990

Source: Havenga (2017).

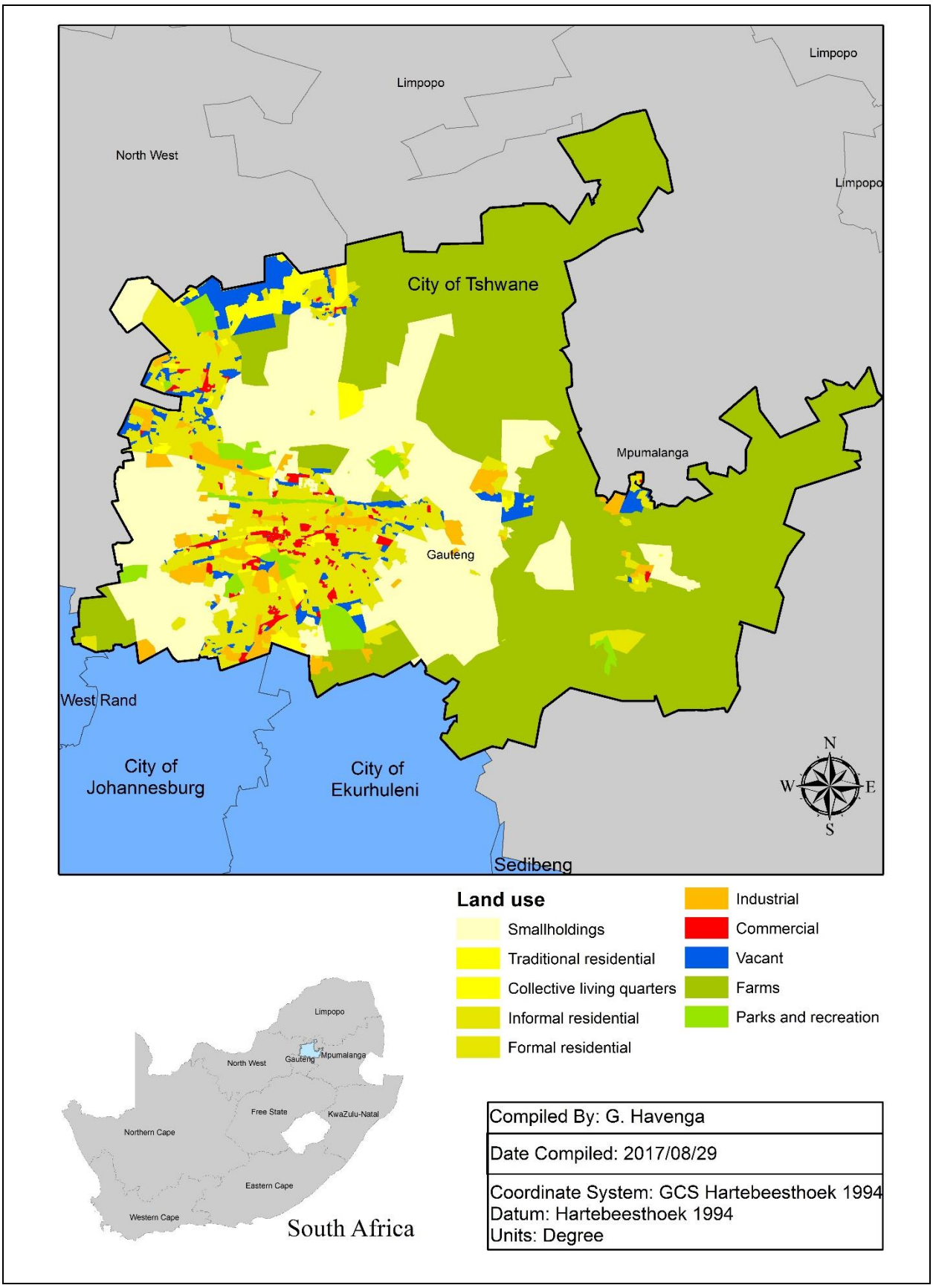


Figure 5.16: Land Cover: Tshwane 2013

Source: Havenga (2017).

5.5.1 Policy and legislative analysis - Tshwane Metropolitan Municipality

The Tshwane Metropolitan Municipality's urban boundary implementation began as a dispute between different spheres of government. In 2001 the Gauteng provincial government developed an urban boundary that included all municipalities within its borders, however, as previously mentioned local governments were dissatisfied with the delineation of the urban boundary and in 2002 requested amendments to be made (Horn, 2009:95).

However, the Gauteng Provincial Government was unsuccessful to adopt these amendments this produced large amounts of confusion within the professionals within the Gauteng province (Horn, 2009:95). As a result of the unsuccessfulness, three municipalities (Tshwane Metropolitan Municipality, City of Johannesburg and Ekurhuleni Local Municipality) delineated urban boundaries and endeavoured to manage these urban boundaries themselves, an interview conducted by Horn (209:95) identified that the provincial urban boundary was implemented for short term management as other growth management strategies and practices are applied.

Land use applications within these three municipalities were the cause of various complexities, the areas between the Municipal urban boundary and Provincial urban boundaries became 'no man's land' (Horn, 2009:96). After five years, municipal authorities resubmitted amendments that require the provincial urban boundary to be altered, after disputes numerous amendments were implemented, however, not all were implemented.

Despite the disputes, in 2011 the decision was made that the Provincial urban boundary would no longer be implemented. Rather, that the edge should be managed by local municipalities, themselves, to ensure an appropriate and contextual application of growth management.

The province of Gauteng is under threat to develop the urban areas to achieve a global city region that is globally competitive (Wray, 2010:38). Gauteng represents approximately 50% of the economic output in South Africa (Wray, 2010:38), with these immense growth pressures the urban boundaries are under enormous pressure. According to Horn (2009:97) to achieve a successful Gauteng Global City Region (GGCR) a well-connected system of urban functioning is required, urban boundaries are therefore not required as a better connected urban network provides a more effective GGCR.

Several development pressures exist within the Tshwane Metropolitan Municipality's urban boundary. Rural areas situated between the City of Johannesburg's urban boundary and Tshwane's urban boundary are experiencing enormous development pressures from several private and public developments, these pressures are as a result of the prime position of the area (Horn, 2009:96). Certain policies and legislation that are applicable in Cape Town Metropolitan Municipality are also applicable in Tshwane Metropolitan Municipality, Tshwane utilises all three

spheres of government policies and legislation to manage and manage the delineation of the urban boundary.

Various **national sphere government** policies and legislation were considered, including the Constitution of the Republic South Africa (Act 108 of 1996) which supports densification to develop the built environment, for the efficient provision of services, social and economic development and environmental sustainability.

NEMA's Listing Notices also influence the Tshwane Metropolitan Municipality urban boundary, and similar to the Cape Town Municipality case study, SPLUMA required the municipalities to develop a SDF before 2020 which will influence the urban boundary within the greater area of Tshwane.

Provincial sphere government policies and legislation provide guidance to local departments. Since 2002 to 2010, the 'Urban Edge Delineation Policy' guided the urban boundary in Tshwane Metropolitan Municipality. The main objective of the 'Urban Edge Delineation Policy' was to ensure the containment of urban development within the urban boundaries with the intention to preserve the rural environment and preventing urban sprawl (RSA, 2017b:13).

Similarly to Cape Town Municipality a PSDF was developed annually or biennial. However, before the enactment of the SPLUMA, the Gauteng PSDF of 2011 addressed concerns pertaining to the continued expansion of the Gauteng urban boundary (Compiled through all municipalities' data) (RSA, 2011:128). The Gauteng PSDF identified the urban boundary as a policy tool to limit urban sprawl (South Africa, 2011:28), however, the urban boundary is extended every so often, and amendments were made in 2002, 2007, 2009, 2010, 2013 and most recently 2017 (South Africa, 2011:28; South Africa, 2014b:40; South Africa, 2017b:xiii; South Africa, 2017d:Rural plans) refer to Figure 5.17.

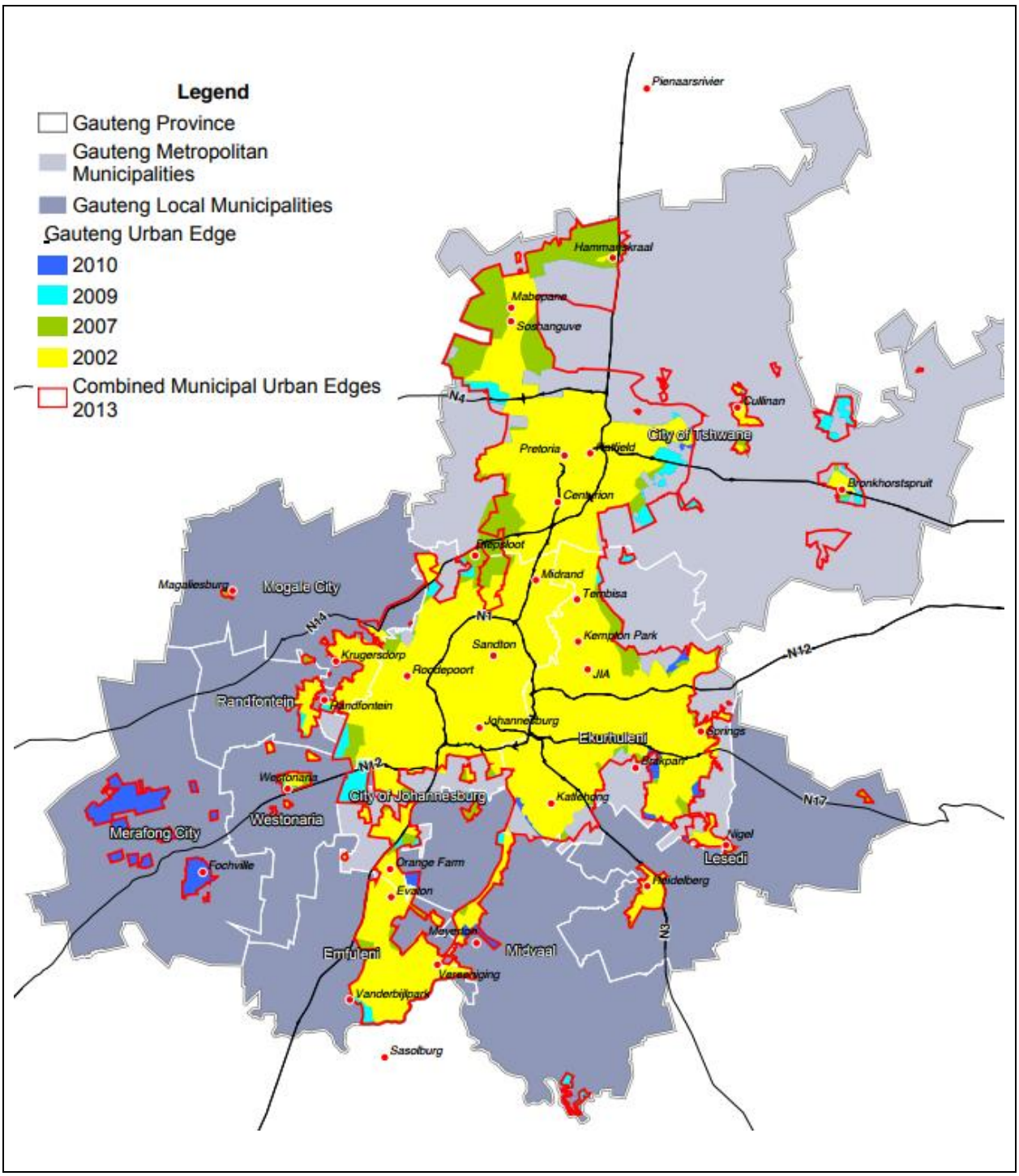


Figure 5.17: The amendments of the Urban Boundary Delineation over the previous decade – Gauteng Perspective.

Source: South Africa (2014b:40).

However, various areas within Municipality area are undevelopable, the 2011 rendition Gauteng PSDF constituted the concept ‘urban void’ (South Africa, 2012a:48). According to South Africa (2011:55,85), certain areas are 'non-urban' areas as informed by the agricultural development policy of the province, various underlying geotechnical conditions make urban development unsuitable, and those areas are to be identified for rural development.

These geotechnical conditions that are definable to urban voids are, namely (South Africa, 2011:85):

- Mining areas,
- Agricultural areas,
- Geotechnical conditions (e.g. dolomite), and lastly
- Health and safety zones/buffers in relation to urban installations and industries that sterilise land for urban development (throughout all urban scales, with the exception of mining and agricultural areas, which occur at the regional and metropolitan scale).

The newest rendition of the Gauteng PSDF, is the 2030 version, which states the importance of the urban boundary and identified the urban boundary as a vital tool to manage urban development (RSA, 2011:63). The provincial legislation Gauteng Growth Management Perspective that was developed in 2014, identified weaknesses of the urban boundary (RSA, 2014b:41) referring to the following issues:

- Only the line of the urban boundary was strictly applied. The urban boundary converted into a line on a plan and very little attention was given to the development of the broader growth management strategy which it is a component of.
- Applications were considered only in terms of their position relative to the line, with little or no consideration to merit or the stipulated criteria for development inside and outside the urban boundary.
- The urban boundary was inconsistently applied. In many cases it was completely ignored and applications were approved that did not comply with the stipulated criteria or procedures for managing the edge.
- The full implementation cycle was never followed through, as previously mentioned two urban boundaries were developed at provincial and municipal level respectively, causing confusion and conflict, especially with land use applications. At the provincial level the urban boundary was an approved policy, however, at municipal level the urban boundary was statutory as it formed part of the IDPs.
- The Development Appeal Tribunal was never established to deal with appeals in terms of applications turned down.
- Supporting Growth Management Strategies were not developed at provincial or local level.

In 2014 the Gauteng Environmental Management Framework was developed its main objective is to direct land use development and protect rural areas through environmental management (RSA, 2014c:7).

Several references to the protection of the rural areas/environmental conservation was also made through various other policies and legislation, namely: Gauteng Growth Management Perspective (RSA, 2014b:2), Gauteng PSDF of 2030 and 2011 (RSA, 2017b: viii; RSA, 2011:10), Concept Paper Gauteng Spatial Perspective: 2030 (RSA, 2015d:32).

Figure 5.18 illustrates the Environmental Management Frameworks and Agri-Hubs of the entire Gauteng province, several protected areas exist within the province's boundaries. The importance to protect these rural areas are of importance, in the Gauteng PSDF of 2030 it identified five focus areas, one of which was the 'Rural Enterprise Support'.

It specified the importance to protect areas of province that provide key environmental support services, are environmentally sensitive, have been formally demarcated as conservation areas, have high agricultural potential, or are used as or have the potential for eco-tourism and rural economic activities (South Africa, 2017b:xi).

