



# What Approach to Development in the Cape Winelands

*An identification & exploration into urban form -  
Planning for future growth and change in the  
Cape Winelands Region*

Dissertation presented of part fulfilment of the degree of Master of City and Regional Planning

School of Architecture, Planning and Geometrics  
University of Cape Town  
October 2016

**Barend Frederik Lutz de Wet** – Bachelor of Architectural Studies  
(University of the Free State)

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

I hereby:

- (a) Grant the University free license to reproduce the above thesis in whole or in part, for the purpose of research;
  
- (b) Declare that:
  - (i) the above thesis is my own unaided work, both in conception and execution, and that apart from the normal guidance of my supervisor, I have received no assistance apart from that stated below;
  
  - (ii) Except as stated below, neither the substance nor any part of the thesis has been submitted in the past, or is being, or is to be submitted for a degree in the University or any other University.
  
  - (iii) I am now presenting the dissertation for examination for the Degree of Master of City and Regional Planning.

## Acknowledgements

I hereby express my sincere gratitude to the following people who assisted me throughout this dissertation:

- *Professor David Dewar*

I would like to thank my research supervisor, David Dewar, for his assistance, guidance, inspiration and theoretical knowledge.

- *My Parents*

I hereby extend my sincere gratitude towards my parent, Francois & Hanchen de Wet, for their enduring support and encouragement throughout this dissertation and MCRP programme.

- *Nicky Sasman*

For her incredible guidance and mentorship during 2013 – providing a solid foundation before embarking on this journey.

- *Juan-Pierre Havenga*

For his ongoing support and motivation throughout the process.

- *MCRP students*

I would like to thank my fellow MCRP students for their camaraderie and support throughout the course of the MCRP programme. I wish them success in their future planning careers.

- *The City of Cape Town's Department of Spatial Planning and Urban Design*

For their financial support without which this research would not have been possible, is gratefully acknowledged.

- *Janine Meyer*

For her assistance in administration matters throughout the course.

## Plagiarism Declaration

1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the Harvard convention for citation and referencing. Each contribution to, and quotation in, this dissertation from the work(s) of other people has been attributed, and has been cited and referenced.
3. This dissertation is my own work.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Name: Barend Frederik Lutz de Wet

Signature 

Signed by candidate
---------------------

Date: 23 October 2016

## ABSTRACT

*What Approach to Development in the Cape Winelands Region*

*Author: Barend Frederik Lutz de Wet, 211 Trafalgar Place, Regent road, Fresnaye, Cape Town*

*Date: November 2016*

The urban form of many South African cities is often considered inequitable, fragmented, and unsustainable. Modernist planning ideology and Apartheid social policies left cities with a highly inefficient urban form and structure that reflects fragmentation, separation and a high degree of lateral urban sprawl. These ideologies have led to the development of mono-functional settlements which are often environmentally sterile. This dissertation aims to find a new approach to development in the Cape Winelands region. It investigates the role of urban form, and proposes a new model for the integration of wilderness, rural and urban space. The study is motivated by the research question: what approach to development in the Cape Winelands? The focus is on the inequitable and inefficient urban structure and form, as well as urban growth management strategies for the emerging global challenges. High levels of growth which is accompanied by increasing levels of poverty, unemployment and inequality enable the critical action for a new approach toward planning. These challenges is also causing uncontrolled urban development that is encroaching into valuable agricultural land and sensitive environmental areas. Moreover the struggle for densification in the core of Stellenbosch - heritage constraints is contributing to the uneven distribution of densities that lead to an unsustainable urban form and use of space. The dissertation seeks to direct public and private capital investment, and to channel growth, but equally protecting wilderness and valuable arable land.

## LIST OF FIGURES

- Figure 1.1: *Location and context of Stellenbosch Municipality*
- Figure 1.2: *Local context of the Stellenbosch Municipality*
- Figure 3.1: *Diagram indicating the challenges faced by the Cape Winelands region*
- Figure 3.2: *Urban growth of Stellenbosch*
- Figure 3.3: *Diagram indicating the direction of urban sprawl in Stellenbosch*
- Figure 3.4: *Diagram indicating the fragmented urban fabric in Stellenbosch*
- Figure 3.5: *Diagram illustrating the center of gravity causing traffic congestion in Stellenbosch*
- Figure 4.1: *Diagram illustrating the Triple Bottom Line of Sustainable Development*
- Figure 4.2: *Principles of Central Concern*
- Figure 4.3: *Normative Principles & Norms and Standards*
- Figure 4.4: *Performance Principles*
- Figure 5.1: *Stellenbosch's growth pattern since its origin up to 1710*
- Figure 5.2: *Stellenbosch growth pattern in 1770*
- Figure 5.3: *Stellenbosch in 1817*
- Figure 5.4: *Stellenbosch in 1859, illustrating the growth pattern i.e. space*
- Figure 5.5: *Stellenbosch in 1905 (see railway on west boundary)*
- Figure 5.6: *Geology of Stellenbosch Municipality*
- Figure 5.7: *Slope Analysis*
- Figure 5.8: *Soils of Stellenbosch Municipality*
- Figure 5.9: *Mean annual runoff in Stellenbosch Municipality*
- Figure 5.10: *Catchments in the Stellenbosch Municipality*
- Figure 5.11: *The two major river systems in the Stellenbosch Municipality*
- Figure 5.12: *State of the rivers in Stellenbosch Municipality*