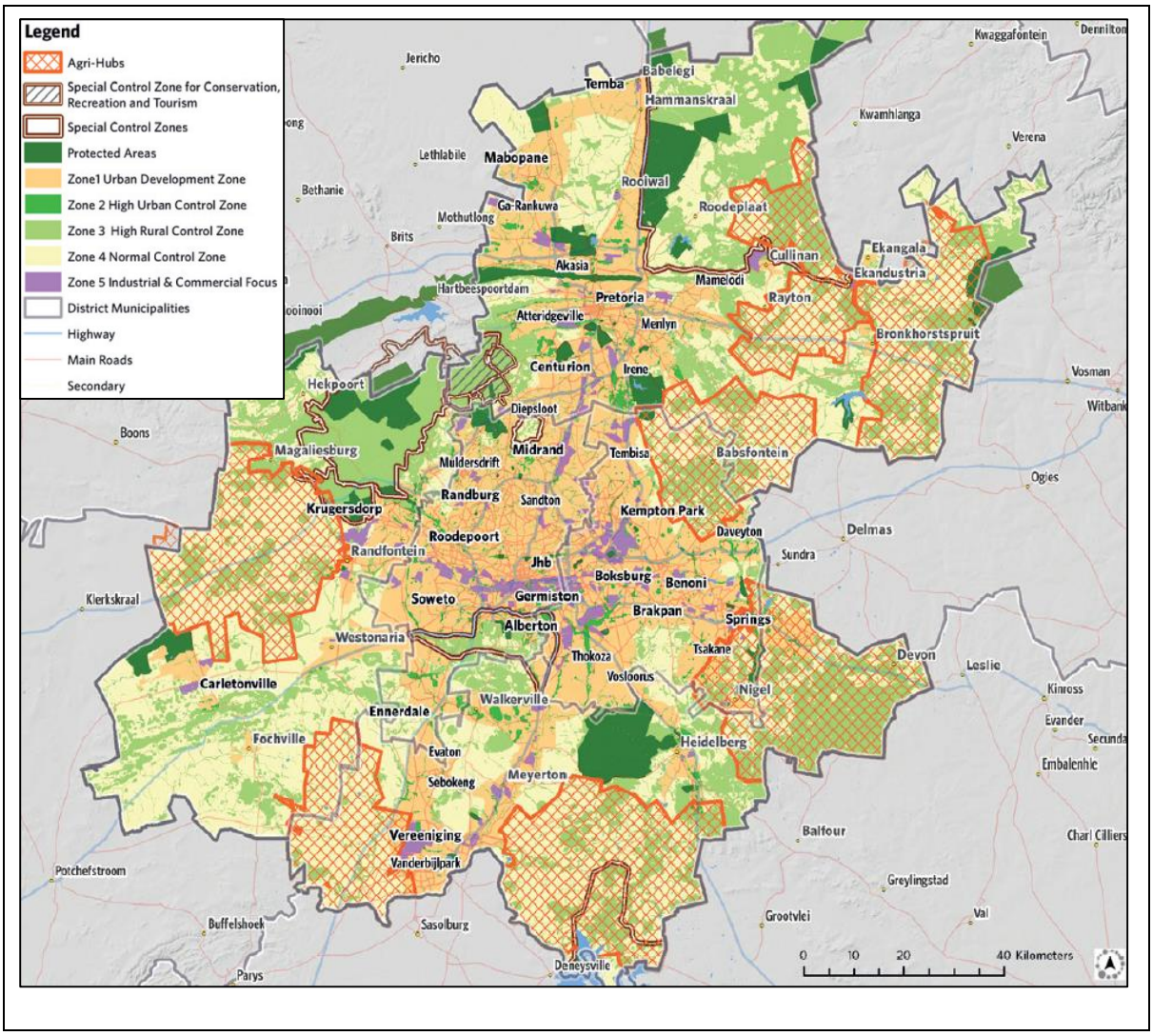


Figure 5.18: Gauteng Environmental Management Frameworks and Agri-Hubs.
Source: South Africa (2017b:20).

As identified within Section 4.3.1, in addition to national, provincial and local SDFs, regional SDFs (RSDF) may be developed, the city of Tshwane established various iterations of RSDFs. The Tshwane Metropolitan Municipality firstly developed 7 administrative regions (see Figure 5.19), regionalisation produced a cluster approach system that the City of Tshwane utilises to better coordinate and alignment functions to be achieved and allow the City to organise itself better, it also increased governmental interaction with the public, and improved service delivery throughout the various regions (Tshwane, 2011:46). Each of these regions have RSDFs to identify the requirements of each region, the urban boundary is identified as a growth management strategy throughout both iterations in 2013 and the draft of 2017.

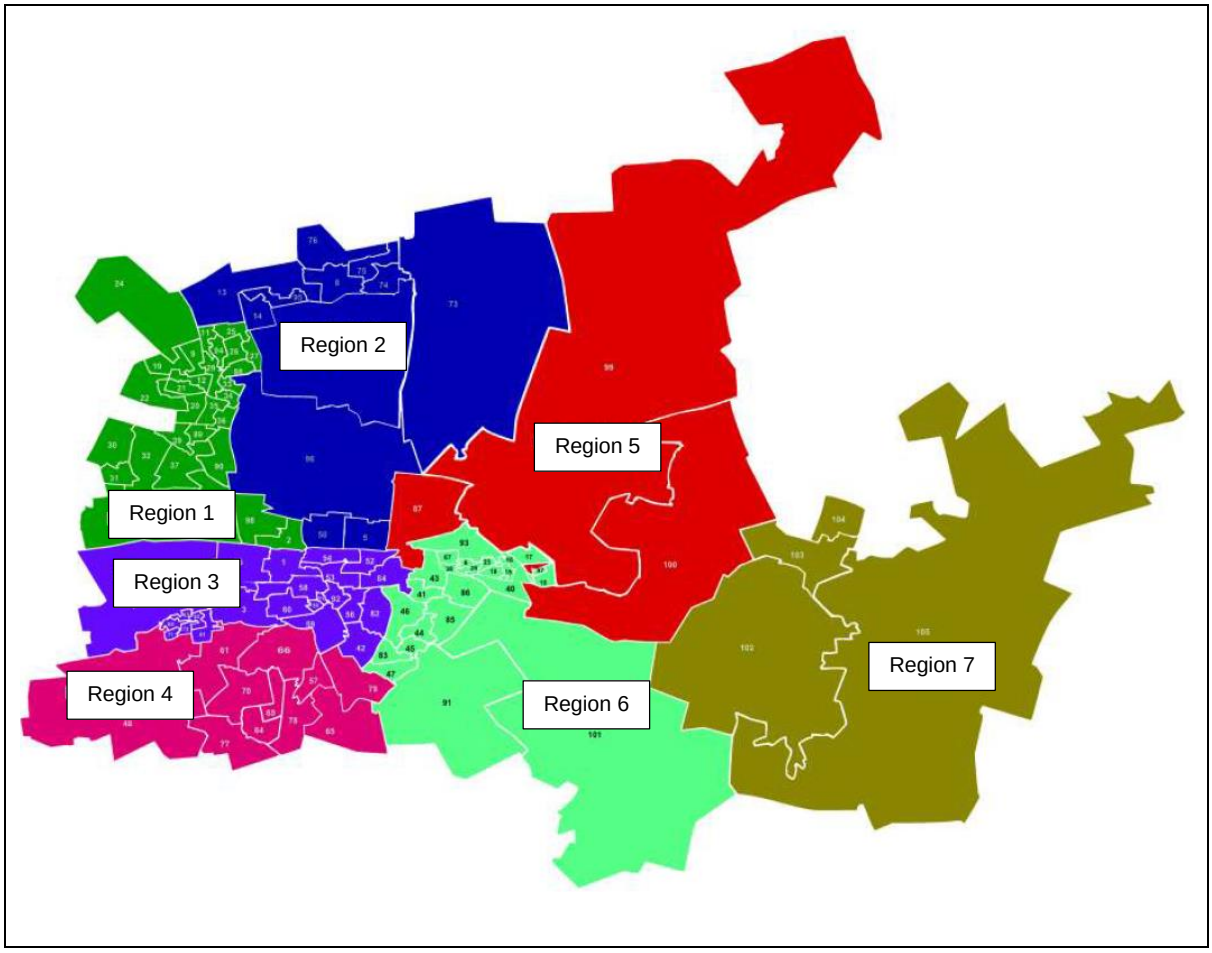


Figure 5.19: City of Tshwane 7 Administrative Regions, 2011

Source: Tshwane (2011:46).

The main economic and agglomeration hub of the Municipality is similarly located within one major metropolitan area – The city of Tshwane. It's surrounded by satellite towns with lower populations that are dependent on the larger metropolitan area, thus the local government sphere will be focused on this high order metro.

Within the **local sphere of government** various policies and legislation exist that address the urban boundary. However, the city of Tshwane developed a 2055 vision, the main objective of

the vision is to provide the City of Tshwane with a broad development logic to guide the City's intervention and program decision-making process over the next four decades of game changing (Tshwane, 2011:27). The vision of 2055 provided various supportive methods for all other local government policies and legislation including IDPs and SDFs.

Specifically, the city of Tshwane was required to develop an IDP every 5 years that are reviewed annually. From the time when the LGMSA was enacted the City of Tshwane developed various iterations of the IDP. The most recent rendition of Tshwane's IDP is the IDP of 2017/21, which identified four pillars to be developed to achieve the vision of the policy. One pillar specifically focus on the urban boundary as is aims towards (South Africa, 2017c:4): a city that delivers excellent services and protects the environment. It was identified as a concern that unsuitable urban development occurred around certain areas within Tshwane (South Africa, 2017c:103), as these developments impacts on the rural areas' declining quality and character (South Africa, 2017c:103).

Since 2000 various SDFs were developed to aid in several spatial aspects and various references were made to the urban boundary as a primary growth management strategy (South Africa, 2012a:47). The 2012 Metropolitan SDF (MSDF) identified the urban boundary as an urban management strategy used to counter urban sprawl and unplanned expansion, encourage densification and protect natural resources within the city (South Africa, 2012a:47). According to the 2012 MSDF, the urban boundary also ensured the protection of land- an exhaustible resource- by encouraging Brownfield developments instead of Greenfield developments (South Africa, 2012a:47).

Based on the information contained throughout this section, adequate policies and legislation are in place to guide the planning and implementation of urban boundaries within the Tshwane Metropolitan Municipality. Accordingly, a spatial analysis was conducted to investigate the current reality and effectiveness of the urban boundary within this case study.

5.5.2 Spatial analysis - Tshwane Metropolitan Municipality

To determine whether Cape Town Metropolitan Municipality adheres to the 4 criteria previously mentioned within Section 3.4.1 the urban areas and urban boundary were analysed. At the finale criteria, the Peter and Facione scoring rubric was considered to rate the Municipality. The 4 criteria that were included as part of the initial spatial analysis of the urban boundary in the Cape Town Metropolitan Municipality are (Gennaio *et al.*, 2009:225; Huang *et al.*, 2007:3):

- Urban boundary development.
- Number of buildings throughout the area, inside and outside the urban boundary.
- The population density in the urban area.
- The porosity of the area. (Open space within the urban boundary)

5.5.2.1 Urban boundary development: Tshwane Metropolitan Municipality

To determine whether the urban boundary of Tshwane Metropolitan Municipality was amended, different policies and legislation are used to identify these amendments visually. To determine whether the urban boundary experienced growth, all relative documentation were utilised to identify areas of development around the urban boundary.

Take notice as previously mentioned the Provincial urban boundary was disbanded within 2011, thus municipal urban boundary is now the boundary that professionals need to adhere to. Figure 5.17 provides the amendments made to both municipal and provincial urban boundaries of the past decade and a half. Various amendments were made as a result of development pressure within those areas.

South Africa (2012a:14) made the statement that the Municipality is not the result of planned growth, however rather, of the extension of its urban boundaries to incorporate new areas over time. This resulted in a sprawled city form, vast and complex in nature. Refer to Figure 5.20 for a visual representation of the development of Tshwane Metropolitan Municipality.

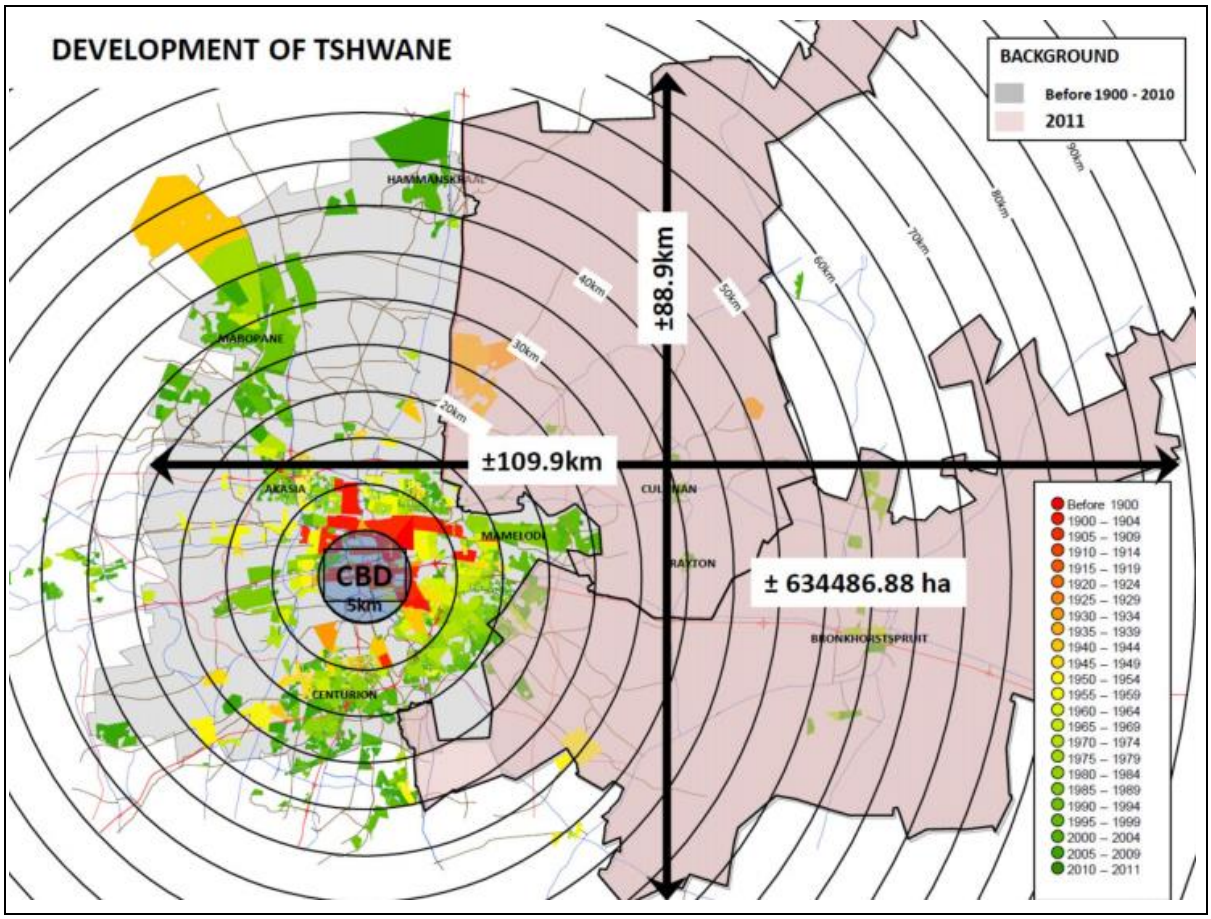


Figure 5.20: Tshwane Metropolitan Municipality development: 1900 - 2011

Source: South Africa (2012a:15).

More recently regional plans were produced and again the urban boundary was altered in several areas, refer to Figure 5.21 and Figure 5.22 for a visual representation. Take notice that the data used is the only available at the time of the research.

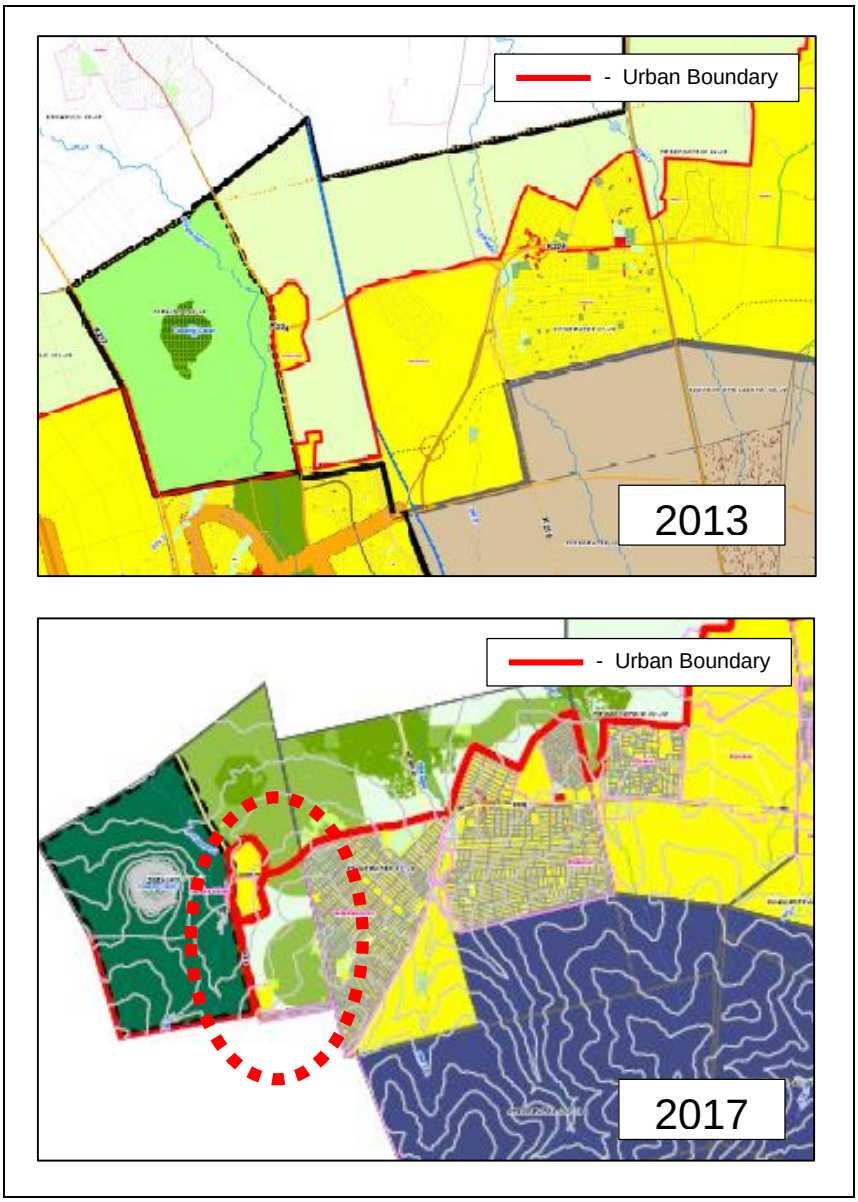


Figure 5.21: Region 2: Urban boundary amendments – 2013 and 2017.

Source: South Africa (2017c).

Above illustrated is an alteration that occurred between 2017 and 2013, the development pressures may have initiated the amendment. Refer to Figure 5.19 for a spatial representation of the location of region 2 within the Municipality. It is of importance to note that no indication was provided that the region was going to develop within this area, this indicates that it was unplanned. Illustrated on the following page is a large amendment that occurred inside region 4, the urban boundary was relocated until it was adjacent to the road. This alteration affected a large region to be included in the urban boundary.

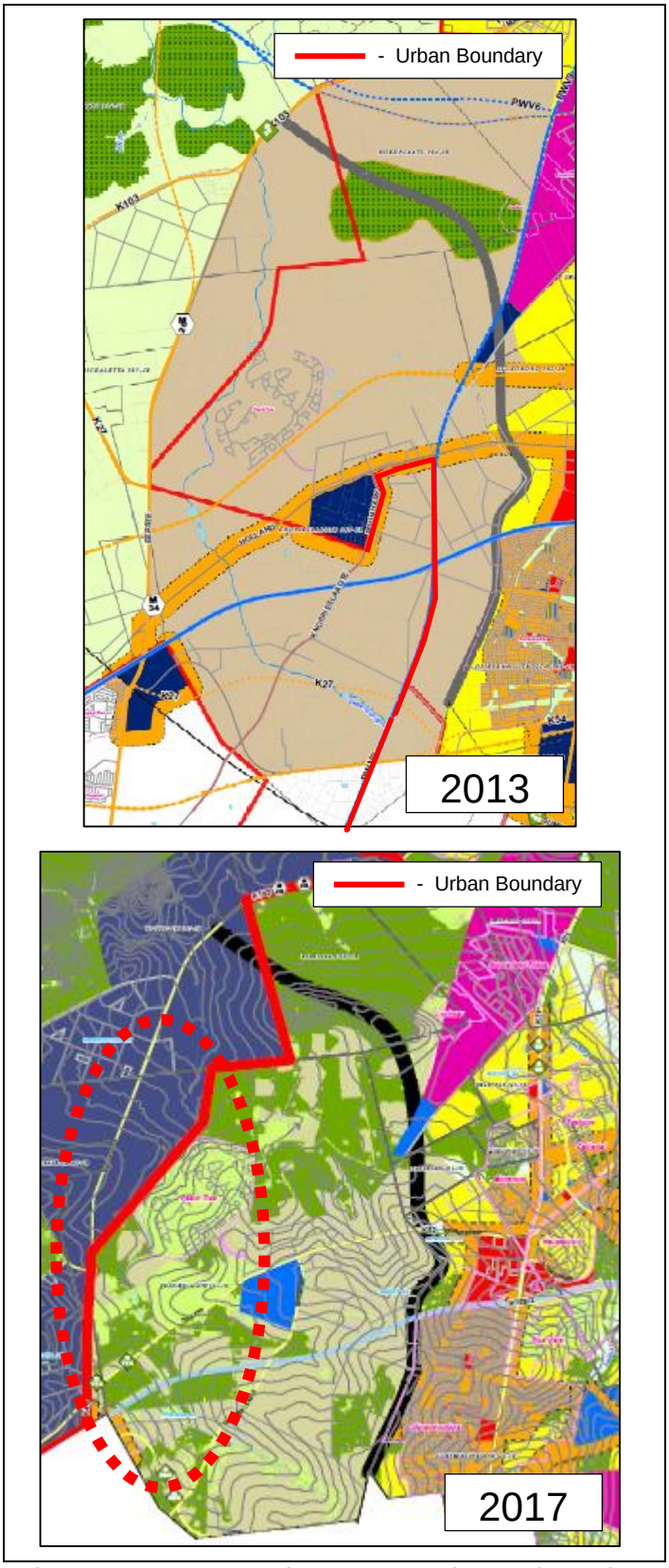


Figure 5.22: Region 4: Urban boundary amendments – 2013 and 2017.
Source: South Africa (2017c).

5.5.2.2 Number of households: Tshwane Metropolitan Municipality

To determine the second criteria, several aspects were utilised. Firstly, Statistics South Africa was used to obtain data on the amount of households within the municipal area (StatsSA, 2017b). Take notice it is acknowledged that other buildings exist throughout the municipality, however, no database exists that has exact numbers on building numbers thus the only data available (Households) are to be utilised. According to StatsSA (2017), a household may be defined as a group of persons who live together and provide themselves jointly with food or other essentials for living, or a single person who lives alone.

Census data collected within 2001 and again in 2011 were considered. In 2001 the amount of households were 606,025 and within 2011 the amount of households increased to 911,536 (StatsSA, 2017b).

The 2011 census data illustrated that 84,516 of the household were agricultural household whereas 2001 did not indicated this data (StatsSA, 2017b). Table **5**.**8** indicates the number of households within the municipal area in 2001 and 2011.

Table 5.8: Tshwane Metropolitan Municipality Households - 2001 Census, 2011 Census, 2016 Data

Tshwane Metropolitan Municipality	2001 Census	2011 Census
Households	606,025	911,536

Source: Own Compilation (2017) adapted from StatsSA (2017b); South Africa (2017a:6).

The Municipality experienced an increase of 50.4% households from 2001 to 2011 (305,511). These increases evidently impacts on land use and development, and the urban boundary should be considered in this sense.

5.5.2.3 The population density: Tshwane Metropolitan Municipality

To determine the population density, the population of the Municipality in 1996, 2001 and 2011 was divided by the area of the whole Municipality (6,298 km) (StatsSA:2017a). Table 5.9 provides the population densities, similarly to Cape Town Municipality the entire municipal area was used to calculate the population density, the reason for this is that the population number consists of both urban and rural residents.

Table 5.9: Tshwane Metropolitan Municipality population density – 1996, 2001 and 2011 Census

Census Year	Population	Municipal Area	Population density
1996	1,770,330	6,298 km	281 persons/km^2
2001	2,142,322	6,298 km	340 persons/km^2
2011	2,921,488	6,298 km	464 persons/km^2

Source: Own Compilation adapted from StatSA (2017b).

The population density inconsistently increased over the course of 15 years. However, the largest occurred amongst the 2001 and 2011 census years. Figure 5.23 illustrates Table 5.9's results visually. According to the trend line, the increase between the 2001 and 2011 was above average.

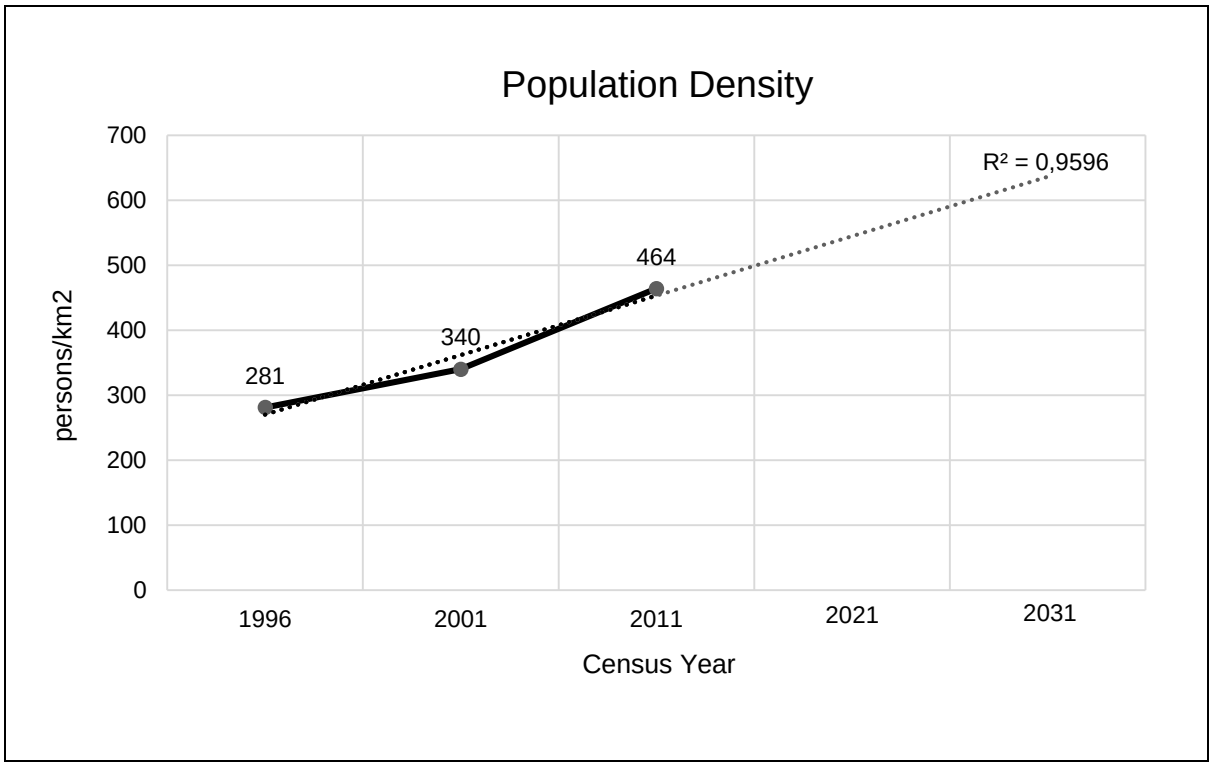


Figure 5.23: Tshwane Metropolitan Municipality population density – 1996, 2001 and 2011 Census

Source: Own Compilation adapted from StatSA (2017b).

Figure 5.23 illustrates that if the trend of growth continues the 2031 population density shall be approximately 650 persons/km^2 that are living within Tshwane Metropolitan Municipality. As the population increases the urban boundary should be expanded accordingly, if not, unplanned expansions over the course of time will be experienced.

5.5.2.4 The porosity of the area: Tshwane Metropolitan Municipality

Huang *et al*. (2007:3) identified that open spaces are a crucial element as an amenity as well as to ensure the sustainability of cities. To determine the open space within the urban boundary delineation and whether the urban area sprawls into green field areas the method of identifying open spaces within three illustrations, from 2005, 2010, 2015. These figures were compared to the subsequent figure, identifying loss of open space within correspondingly located open spaces within the subsequent figure.

The natural spaces of Tshwane Metropolitan Municipality were identified within Figure 5.24. South Africa (2011:89) states that natural systems consist of the ecosystems within the urban area, the natural environment, and its distinguishing features. The natural system within the Municipality includes various rural areas, conservation areas and natural habitats that are required to be rehabilitated and/or expanded (South Africa, 2011:89).

The Figure 5.24, Figure 5.25 and Figure 5.26 illustrates the open space systems within the Tshwane Municipality. The first originated from the proposed Tshwane Open Space Framework that was developed in 2005, secondly, the PSDF of 2011 provided the figure of the 2010 MSDF and the 2015 PSDF (Vision for 2030) produced the last figure to be compared.

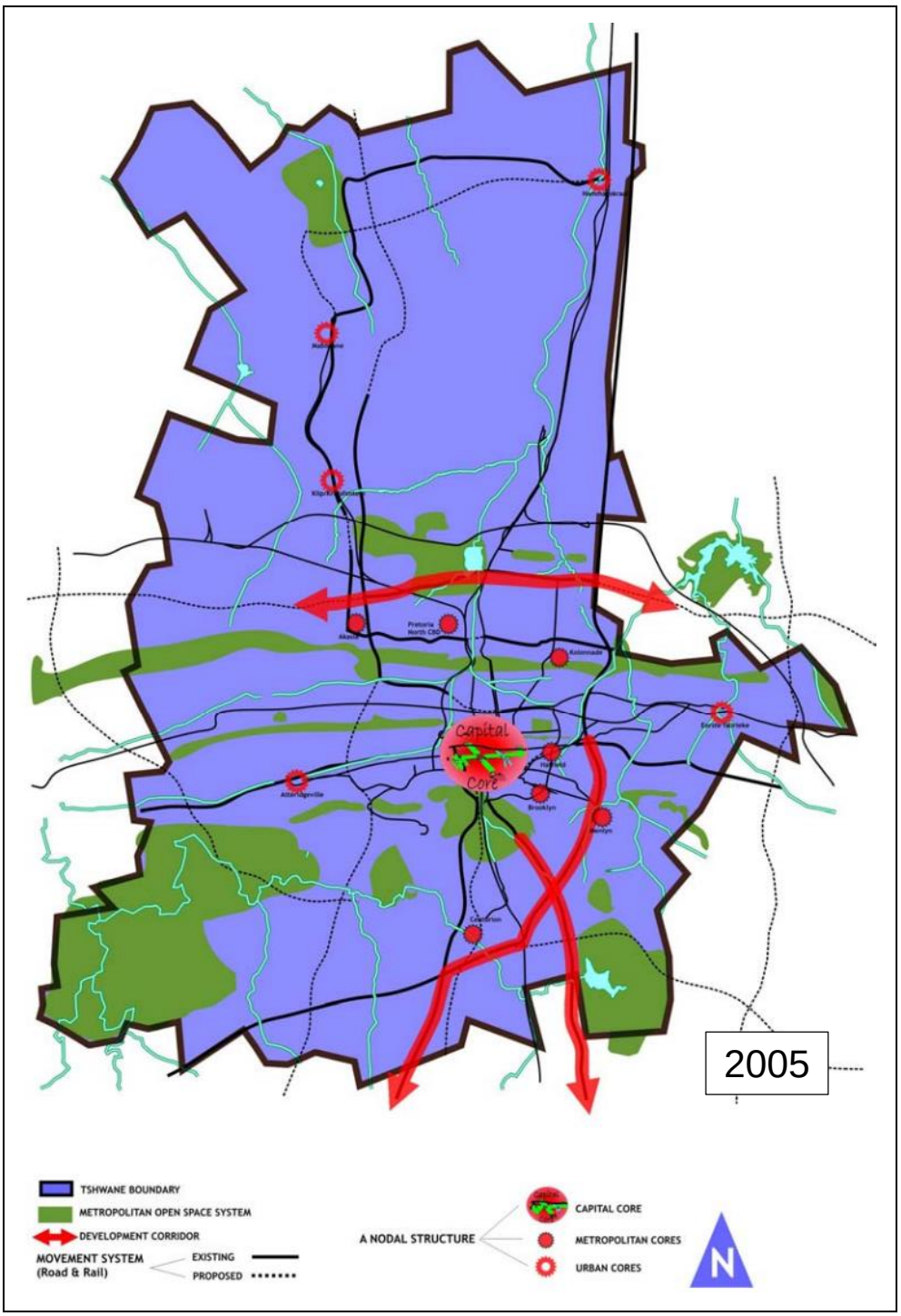


Figure 5.24: Open spaces within Tshwane

Source: South Africa (2005b:12).

Figure 5.25 provides the entire Tshwane Metropolitan Municipality of 2005, it was expanded to the Tshwane Metrolpitian Municipality of today between 2007 – 2012.

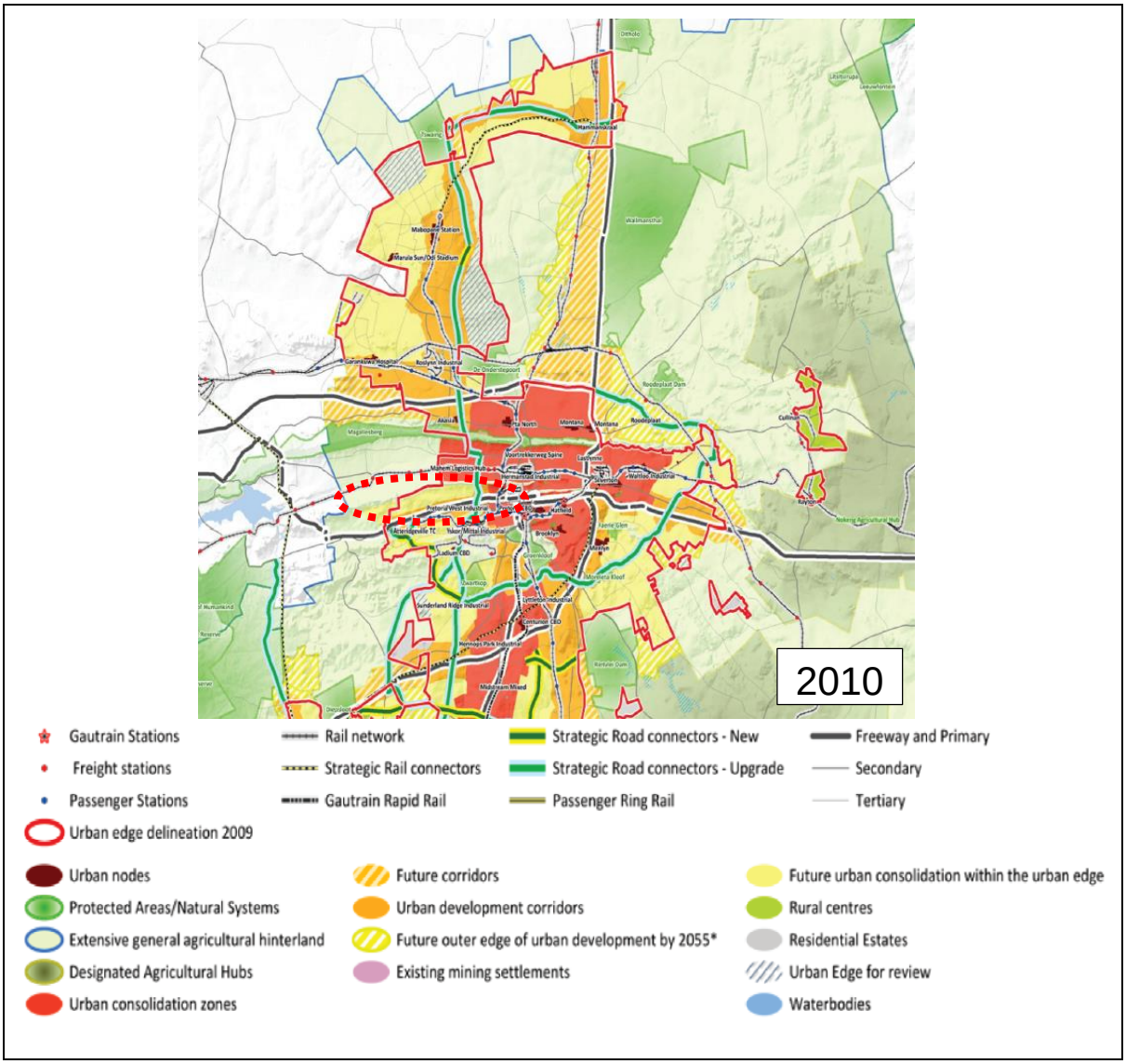


Figure 5.25: Tshwane Metropolitan Municipality SDF - 2010

Source: South Africa (2012a:51).

As previously mentioned above-illustrated figure is compared to Figure 5.24, visually solitary loss of open space occurred - indicated by the dotted red circle. The area was set aside for future corridor development loss of open space may not have occurred at the time of the SDF. However, with future development the rural areas may be enveloped by urban development.

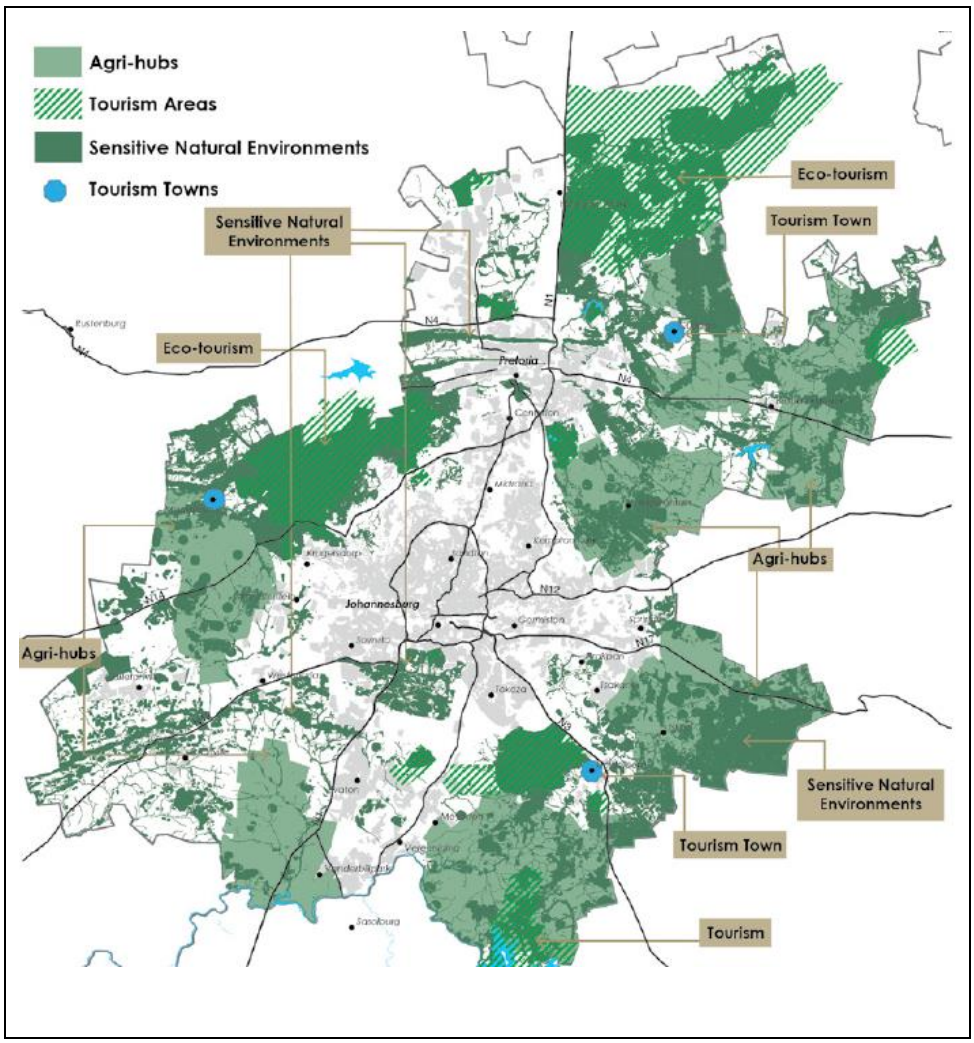


Figure 5.26: Gauteng's Environment areas

Source: South Africa (2015d:110).

Figure 5.26 illustrates various environmental areas, however, when compared to previously illustrated figure no further loss of open space is identified

5.5.3 Spatial analysis - Tshwane Metropolitan Municipality: Scoring rubric

Section 5.3.1 identified Peter and Facione's 'Holistic Critical Thinking Scoring Rubric' (Peter and Facione, 2012:1). The four criteria included in the spatial analysis (from 5.5.2.1 to 5.5.2.4) were scored on a scale of 1 to 5. According to the model, the higher the total value, the more effective the urban boundary was perceived to be. Table 5.10 provides the rating of the urban boundary.

Table 5.10: Scoring rubric: Tshwane Metropolitan Municipality

	Rating Scale				
Criteria	Very Negative (1)	Negative (2)	Neutral (3)	Positive (4)	Very Positive (5)
Urban boundary development.		X			
Number of households throughout the area.			X		
The population density on the Municipal area.			X		
The porosity of the area. (Open space within the urban boundary)				X	

Source: Own Compilation (2017) adapted from Peter and Facione (2012:1).

5.5.2.1 Urban boundary development: Tshwane Metropolitan Municipality

The number and regularity of amendment made to the urban boundary of the Metropolitan Municipality of Tshwane obtained a numerical value of 2.

5.5.2.2 Number of households: Tshwane Metropolitan Municipality

However, the number of households increased over the course of the analysis, with these increased households the development pressure experienced was too large and forced expansion of the urban boundary thus obtaining a 3 of the Scoring Rubric.

5.5.2.3 The population density: Tshwane Metropolitan Municipality

The density of the municipal area increased with expansion of the urban boundary thus, obtaining a numerical value of 3 for this criteria.

5.5.2.4 The porosity of the area: Tshwane Metropolitan Municipality

Throughout Tshwane a large extent of the area is visible green areas, however, preservation of these areas are not top priority as several rural areas were lost. However, a small number of these areas were lost thus the Tshwane municipal area obtains a numerical value of 4. Metropolitan Municipality of Tshwane obtained a total of 12 on the Scoring Rubric developed by Peter and Facione.

5.6 Comparative analysis of case studies

This section aims to compare the two case studies included in the empirical investigation (Cape Town Metropolitan municipality and Tshwane Metropolitan municipality) in order identify further complexities and intricacies regarding urban boundaries in practice. The comparative analysis was conducted within the same themes as the respective case study analyses, including the legislation and policy analysis and followed by the spatial analysis.

5.6.1 Legislation and policies analysis of case studies

The legislations and policies of the two case studies were compared and Table 5.11 provides a summary of all included policies and legislations. As indicated by Table 5.11 various spheres of government provide guidance on the urban boundary. Both case studies' policies and legislation aided to guide several aspects of local authorities. Several references that identified enforcement of the policies and legislation as a vital aspect to the successfulness of indicated policies or legislation.

Table 5.11: Legislative and policy comparative analysis between case studies

National sphere policies and legislation	
Tshwane Metropolitan Municipality	City of Cape Town Metropolitan Municipality
Constitution of the Republic South Africa (Act 108 of 1996)	Constitution of the Republic South Africa (Act 108 of 1996)
National Environmental Management (Act 107 of 1998)	National Environmental Management (Act 107 of 1998)
-	National Environmental Management: Integrated Coastal Management (Act 24 of 2008)
National Spatial Development Framework	National Spatial Development Framework
Provincial sphere policies and legislation	
Tshwane Metropolitan Municipality	City of Cape Town Metropolitan Municipality
Urban Edge Delineation Policy	Provincial Urban Edge Guideline, 2005
Gauteng Provincial Spatial Development Framework	Western Cape Provincial Spatial Development Framework
Gauteng Growth Management Perspective	-
Gauteng Environmental Management Framework	-
Regional Spatial Development Framework	District Plans, 2012
Local sphere policies and legislation	
Tshwane Metropolitan Municipality	City of Cape Town Metropolitan Municipality
The city of Tshwane developed a 2055 vision	-
The City of Tshwane Integrated Development Plan	The City of Cape Town Integrated Development Plan
The City of Tshwane Metropolitan Spatial Development Framework	The City of Cape Town Metropolitan Spatial Development Framework
-	Cape Town Densification policy, 2012

Source: Own Compilation (2017)

Evident from the comparison analysis is that there is no national guideline on the development and implementation of urban boundaries. It is evident that each province (and each municipality) enforce its own view on urban boundaries, as supported by respective local policies and frameworks. There are currently various overlapping policies and guidelines that steer the development of urban boundaries on national, provincial and local level, but this is not uniform across South Africa.

5.6.2 Spatial analysis of case studies

Both case studies' urban boundaries were spatially analysed to identify amendments of the urban boundary that occurred over the past 2 decades. The Tshwane Metropolitan Municipality case study indicated that several ad hoc developments occurred which impacted on both the provincial and local authority urban boundaries. In the Cape Town Metropolitan Municipality, less ad hoc developments were evident.

Both metropolitan municipalities exhibited consistent growth between 1996, 2001 and 2011, based on the Census Data (StatsSA, 2017a; StatsSA, 2017b) implying an additional pressure on available land within the current demarcated urban areas. Both Municipalities also indicated an increase in population density

Finally, in terms of the porosity of the area, the open spaces within the urban boundary was analysed for each case study. Cape Town indicated no growth within these open spaces within the urban boundary, contrary to Tshwane that rezoned an open space area for future corridor development.

After the completion of the analyses, the case studies' results were numerically scored through the use of Peter and Facione scoring rubric (Peter and Facione, 2012:1). With 20 the maximum that may be scored the Cape Town Municipality scored a 17 and Tshwane Municipality respectively scoring 12. Refer to Figure 5.27 for a visual comparison between the case studies of the scoring rubric. Based on the findings in Figure 5.27 the Cape Town Municipality has a more effective urban boundary.

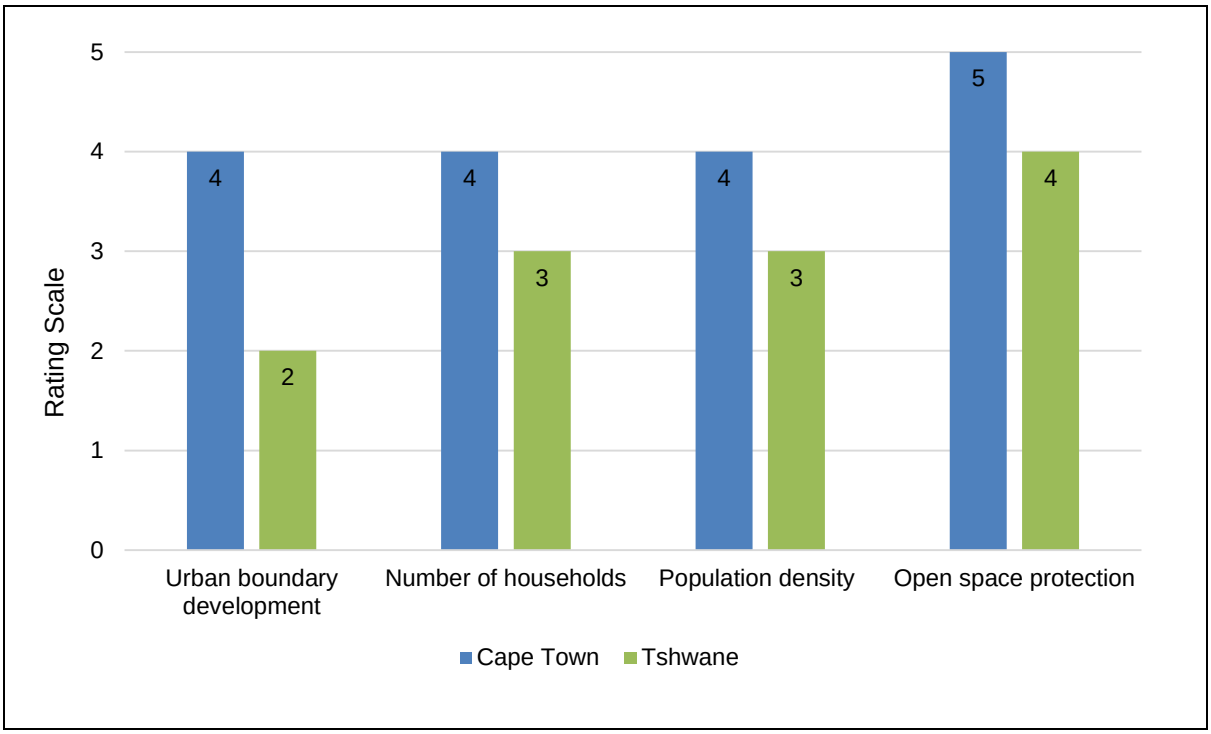


Figure 5.27: Scoring rubric outcome: Case studies

Source: Own Compilation (2017).

The second part of the empirical investigation entailed an expert analysis that aimed to obtain perspectives of professional Planners currently experiencing the intricacies of urban boundaries within the planning profession.

5.7 Expert analysis

The expert analysis was conducted both qualitatively and quantitatively. Quantitative research methods are defined as the explanation of a phenomena by collecting numerical data that are used mathematically, it emphasises objectives measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques (Muijs, 2004:1). As stated by Marsland *et al.* (1998:22) to combine qualitative and quantitative research methods improves the trustworthiness, to obtain a combined research approach open-ended question were included in the questionnaire.

The expert analysis was conducted by means of a structured questionnaire completed by a convenience sample of purposefully selected planning professionals, regarded as experts within the planning discipline based on qualifications and expertise, with the aim to obtain opinions and perspectives regarding the intricacies experienced in practice with reference to the urban boundary. The structured, online questionnaire was completed via Google Forms. To ensure a

standardised method of affiliation throughout the questionnaire a scale unit was utilised, namely: Strongly Agree, Agree, Disagree and Strongly Disagree.

In addition to identifying several aspects that provide a better perspective of the intricacies that are experienced, the province that these professionals practice in, were also recorded to provide a connection to the case studies of the previous sections. Refer to Annexure 2 and 3 for the questionnaire as well as the processed results.

5.7.1 Data findings

The results of the questionnaires (data of a convenience sample) were statistically analysed and interpreted, where cross-tabulations were utilised to determine the association between two variables. Cramer's V (symbolised by V: large effect or practical significant association V ~ 0.5; a medium effect or practical visible significant association V ~ 0.3; and a small effect or practical non-significant association V ~ 0.1) (Ellis and Steyn, 2003:51-53) determined the effect size and practical significance thereof. P-values are reported for completeness sake, however, it will not be interpreted as a convenience sample, instead of a random sample, was used. Findings were based on 32 responses received from the convenience sample included in this research.

Table 5.12 provides the descriptive statistics of the multiple choice questions that were included in the questionnaire, illustrating the minimum and maximum values as per unit scales. The mean represents the average of the participants' answers, while the standard deviation represents approximately the distribution of the answers around the mean.

Table 5.12: The questionnaire's descriptive statistics

Question reference	N (Number of valid cases)	Minimum	Maximum	Mean	Std. Deviation
Question 2	31	1	4	2,03	0,795
Question 3	31	2	4	2,84	0,779
Question 5	31	1	4	2,35	0,798
Question 6	30	1	4	2,83	0,699
Question 7	30	1	4	1,83	0,699
Question 8	31	2	4	3,00	0,775

Source: Own Compilation (2017).

From this sample, 87.5% of the participants were employed within the private sector, with 12.5% employed in the public sector. Through the convenience sample, various experience levels were provided, however, the participants had a minimal of 2 years' experience within the professional planning environment.

5.7.1.1 Findings related to complexities of urban boundaries

Throughout the literature section, several references substantiated the intricacies of the urban boundary concept. The main objective of this questionnaire was to capture the purposefully

selected participants' perception regarding the urban boundary, to identify the local perceptions and professional opinions regarding the relevance and role of urban boundaries in South African context. Within the questionnaire, 74% of the participants agreed that the urban boundary concept is a complex concept, as illustrated in Figure 5.28, with 26% strongly agreeing with this statement.

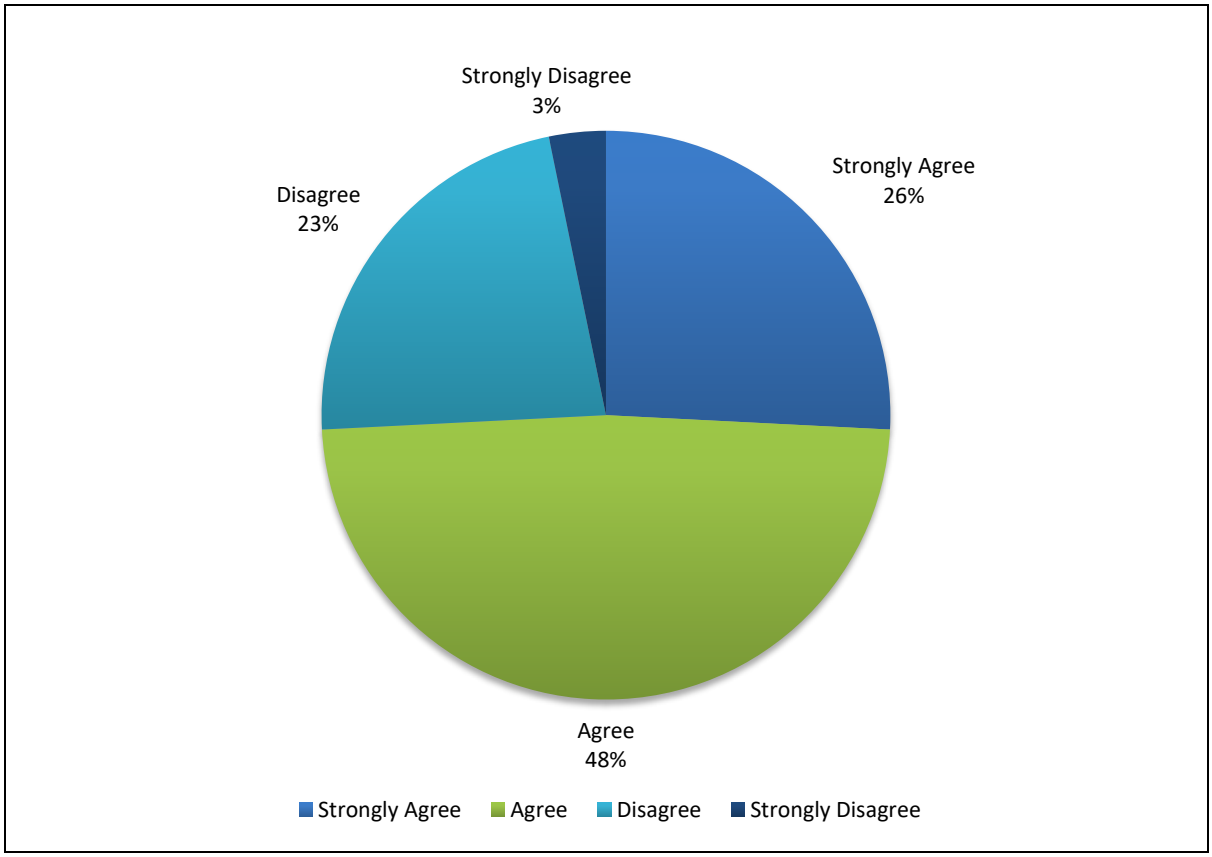


Figure 5.28: Chart representing the complexities of urban boundaries

Source: Own Compilation (2017).

Cross-tabulations were further conducted to provide some insight in terms of the statistical significance of different questions and themes. The cross-tabulation between Question 2 and Question 5 illustrated a small effect or practical non-significant association (V = 0,179). Within the questionnaire, 69.6% of the participants agreed that the urban boundary is a complex concept, also agreed that urban boundaries are a successful growth management strategy. Even though participants experience the urban boundary as a complex concept their opinion is that the urban boundary is a successful growth management strategy (p=0,319).

Moreover, a cross tabulation between Question 2 and Question 6 illustrated a small effect or practical non-significant association (V=0,024). It was evident that most participants that viewed the urban boundary as complex, also indicated that there were not sufficient policies and legislation to support the development of urban boundaries.

Majority of the participants (73.9%) who agreed that urban boundaries are a complex concept disagreed that South African legislation is specific to the implementation process regarding urban

boundaries. Participants indicated that South African legislation aggravates the complex environment surrounding urban boundaries by not specifying the requirements (p=0,896).

Cross tabulation between Question 2 and Question 8 illustrated a small effect or practical non-significant association (V=0,110). Within the questionnaire, 79.3% of the participants who agreed that the urban boundary is a complex concept, disagreed that urban boundaries are effective in South African authorities. This cross tabulation might indicate that as a result of the complexity of the urban boundary it may affect the effectiveness of these urban boundaries (p=0,540).

5.7.1.2 Findings related to the knowledge of the concept of the urban boundary

To evaluate the inconsistencies of the knowledge of the concept of urban boundaries, a multiple answer question were included that listed various functions of urban boundaries, derived from various literature references. Table 5.13 indicates the responses acquired from participants on the function of the urban boundary within South Africa.

Table 5.13: Reporting the function of an urban boundary within South Africa (%)

Answer options	Responses
To divide urban and rural areas.	32,3%
To protect the rural environments.	61,3%
To provide political/municipal boundaries.	22,6%
Prevent urban sprawl.	80,6%
Preserve the urban environment.	16.1%
Provide better services supply in the urban boundary.	61.3%
Promote infill development and curb expensive infrastructure linked to sprawl.	3,2%
Maximise the use of resources and accessibility to it also makes provision of utilities and addressing of basic needs more cost effective.	3,2%

Source: Own Compilation (2017).

According to theory, all of these functions should have scored 100%, as all listed functions relate to that of urban boundaries. However, as evident from Table 5.13, not all participants associated all these functions with the role of urban boundaries. It's important to identify outliers within the responses, as these provide context to the South African planning profession. For several years the main function of the urban boundary was identified to prevent urban sprawl, Table 5.13 supports this notion.

It is, however, evident that most participants do not fully comprehend the role and function of urban boundaries, especially relating to the promotion of infill development, curbing of expensive infrastructure, maximising the use of resources and addressing of basic needs in a more cost-effective manner. It is evident that there is a need to define and clarify the role of urban boundaries within a local context.

5.7.1.3 Findings related to the South African legislative context

The majority (74%) of the respondents disagreed that the legislative context is specific in what is required. It was identified within Section 4.4 that the promulgation of SPLUMA introduced a new framework for urban boundaries in a local context, which might be the reason for the majority of participants indicating uncertainty regarding the legislative context related to the spatial environment in which urban boundaries functions.

Within the questionnaire, 90% of the participants identified that the implementation of urban boundaries is still relevant for South African local authorities. The majority of participants consider the urban boundary as an important growth management strategy for urban planning within South Africa, however, intricacies are created as legislation does not specify the implementation of urban boundaries. In comparison, as previously mentioned, 71% of participants indicated that the urban boundary is not effective in South African local authorities. It may be as a result of the consistent amendments made to urban boundaries across South Africa.

To evaluate the knowledge of the participant on current urban planning legislation, various options were provided on what the role of SPLUMA is with reference to urban boundaries. However, to indicate the lack of knowledge of the new urban planning legislation various incorrect options were added with only 2 correct options (Bolded option 4 and 5 are thus correct answers). As Table 5.14 indicates a gap in the knowledge of the participants were apparent as various participants chose the incorrect options (21 Participants provided answers to this respective question).

Table 5.14: Reporting the percentage of options selected that SPLUMA were specific on

Answer options	Responses
Urban boundaries as legal requirement.	66.7%
The identification of urban boundaries.	19%
Requirements for the identification of urban boundaries.	19%
Spatial representation of boundaries.	**33.3%**
Timeframes related to urban boundaries.	**28.6%**
Various boundaries.	0%
The concept of urban boundaries.	19%
Intergovernmental decision-making relating to boundaries.	28.6%

Source: Own Compilation (2017).

Cross tabulation was conducted between the selected questions considering the intricacies of boundaries, in relation to the provinces of Gauteng and Western Cape. Table 5.**15**15 provide a statistical significance cross tabulation.

Table 5.15: Cross tabulation between Gauteng and Question 8.

Question reference	N (Number of valid cases)	Strongly Agree/ Agree	Strongly disagree/ Disagree	Chi-square test (p<0.05)	Cramer's V test Value.	Cramer's V Test Approx. Sig.
Gauteng_B8	31	29,0%	71,0%	0,041	0,367	0,041

Source: Own Compilation (2017).

The cross-tabulation between Gauteng and Question 8, provided a medium effect or practical visible significant association (V=0.367). Question 8 required participant to provide their opinions whether urban boundaries are effective in South African local authorities. Within the questionnaire, 84.2% of the participants that work in Gauteng identified that the urban boundary was not effectively employed.

A similar cross tabulation was conducted for the Western Cape, however, a statistically non-significant result was reported. Within the questionnaire, 87.5% of the participants that work in Western Cape identified that the urban boundary was not effectively employed. However, the sample size for the Western Cape only yielded 8 participants, and it may have affected the result of the cross tabulation. An increased sample size may provide a different result (V=0,215) (p= 0,232).

5.7.1.4 Relevance of urban boundaries

A statistical significance where evident between Question 5 and Question 7 referring to the urban boundary as a successful growth management tool and whether the implementation of urban boundaries are still relevant in South African context. Table 5.16 captures the data of the cross tabulation conducted in terms of Cramer's V test value and effects.

Table 5.16: Cross tabulation between question 5 and Question 7.

Question reference	N (Number of valid cases)	Strongly Agree/ Agree	Strongly disagree/ Disagree	Chi-square test (p<0.05)	Cramer's V test Value.	Cramer's V Test Approx. Sig.
B5_B7	30	90,0%	10,0%	0,016	0,438	0,016

Source: Own Compilation (2017).

A large effect or practical significant association was evident (V = 0,438) implying that the results of this analysis will be applicable to a large size of the population. Within the questionnaire, 90% of the participants agreed that urban boundaries are still relevant in local authorities and are a successful growth management strategy. However, eight participants disagreed with the assumption that urban boundaries are a successful growth management strategy.

5.7.1.5 Findings related to open-ended questions

In addition to the scale method, **open-ended questions** were used to provide participants the opportunity to provide personal opinions on various aspects not covered in the structured questions. Open-ended questions do not limit participants to a predetermined set of possible answers, these answers that were recorded provide personal opinions relating to the urban boundary concept.

To analyse these answers statistically, it was re-coded into specific categories. The first open-ended question related to any opportunities and challenges of urban boundaries in South Africa. 27 Responses were recorded, captured and categorised as illustrated in Figure 5.29. However, all represented categories were challenges as no opportunities were identified.

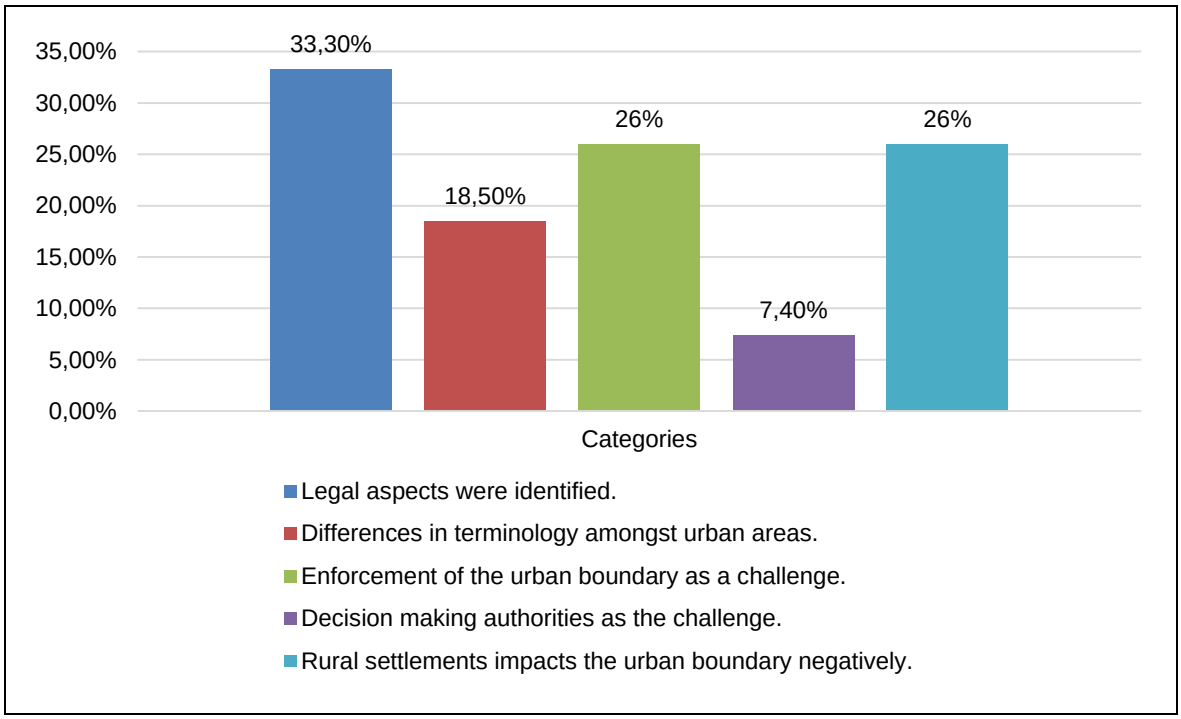


Figure 5.29: Categories of the challenges provided by participants

Source: Own Compilation (2017).

The greatest challenges that were identified related to a lack of supportive legislative and policy aspects in support of urban boundaries. Accordingly, various solutions and recommendations, based on professional opinion, was captured. Several categories were recognised, these categories are displayed in Figure 5.30 (27 Responses were recorded).

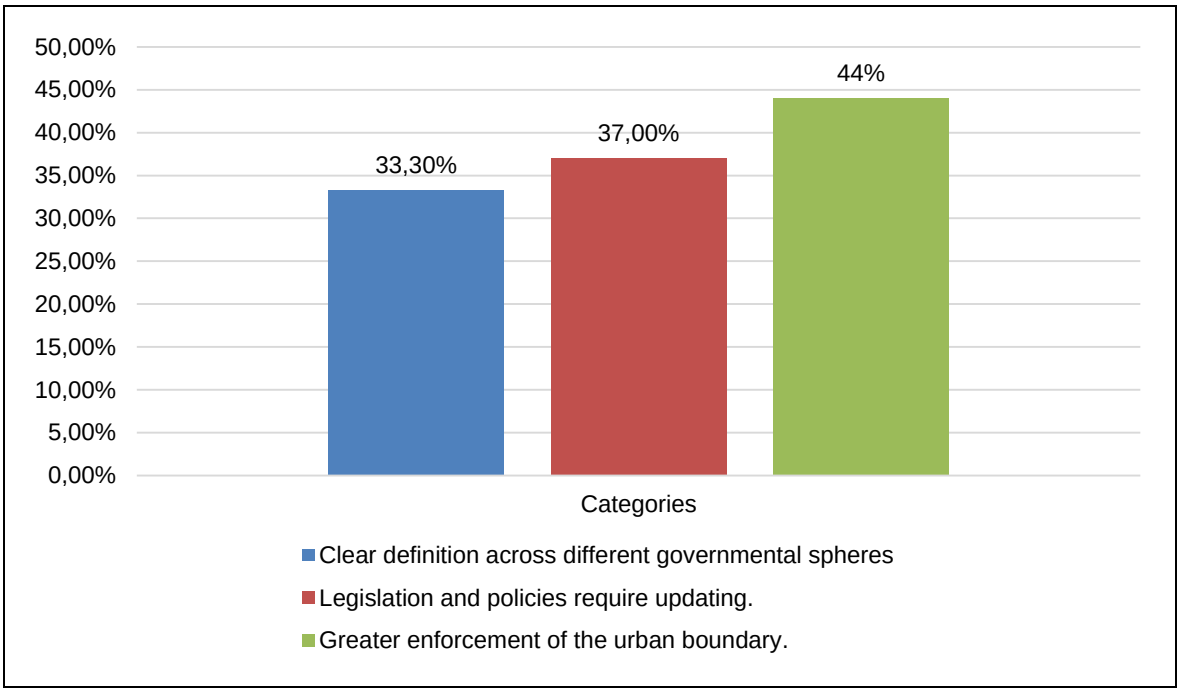


Figure 5.30: Categories for solutions rectify the urban boundary

Source: Own Compilation (2017).

Figure 5.30 illustrated that the enforcement of the urban boundary is of utmost importance especially when considering the effectiveness of an urban boundary. While the necessity for the legislative context and clear definition should also be addressed accordingly.

The third open-ended question considered aspects to improve the practical applicability of the urban boundary. Identified categories were identified and captured in Figure 5.31, relating to the 23 responses received. Question 12's largest category was the same as Question 11's, that urban boundaries require greater enforcement, thus strengthening the argument in favour of such.

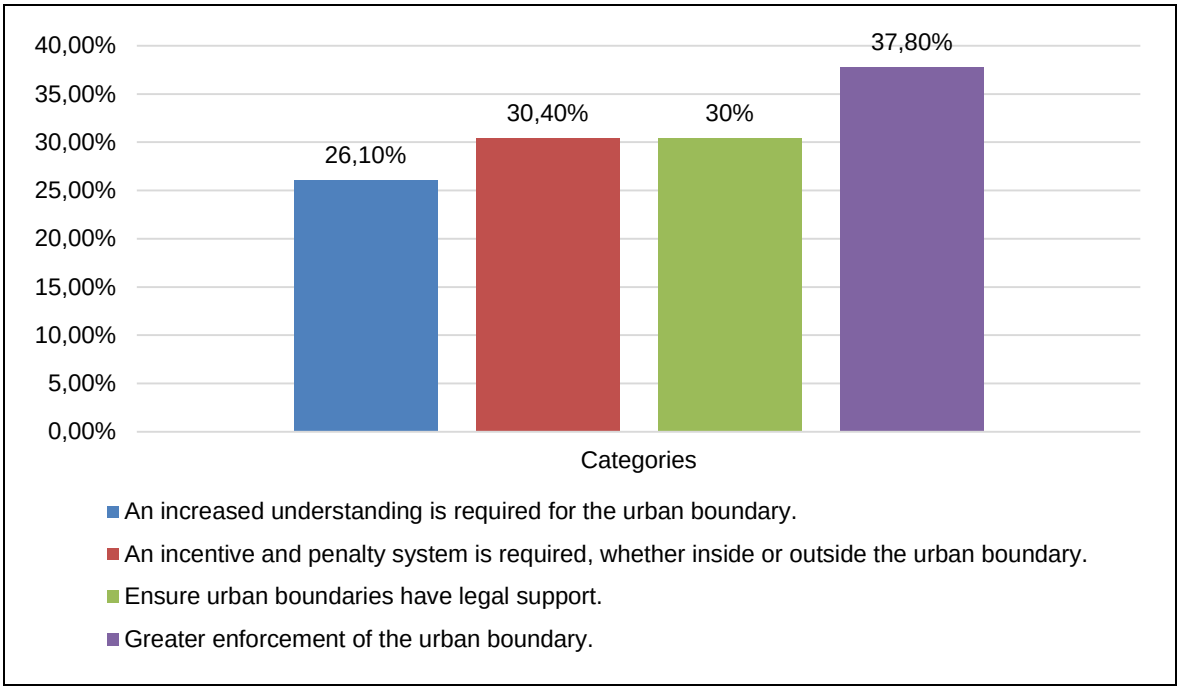


Figure 5.31: Categories to improve the practical applicability of urban boundaries

Source: Own Compilation (2017).

The last open-ended question requested the identification of aspects that are considered intricacies pertaining to the implementation of urban boundaries. Categories were identified as captured in Figure 5.32, relating to 20 Responses received.

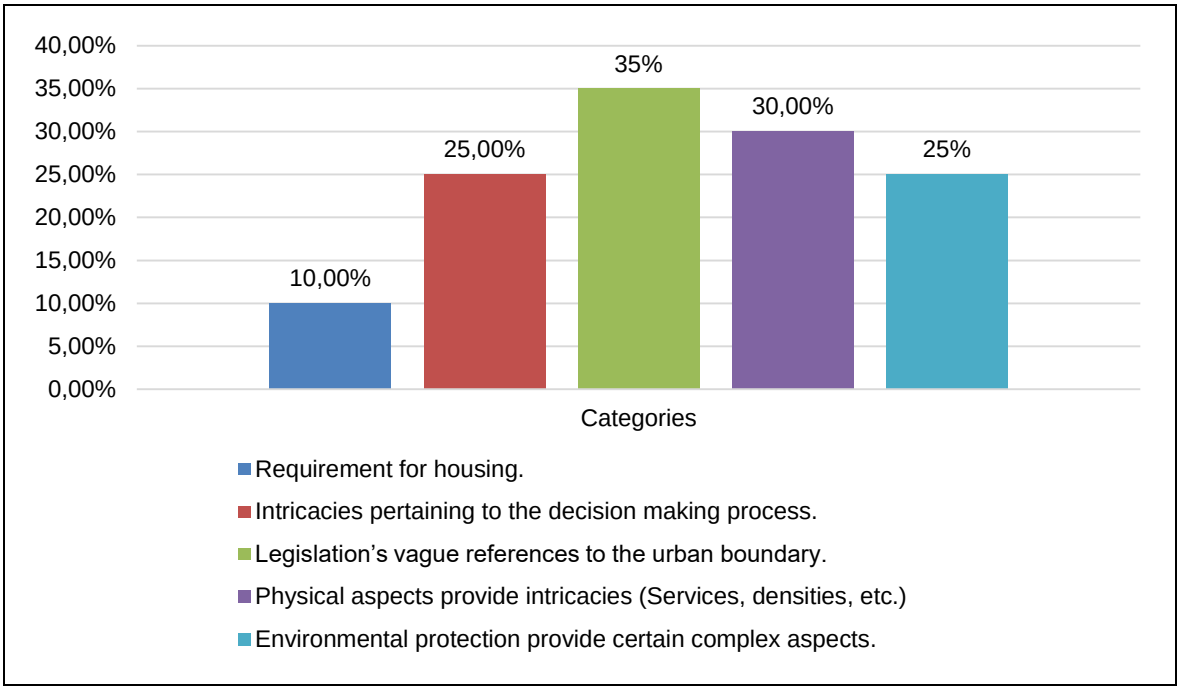


Figure 5.32: Categories that indicate the intricacies experienced within the implementation of urban boundaries

Source: Own Compilation (2017).

Based on the findings of the participants, the vague policy and legislative reference to the urban boundary. Participants further identified physical aspects as an issue that contributes to the intricacies of urban boundary implementation. Several participants identified that service provision has implications on the implementation process.

5.8 Conclusion

The **policy and legislative analysis** identified the range of policies and legislation that is currently in place to guide the development of urban boundaries in South Africa. It was evident that no uniform urban boundary policy exists or applies within the two case studies considered.

The **spatial analysis**, utilised methodologies of Gennaio *et al.* and Huang *et al.* to determine whether the urban boundaries were effective. The Holistic Critical Thinking Scoring Rubric aimed to provide numerical values to the four criteria that were analysed. Refer to Section 5.6 for a detailed comparison between the two case studies.

It was evident that the Cape Town urban boundary was not amended throughout the identified period, irrespective or urban growth or population increases. The Tshwane urban boundary was amended and expanded and ad hoc developments were evident. The spatial analysis provides an indication that even though similar policies and legislation exist within two case studies', the effectiveness of an urban boundary may vary.

The **expert analysis** provided various insights of participants regarding the urban boundary in practice. In summary, 74% of participants perceived the urban boundary as a complex concept. Various different functions related to the urban boundary concept were interpreted incorrectly by these participants.

Participants emphasised the vagueness of policies and legislation to support the development of urban boundaries in a local context. It was further evident that there is an uninformative view regarding the role of the new Spatial planning legislation (SPLUMA) with specific reference to urban boundaries.

Expansion of the urban boundary is inevitable. In agreement with Bengston and Youn (2006:1-3) this research confirm that the urban boundary could be a growth management tool that requires adjustment and is not intended to be static. However, proper guidance and management are required as improper amendments may have a negative effect on both urban and rural areas bordering the urban boundary, and impacts on the successful of implementation and function of the urban boundary. The following chapter will draw conclusions based on the theoretical and empirical investigation captured in this document.

CHAPTER 6: CONCLUSIONS

6.1 Introduction

Throughout history, urban boundaries were employed primarily as part of a growth management strategy, originating from the first Garden city concept created by Howard (Howard, 1902:20-45). Over the years, various terms and definitions were developed for urban boundaries, relating to the specific location and context of implementation (Section 0). These different concepts and definitions are still sometimes used interchangeably as it, in most cases, refer to a function and role relating to growth management.

This chapter aims to conclude on the findings from the literature study and empirical investigation as captured in the preceding chapters and seek to answer the research questions stated in Chapter 1. The primary purpose of this research was to consider the intricacies of urban boundaries and the application thereof in the South African context. Accordingly, the objectives of the research, in accordance with the research questions will be discussed.

6.2 Conclusions

This research lead to conclusions regarding the role and relevance of urban boundaries, the importance of the implementation of urban boundaries, methods to determine the effectiveness of urban boundaries, practical intricacies of urban boundaries in a local context, as well as professional planners' perception of urban boundaries, the relevance and importance of urban boundaries within current South African spatial planning systems, linkage between the theory and practice of urban boundaries and lastly the overall findings and lessons provided to the planning profession, as explained accordingly.

6.2.1 Conclusion regarding the function of urban boundaries in urban growth models

Within the theoretical section of the research, several urban growth models were considered. These analyses indicated that throughout history urban boundaries were utilised to obtain various objectives such as for segregation purposes; division of land uses, and for demarcating expansion (growth) zones. The urban models employed different forms of boundaries to demarcate different land-uses in an attempt to create the optimal urban form. All of the urban models included in this research identified the function of boundaries to manage urban growth while simultaneously enhancing the function of other related land-uses.

Long *et al*. (2007:361) stated that various elements contribute to urban growth pressures (refer to Section 2.1) and as a result, the urban morphology is constantly altered. The role of urban boundaries, in broad planning terms, is thus to protect the urban morphology and manage urban growth in a sustainable manner. This would imply context-based planning as each city, urban

area, and managing authority would have a different future planning vision that the urban boundary, as a spatial planning tool, could assist to enforce.

6.2.2 Conclusion regarding the changing role and importance of urban boundaries

Various alterations to the role and importance of the urban boundary have been experienced over the course of history. Section 0 indicated the origination of the urban boundary, referring to the work of Ebenezer Howard who developed the first Garden City with the intention of specifically demarcating land uses in order to preserve rural areas and inhibit further growth of the urban areas (Howard, 1902:20-45). Since the Garden City concept, urban growth management was employed in various other cities and towns and the urban boundary became a crucial spatial planning tool in this regard. The wide application of the urban boundary concept led to different interpretation and translations (Refer to Table 3.1 for a complete compilation of various terms used of the urban boundary).

Most common interchangeably used terms for the urban boundary includes “Urban Development Boundary” and “Urban Edge”, however, upon investigation, these terms also refer to urban growth management as a primary objective. Through the implementation, the role of the urban boundary may vary, from curbing urban sprawl to producing more dense urban areas. Within the current reality defined by increasing populations, urbanisation and influx into urban areas, it can be assumed that the urban boundary will now play an even more important role in spatial planning and growth management (UN, 2014:7). The urban boundary thus developed to become one of the most prominent spatial planning tools.

6.2.3 Conclusion regarding the effectiveness of urban boundaries

The research identified the urban boundary to be one of the most prominent spatial planning tools, however, the practical implementation thereof would determine the effectiveness thereof. Section 3.4.1 identified various methods to quantify the effectiveness of urban boundaries, the most important factors being, time and analysing both physical and legal perspectives.

The time span is crucial when considering the effectiveness of boundaries, as urban growth is no short-term change, but implies a continuous adaption of the urban morphology (Bengston and Youn, 2004:280; Gennaio *et al.*, 2009:225). The effectiveness of the urban boundary should, therefore, be considered over a long-term period to be able to draw meaningful conclusions. Another key element would be to analyse both physical and legal aspects relating to the urban boundary, as the physical environment might pose challenges or opportunities to effectively employ the urban boundary. Similarly, guiding policies and legislation applicable to the specific area might also impose restrictions or enhance the application of the urban boundary, and these should at least be acknowledged when considering the effectiveness of the urban boundary.

6.2.4 Conclusion regarding the practical intricacies of urban boundaries as perceived within the local South African context

Urban boundaries in the South African spatial planning system has been used for various functions such as segregation, preservation of rural areas and inhibit the growth of urban areas. However, within the current spatial planning legislative context, various controversies exist, these controversies lead to intricacies. These controversies include:

- The lack of reference to urban boundaries: Due to the lack of reference local authorities are not required to implement an urban boundary.
- Intergovernmental relation complexities: The lack of indication through legislation of which governmental sphere reigns responsible for objectives, this produces confusion within the spheres.
- Capacity constraints: Due to the responsibility placed on municipalities by SPLUMA (Spatial Planning and Land Use Management Act) it may be difficult for municipalities to achieve objectives indicated by SPLUMA.
- Decision-making authorities: Municipalities were identified as the decisive authority regarding rural land use purposes, which is a duplication of the responsibility of the Minister of Rural Development and Land Reform.

SPLUMA now provides for opportunities to rethink the spatial planning approach in South Africa, and urban boundaries should be considered, and emphasised, within this context.

6.2.5 Conclusion on the perception of professional planners regarding the role and importance of urban boundaries in the South African context

The expert analysis (captured in Section 5.7) employed a qualitative research method to determine the perception of professional planners relating to the role and importance of urban boundaries in the South African context. Within the questionnaire, 90% of the participants indicated that the urban boundary is a relevant urban management tool.

However, despite participants stating the relevance of the urban boundary, it was evident that it did not translate to the practical environment. Within the questionnaire, 74% of the participants indicated a need for legislation to guide the concept and effectiveness of urban boundaries. Thus, the professional planners' perception indicated that urban boundaries are a required urban management tool in a South African context.

6.2.6 Conclusion regarding the relevance and importance of urban boundaries for current Spatial Planning approaches in South Africa

The role and function of urban boundaries changed over time in accordance with the urban planning system in South Africa. However, as previously mentioned within Section 5.7.1 most (90%) of professional planners included as part of the empirical investigation as this research agreed that the urban boundary is still relevant within the South African spatial planning system.

The urban boundary is concluded to be an important spatial planning tool to guide growth management in South Africa, as it can conform to the theoretical objectives of preserving the rural area, curb urban sprawl, create an evident divide between rural and urban areas, conserve environmental resources, produce more dense urban areas, prevent of urban decay, increase all land values – both rural and urban land, delineated area for servicing, suitable servicing standards within the urban boundary, prevent neighbouring cities to merge with one another, preserve the character of historic cities, also to assist with urban regeneration by encouraging densification (Southworth and Owens, 1993:284; Anderson, 1999:4; Western Cape Department of Environmental Affairs and Development Planning, 2006:28-38; Georgia Planning, 2008:7; Ekurhuleni MSDF (Section B), 2015a:36; Ekurhuleni MSDF (Section C), 2015b:34-35).

It should, however, be included as part of broader spatial planning thinking and cannot be implemented ad hoc or in isolation to other spatial plans and frameworks. The role of urban boundaries should be well defined within the SPLUMA context. Authorities and decision-makers should be aware of the important role of this spatial planning tool and the legal implications thereof for future growth management.

6.2.7 Overall findings of this research and lessons for the planning profession

The findings of this research, as lessons for the planning profession, may be summarised as follows:

- Urban boundaries are a crucial spatial planning tool to manage urban growth and protect the urban morphology.
- Urban boundaries within the South African context are still relevant, however, it is considered ineffective, except for specific cases of successful implementation.
- The need for a supportive legislative base enforcing the role and importance of urban boundaries were identified.
- Methods to determine the effectiveness of urban boundaries should be employed to enhance the importance of boundaries and ensure the sustainability thereof.
- Awareness should be created about the importance function of urban boundaries and how to utilise it as a spatial planning tool.

- Most intricacies of the urban boundary as applied in South African context refer to a lack of understanding the scope of the urban boundary context, the disparities in enforcing the implementation thereof due different metropolitan- and municipal visions, and in some cases to a lack of adequate legislative support.

CHAPTER 7: RECOMMENDATIONS

7.1 Introduction

The previous chapters confirmed the importance of the urban boundary as an urban growth management strategy referring to several functions and roles thereof. This chapter provides planning recommendations based on the theoretical and empirical investigations and findings drawn from these sections.

7.2 Planning recommendations based on the findings of this research

Recommendation 1: The function and importance of urban boundaries should be defined

Several intricacies of the urban boundary are produced due to the lack of clear objectives and functions. A standardised definition of an urban boundary concept might pose a solution and point of departure for uniform application of the concept. Defined as – an urban boundary is a demarcated line that aims to inhibit further growth of the urban areas through the management and control of the outer limits of development. The urban boundary identifies where development may occur and predict future growth patterns to ensure an alternative to uncontrolled sprawl while conserving the city's rural areas.

Within this definition, the objectives of the urban boundary should be well explained, relating to 1) the management of growth, 2) conserving of rural areas, 3) protection of the urban area and urban morphology, 4) demarcating of densification areas and 5) prevent neighbouring cities to merge with one another. The concept of urban boundaries should be translated to measurable objectives, to enhance the implementation thereof in practice and continuous evaluation of the effectiveness and success thereof in line with the development and growth vision.

Recommendation 2: The effectiveness of urban boundaries should be determined

The effectiveness of urban boundaries should be determined to identify areas of intervention. To ensure a uniform approach to urban boundaries, this should be enforced on a national level, to require all scales of municipalities to evaluate its respective boundaries in line with the growth management vision of the country.

To utilise the methods identified in the conclusions as a method to measure the effectiveness of an urban boundary. The most important aspect is to identify an objective of what the urban boundary is required to achieve, this produces a measurable aspect that may indicate the effectiveness.

Physical and legal aspects (refer to Section 3.4) should be included in this evaluation that would need to be conducted over a long timeframe to be able to draw meaningful conclusions. A uniform

urban boundary policy might assist the application of urban boundaries in South Africa, in line with SPLUMA requirements, and the effectiveness of the urban boundaries might provide insight on the way forward.

Recommendation 3: The relevance and importance of urban boundaries for current Spatial Planning approaches in South Africa should be emphasised

The relevance of the urban boundary was proved through various theories as well as the empirical investigation included in this research. Spatial planning in South Africa was driven through boundaries these boundaries have been altered through the course of time. Currently, various boundaries co-exist for example an urban edge, urban boundary, LUS boundary, development boundary etc. These boundaries are required to be developed within the context of the SPLUMA, accomplishing this may produce more effective boundaries.

The research also identified the various intricacies of the urban boundary which might pose a constraint to the successful implementation thereof. It is thus of importance to recognise these intricacies and identify methods to address these intricacies to enhance the function of the urban boundary concept in South African context.

The following table captures the most prominent intricacies relating to urban boundaries within the South African context. It also provides recommendations and possible methods to address these intricacies. These intricacies were identified throughout the research, the perception of planners was utilised to identify these intricacies.

Table 7.1: Intricacies relating to urban boundaries within the South African context

Urban boundary intricacy	Planning recommendations
Inconsistent concept identification	Produce a standardised definition that may be utilised across, these definitions are required to include all relevant information. It's of necessity that the definition is produced through inter-governmental cooperation, this ensures that each level of aids in the development of the definition. Departments such as the DRDLR and Department of Mineral Resources are an essential part of the development of said definition.

Undefined function and role of urban boundaries	Ensure the above-mentioned definition identifies the role and function of the urban boundary within a South African context.
Ineffective boundaries	Ensure measurable objectives are produced as a method to measure the effectiveness of said boundary. These objectives are required to be consistently implemented across South African urban boundaries as a method to enhance enforcement.
Different application of boundaries in different provinces and municipalities	Ensure a uniform plan is developed that is supported by SPLUMA as a method to ensure consistency within the implementation of urban boundaries.
SPLUMA requirements are unclear about urban boundary application	Within the scope of SPLUMA, a detailed application of urban boundaries could be developed. Guidelines to the SDF may be altered as a method to obtain a more coherent urban boundary implementation process. This should be considered as part of future research.
Planners have varying perspectives regarding the implementation of urban boundaries	Ensure the planning profession (private and public sectors) and decision-makers are educated on the important role and function of the urban boundary. As well as better awareness on the advantages it has on rural and urban areas.
Urban boundaries are not recognised as a crucial planning tool	As mentioned the spatial planning in South Africa was based on the utilisation of boundaries, the relevance of boundaries are apparent. However, the legislative support of urban boundaries is insufficient. It's required to be addressed, the importance of the urban boundary has to be addressed this includes an indication of the role and function that the boundary has as a tool of

	urban planning, guiding future urban planning and vision of growth for the country's urban areas.
Development occurs uncontrolled	Urban development is required to be managed as it needs to occur within specifically delineated areas (Within the urban boundary). These areas are easier to control and manage as development intensifies.
Source: Own Compilation (2017).	

Recommendation 4: Urban boundaries as a broader contribution to planning approaches

Urban boundaries form part of a wide and complex system. As identified across several instances within the research urban boundaries are perceived as the most utilised urban growth management strategy (Anderson, 1999:4-5). Even though urban boundaries contribute to a large portion of the urban management system more strategies are required.

The importance of this may be the indication that to optimise urban growth management the urban boundary is required to be supported by various other strategies. These strategies are required to address the urban growth causes described within Table 2.3. Urban boundaries may be the most utilised, however, without support from other strategies it may be futile to assume effectiveness. The vision of national entities may affect the enforcement of urban boundaries and in turn positively affect the effectiveness.

In addition to the dependence of additional strategies, urban boundaries are interdependent on one another, as identified within the literature section assuming that the Gauteng Global City Region is formed the requirement for individual urban boundaries are obsolete, as without boundaries growth will occur. An urban boundary is required to be seen as a small piece on the 'war' against undesirable and uncontrolled urban growth, not as the entire urban management system. This research, however, agree that the urban boundary is an important spatial tool and, despite various intricacies, if planned and managed effectively, it could contribute to addressing contemporary urban problems relating to urban sprawl, unplanned growth and enhance the broader objectives of sustainable development.

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ANNEXURES

ANNEXURE 1: REFERENCE FOR GIS MAPS

Figure **5**.**2**: Locality map of City of Cape Town Metropolitan Municipality
Data layers: North West University Database: South African Provinces, South Africa: Municipalities. North West University, Potchefstroom: Generated by Thian Jansen, 8 August, 2017. Using: ArcGIS for Desktop [GIS]. Version 10.0. Redlands, CA: Esri, 2010.

Figure **5**.**14**: Locality map of Tshwane Metropolitan Municipality

Data layers: North West University Database: South African Provinces, South Africa: Municipalities. North West University, Potchefstroom: Generated by Gustav Havenga, 8 August, 2017. Using: ArcGIS for Desktop [GIS]. Version 10.0. Redlands, CA: Esri, 2010.

Figure **5**.**3**: Land Cover: Cape Town 1990

Data layers: North West University Database: South African Provinces, South Africa: Municipalities. South African Department of Environmental Affairs (data egis): Land cover 1990. North West University, Potchefstroom: Generated by Gustav Havenga, 22 August, 2017. Using: ArcGIS for Desktop [GIS]. Version 10.0. Redlands, CA: Esri, 2010.

Figure **5**.**15**: Land Cover: Tshwane 1990

Data layers: North West University Database: South African Provinces, South Africa: Municipalities. South African Department of Environmental Affairs (data egis): Land cover 1990. North West University, Potchefstroom: Generated by Gustav Havenga, 22 August, 2017. Using: ArcGIS for Desktop [GIS]. Version 10.0. Redlands, CA: Esri, 2010.

Figure **5**.**4**: Land Cover: Cape Town 2013

Data layers: North West University Database: South African Provinces, South Africa: Municipalities; Land cover 2013. North West University, Potchefstroom: Generated by Gustav

Havenga, 15 August, 2017. Using: ArcGIS for Desktop [GIS]. Version 10.0. Redlands, CA: Esri, 2010.

Figure **5**.**16**: Land Cover: Tshwane 2013

Data layers: North West University Database: South African Provinces, South Africa: Municipalities; Land cover 2013. North West University, Potchefstroom: Generated by Gustav Havenga, 15 August, 2017. Using: ArcGIS for Desktop [GIS]. Version 10.0. Redlands, CA: Esri, 2010.

ANNEXURE 2: QUESTIONNAIRE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

RESEARCH ETHICS PROJECT INFORMATION SHEET

UNIT FOR ENVIRONMENTAL SCIENCES AND MANAGEMENT, SUBPROGRAM 7:

Informed consent for participation in the research "Considering the intricacies of urban boundaries: The South African story" by Thian Jansen (24304700) as part of post-graduate research for the degree M.Art et Scien (Planning) at the North-West University

Purpose of the research:	Orientation of research topic: Urban Boundaries Relevance and value: Provide a comprehensible understanding of urban boundaries.
Research competence and expertise:	Post-graduate student introduction: T Jansen Study leader introduction: Prof EJ Cilliers Introduction of entity: *Urban and Regional Planning, Unit for Environmental Sciences and Management, North-West University.*
Research sponsor:	N/A
Requirements of participation:	State favourable risk-benefit ratio: Low risk, informative answers of concepts.
Statements of voluntary participation:	*Your participation in this study is voluntary. If you do not want to participate, please return the questionnaire to the researcher. You also do not have*

	to answer any question that makes you feel uncomfortable
Privacy statements:	Participant's responses are confidential. Confidentiality statement: Only the researchers involved in this study will see your responses
Submission information:	Electronic submission
Note of thanks:	Thanks for the participation, the received information is valued and will provide a better understanding of the complexities relating to urban boundaries.

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

RESEARCH ETHICS CONSENT FORM

UNIT FOR ENVIRONMENTAL SCIENCES AND MANAGEMENT, SUBPROGRAM 7:

Full title of Project: Considering the intricacies of urban boundaries: the South African story

Name, position and contact address of Researcher: Thian Jansen (Post-graduate Student)
thianj9@gmail.com

1.	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	
3.	I agree to take part in the above study.	
4.	I agree to the use of anonymised quotes in publications'	
5.	I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research.	

Name of Participant	Date	Signature
Thian Jansen		
Name of Researcher	Date	Signature
Name of Witness	Date	Signature

QUESTIONNAIRE FOR RESEARCH STUDY: CONSIDERING THE INTRICACIES OF URBAN BOUNDARIES: THE SOUTH AFRICAN STORY.

The questionnaire will take approximately 5 - 10 minutes of your time.

The rationale for this questionnaire:

Urban boundaries play a crucial role in terms of growth management and sustainable urban form. Urban boundaries, however, have various intricacies, questioning the function and relevance of such boundaries, especially in light of recent planning approaches in favour of integrated planning. This is also true in South Africa where the newly enacted SPLUMA calls for wall-to-wall LUS. This research aims to investigate the intricacies of urban boundaries from a South African perspective.

Section A: Applicant information

What is your highest qualification?	Click here to enter text.
What is your occupation?	Click here to enter text.
Province/s of work?	☐ Gauteng ☐ North West ☐ Limpopo ☐ KwaZulu - Natal ☐ Mpumalanga ☐ Eastern Cape

	☐ Free State ☐ Western Cape ☐ Other, please specify Click here to enter text.
In what sector are you currently employed?	☐ Private Sector OR ☐ Public Sector

Section B: Questionnaire

1. I am familiar with the following growth management strategies.
☐ Urban edge concept
☐ Urban development boundary
☐ Urban service area
☐ Urban fringe
☐ Urban expansion area
☐ Greenbelt
☐ Other, please identify. Click here to enter text.

2. I consider urban boundaries a complex concept.
☐ Strongly Agree
☐ Agree
☐ Disagree

☐ Strongly Disagree

3. The concept of urban boundaries are widely misunderstood.
☐ Strongly Agree
☐ Agree
☐ Disagree
☐ Strongly Disagree

4. The function of an urban boundary in South Africa is.
☐ To divide urban and rural areas
☐ To protect the rural environments
☐ To create political/municipal boundaries
☐ Prevent urban sprawl
☐ Preserve the urban environment
☐ Better services supply in the urban boundary
☐ Other, please identify. Click here to enter text.

5. I consider urban boundaries as an successful growth management strategy
☐ Strongly Agree
☐ Agree
☐ Disagree
☐ Strongly Disagree

6. I consider the South-African legislation specific in what is required of local authorities in the implementation of an urban boundary.
☐ Strongly Agree
☐ Agree
☐ Disagree
☐ Strongly Disagree

7. The implementation of urban boundaries are still relevant for South African local authorities?
☐ Strongly Agree
☐ Agree
☐ Disagree
☐ Strongly Disagree

8. Urban boundaries are effective in South African local authorities?
☐ Strongly Agree
☐ Agree
☐ Disagree
☐ Strongly Disagree

9. SPLUMA provides clear indication on…
☐ Urban boundaries as legal requirement
☐ The identification of urban boundaries

☐ Requirements for the identification of urban boundaries
☐ **Spatial representation of boundaries**
☐ **Timeframes related to urban boundaries**
☐ Various boundaries
☐ The concept of urban boundaries
☐ Intergovernmental decision-making relating to boundaries

10. Provide any Opportunities and Challenges of urban boundaries in South Africa.	
Opportunities	Challenges
Click here to enter text.	Click here to enter text.

11. Applicable solution/s to clarify the urban boundary concept would be to:
Click here to enter text.

12. To improve the practical applicability of an urban boundary would be to:
Click here to enter text.

13. The following aspects are the intricacies pertaining to the implementation of urban boundaries.
Click here to enter text.

Frequency Table		
Notes		
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Comments		
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Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
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ANNEXURE 3: PROCESSED RESULTS OF QUESTIONNAIRE

Statistics								
		A4	B2	B3	B4	B5	B6	B7	B8
N	Valid	31	31	31	31	31	30	30	31
	Missing	0	0	0	0	0	1	1	0

1 – Strongly Agree	2 – Agree	3 - Disagree	4 – Strongly Disagree

Frequency Table					
A4 – Question 1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	28	90,3	90,3	90,3
	2	3	9,7	9,7	100,0
	Total	31	100,0	100,0	

B2 – Question 2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	25,8	25,8	25,8
	2	15	48,4	48,4	74,2
	3	7	22,6	22,6	96,8
	4	1	3,2	3,2	100,0
	Total	31	100,0	100,0	

B3 - Question 3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	12	38,7	38,7	38,7
	3	12	38,7	38,7	77,4
	4	7	22,6	22,6	100,0

	Total	31	100,0	100,0	

B5 - Question 5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	9,7	9,7	9,7
	2	17	54,8	54,8	64,5
	3	8	25,8	25,8	90,3
	4	3	9,7	9,7	100,0
	Total	31	100,0	100,0	

B6 - Question 6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	3,2	3,3	3,3
	2	7	22,6	23,3	26,7
	3	18	58,1	60,0	86,7
	4	4	12,9	13,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

B7 - Question 7					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	29,0	30,0	30,0
	2	18	58,1	60,0	90,0
	3	2	6,5	6,7	96,7
	4	1	3,2	3,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

B8 - Question 8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	9	29,0	29,0	29,0
	3	13	41,9	41,9	71,0
	4	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

Descriptives		
Notes		
Output Created		01-AUG-2017 15:33:57
Comments		
Input	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	31
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.

	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=B2 B3 B5 B6 B7 B8 /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00,00
	Elapsed Time	00:00:00,00

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
B2	31	1	4	2,03	0,795
B3	31	2	4	2,84	0,779
B5	31	1	4	2,35	0,798
B6	30	1	4	2,83	0,699
B7	30	1	4	1,83	0,699
B8	31	2	4	3,00	0,775
Valid N (listwise)	29				

Crosstabs

Notes

Output Created		02-AUG-2017 12:48:58
Comments		
Input	Data	P:\Uitvoer\J\Jansen_Thian_Aug17\data.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>

	N of Rows in Working Data File	31
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
Syntax		CROSSTABS /TABLES=B2_grouped BY B3_grouped B5_grouped B6_grouped B8_grouped /FORMAT=AVALUE TABLES /STATISTICS=CHISQ PHI /CELLS=COUNT ROW /COUNT ROUND CELL.
Resources	Processor Time	00:00:00,05
	Elapsed Time	00:00:00,05
	Dimensions Requested	2
	Cells Available	524245

B2_grouped * B3_grouped

Crosstab

			B3_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
B2_grouped	Strongly Agree / Agree	Count	9	14	23
		% within B2_grouped	39,1%	60,9%	100,0%

	Strongly disagree / Disagree	Count	3	5	8
		% within B2_grouped	37,5%	62,5%	100,0%
Total		Count	12	19	31
		% within B2_grouped	38,7%	61,3%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.007[a]	1	0,935		
Continuity Correction[b]	0,000	1	1,000		
Likelihood Ratio	0,007	1	0,935		
Fisher's Exact Test				1,000	0,638
Linear-by-Linear Association	0,006	1	0,936		
N of Valid Cases	31				

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	0,015	0,935
	Cramer's V	0,015	0,935
N of Valid Cases		31	

B2_grouped * B5_grouped

Crosstab

			B5_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
B2_grouped	Strongly Agree / Agree	Count	16	7	23
		% within B2_grouped	69,6%	30,4%	100,0%
	Strongly disagree / Disagree	Count	4	4	8
		% within B2_grouped	50,0%	50,0%	100,0%

Total	Count	20	11	31
	% within B2_grouped	64,5%	35,5%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.992[a]	1	0,319		
Continuity Correction[b]	0,322	1	0,571		
Likelihood Ratio	0,967	1	0,326		
Fisher's Exact Test				0,405	0,281
Linear-by-Linear Association	0,960	1	0,327		
N of Valid Cases	31				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.84.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	0,179	0,319
	Cramer's V	0,179	0,319
N of Valid Cases		31	

B2_grouped * B6_grouped

Crosstab

			B6_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
B2_grouped	Strongly Agree / Agree	Count	6	17	23
		% within B2_grouped	26,1%	73,9%	100,0%
	Strongly disagree / Disagree	Count	2	5	7
		% within B2_grouped	28,6%	71,4%	100,0%
Total		Count	8	22	30

	% within B2_grouped	26,7%	73,3%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.017[a]	1	0,896		
Continuity Correction[b]	0,000	1	1,000		
Likelihood Ratio	0,017	1	0,897		
Fisher's Exact Test				1,000	0,623
Linear-by-Linear Association	0,016	1	0,898		
N of Valid Cases	30				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.87.					
b. Computed only for a 2x2 table					

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	-0,024	0,896
	Cramer's V	0,024	0,896
N of Valid Cases		30	

B2_grouped * B8_grouped					
Crosstab					
			B8_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
B2_grouped	Strongly Agree / Agree	Count	6	17	23
		% within B2_grouped	26,1%	73,9%	100,0%
	Strongly disagree / Disagree	Count	3	5	8
		% within B2_grouped	37,5%	62,5%	100,0%
Total		Count	9	22	31

	% within B2_grouped	29,0%	71,0%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.375[a]	1	0,540		
Continuity Correction[b]	0,026	1	0,873		
Likelihood Ratio	0,364	1	0,546		
Fisher's Exact Test				0,660	0,424
Linear-by-Linear Association	0,363	1	0,547		
N of Valid Cases	31				
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.32.					
b. Computed only for a 2x2 table					

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	-0,110	0,540
	Cramer's V	0,110	0,540
N of Valid Cases		31	

B5_grouped * B7_grouped					
Crosstab					
			B7_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
B5_grouped	Strongly Agree / Agree	Count	19	0	19
		% within B5_grouped	100,0%	0,0%	100,0%
	Strongly disagree / Disagree	Count	8	3	11
		% within B5_grouped	72,7%	27,3%	100,0%
Total		Count	27	3	30
		% within B5_grouped	90,0%	10,0%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.758[a]	1	0,016		
Continuity Correction[b]	3,126	1	0,077		
Likelihood Ratio	6,614	1	0,010		
Fisher's Exact Test				0,041	0,041
Linear-by-Linear Association	5,566	1	0,018		
N of Valid Cases	30				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.10.					
b. Computed only for a 2x2 table					

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	0,438	0,016
	Cramer's V	0,438	0,016
N of Valid Cases		30	

B6_grouped * B7_grouped					
Crosstab					
			B7_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
B6_grouped	Strongly Agree / Agree	Count	8	0	8
		% within B6_grouped	100,0%	0,0%	100,0%
	Strongly disagree / Disagree	Count	18	3	21
		% within B6_grouped	85,7%	14,3%	100,0%
Total		Count	26	3	29
		% within B6_grouped	89,7%	10,3%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.275[a]	1	0,259		
Continuity Correction[b]	0,200	1	0,655		
Likelihood Ratio	2,066	1	0,151		
Fisher's Exact Test				0,540	0,364
Linear-by-Linear Association	1,231	1	0,267		
N of Valid Cases	29				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .83.					
b. Computed only for a 2x2 table					

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	0,210	0,259
	Cramer's V	0,210	0,259
N of Valid Cases		29	

Frequencies

Notes		
Output Created		02-AUG-2017 16:04:02
Comments		
Input	Data	P:\Uitvoer\J\Jansen_Thian_Aug17\data.sav
	Active Dataset	DataSet6
	Filter	<none>
	Weight	<none>
	Split File	<none>

	N of Rows in Working Data File	31
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=Gauteng WesternCape /ORDER=ANALYSIS.
Resources	Processor Time	00:00:00,00
	Elapsed Time	00:00:00,01

Frequency Table

Gauteng

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	61,3	61,3	61,3
	No	12	38,7	38,7	100,0
	Total	31	100,0	100,0	

Western Cape

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	25,8	25,8	25,8
	No	23	74,2	74,2	100,0
	Total	31	100,0	100,0	

Crosstabs

Notes

Output Created		02-AUG-2017 16:04:48
Comments		
Input	Data	P:\Uitvoer\J\Jansen_Thian_Aug17\data.sav
	Active Dataset	DataSet6
	Filter	<none>
	Weight	<none>
	Split File	<none>

	N of Rows in Working Data File	31
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
Syntax		CROSSTABS /TABLES=Gauteng WesternCape BY B2_grouped /FORMAT=AVALUE TABLES /STATISTICS=CHISQ PHI /CELLS=COUNT ROW /COUNT ROUND CELL.
Resources	Processor Time	00:00:00,00
	Elapsed Time	00:00:00,01
	Dimensions Requested	2
	Cells Available	524245

Gauteng * B2_grouped

Crosstab

			B2_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
Gauteng	Yes	Count	14	5	19
		% within Gauteng	73,7%	26,3%	100,0%
	No	Count	9	3	12
		% within Gauteng	75,0%	25,0%	100,0%
Total		Count	23	8	31

	% within Gauteng	74,2%	25,8%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.007[a]	1	0,935		
Continuity Correction[b]	0,000	1	1,000		
Likelihood Ratio	0,007	1	0,935		
Fisher's Exact Test				1,000	0,638
Linear-by-Linear Association	0,006	1	0,936		
N of Valid Cases	31				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.10.					
b. Computed only for a 2x2 table					

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	-0,015	0,935
	Cramer's V	0,015	0,935
N of Valid Cases		31	

Western Cape * B2_grouped					
Crosstab					
			B2_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
Western Cape	Yes	Count	6	2	8
		% within Western Cape	75,0%	25,0%	100,0%
	No	Count	17	6	23
		% within Western Cape	73,9%	26,1%	100,0%

Total	Count	23	8	31
	% within Western Cape	74,2%	25,8%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.004[a]	1	0,952		
Continuity Correction[b]	0,000	1	1,000		
Likelihood Ratio	0,004	1	0,952		
Fisher's Exact Test				1,000	0,669
Linear-by-Linear Association	0,004	1	0,953		
N of Valid Cases	31				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.06.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	0,011	0,952
	Cramer's V	0,011	0,952
N of Valid Cases		31	

Crosstabs

Notes

Output Created		02-AUG-2017 16:05:17
Comments		
Input	Data	P:\Uitvoer\J\Jansen_Thian_Aug17\data.sav
	Active Dataset	DataSet6
	Filter	<none>

	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	31
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
Syntax		CROSSTABS /TABLES=Gauteng WesternCape BY B8_grouped /FORMAT=AVALUE TABLES /STATISTICS=CHISQ PHI /CELLS=COUNT ROW /COUNT ROUND CELL.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,02
	Dimensions Requested	2
	Cells Available	524245

Gauteng * B8_grouped

Crosstab

			B8_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
Gauteng	Yes	Count	3	16	19
		% within Gauteng	15,8%	84,2%	100,0%

	No	Count	6	6	12
		% within Gauteng	50,0%	50,0%	100,0%
Total		Count	9	22	31
		% within Gauteng	29,0%	71,0%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.178[a]	1	0,041		
Continuity Correction[b]	2,682	1	0,101		
Likelihood Ratio	4,142	1	0,042		
Fisher's Exact Test				0,056	0,052
Linear-by-Linear Association	4,043	1	0,044		
N of Valid Cases	31				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.48.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	-0,367	0,041
	Cramer's V	0,367	0,041
N of Valid Cases		31	

WesternCape * B8_grouped

Crosstab

			B8_grouped		Total
			Strongly Agree / Agree	Strongly disagree / Disagree	
WesternCape	Yes	Count	1	7	8

		% within WesternCape	12,5%	87,5%	100,0%
	No	Count	8	15	23
		% within WesternCape	34,8%	65,2%	100,0%
Total		Count	9	22	31
		% within WesternCape	29,0%	71,0%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.430[a]	1	0,232		
Continuity Correction[b]	0,553	1	0,457		
Likelihood Ratio	1,603	1	0,206		
Fisher's Exact Test				0,379	0,235
Linear-by-Linear Association	1,384	1	0,239		
N of Valid Cases	31				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.32.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	-0,215	0,232
	Cramer's V	0,215	0,232
N of Valid Cases		31	

LAST UPDATED: 20 FEBRUARY 2018