- Figure 5.13: *Conservation areas in the Greater Stellenbosch Municipality*
- Figure 5.14: *Broad vegetation types and their distribution in Stellenbosch Municipality*
- Figure 5.15: *Irreplaceability of habitats in Stellenbosch Municipality*
- Figure 5.16: *Composite Constraints and Informants*
- Figure 5.17: *Conceptual diagram of existing movement routes*
- Figure 5.18: *Sub-regional Road Network* Figure 5.19: *An overview of the Stellenbosch Economy*
- Figure 5.20: *Gross Value Added Growth*
- Figure 5.21: *Gross Value Added, Sector Composition 2011*
- Figure 5.22: *Employment trends*
- Figure 5.23: *Sectoral economic growth and employment composition*
- Figure 5.24: *Formal and informal employment: Manufacturing*
- Figure 5.25: *Formal and informal employment: Construction*
- Figure 5.26: *Formal and informal employment: Trade*
- Figure 5.27: *Formal and informal employment: Finance*
- Figure 5.28: *Formal and informal employment: Government*
- Figure 5.29: *Employment trends by wards*
- Figure 5.30: *Crime levels in the Stellenbosch Municipality*
- Figure 5.31: *Illustrates the correlation between informal dwelling type housing and unemployment in each ward of the Municipality*
- Figure 5.32: *Average Income per Household per year*
- Figure 5.33: *Educational attainment by ward (% of Stellenbosch)*
- Figure 5.34: *Land-use and land coverage in Stellenbosch Municipality*
- Figure 5.35: *Land-use potential and suitability assessment*
- Figure 6.1: *Concept for Stellenbosch's space transition*
- Figure 6.2: *Sub-regional Concept – Self Sustain Urban Rooms*

- Figure 6.3: *Beads on a String Concept, illustrating urban villages along the R44*
- Figure 6.4: *Ecological Corridor Concept*
- Figure 6.5: *Conceptual diagram of proposed connector route- indicated in yellow*
- Figure 7.1: *Spatial Development Framework for Stellenbosch*
- Figure 7.2: *Identification of Precinct Areas for Detail Design*
- Figure 7.3: *Precinct A - detail Spatial Plan*
- Figure 7.4: *Precinct B – detail Spatial Plan*
- Figure 7.5.1: *Precinct C - detail Spatial Plan*
- Figure 7.5.2: *Detail Design - Precinct C (mixed-use intensification and restructuring)*
- Figure 7.6: *Precinct D – detail Spatial Plan*
- Figure 7.7: *Precinct E - detail Spatial Plan*
- Figure 7.8: *Proposed Public Transport network*
- Figure 8.1: *Indication of Precinct E - location in terms of spatial context*
- Figure 8.2: *Location of Precinct- E*
- Figure 8.3: *Movement Hierarchy*
- Figure 8.4: *Public Transport Network and Stops correlation with Institutional Precinct*
- Figure 8.5: *Land use allocation*
- Figure 8.6: *Public and Green Space & NMT route network integrating with it*
- Figure 8.7: *Babylon Storen is an excellent example of an urban food garden.*
- Figure 8.8: *Proposed Urban Park layout and Concept*

- Figure 8.9: *Indication of Character Areas regarding the Public space Network*
- Figure 8.10: *Indication of Character Area regarding Public Space, Squares and Court Yards*
- Figure 8.11: *Illustrates Solid and Voids enabling a strong parti, which is the core and classified as POS, & three view cones indicating the desired spatial form for the area*
- Figure 8.12: *View cones of desired Spatial Form*
- Figure 8.13: *Proposed Housing Typologies*
- Figure 8.14: *Indication of desired Housing Typologies*
- Figure 8.15: *Building Height Restrictions & identification of Section A-A*
- Figure 8.16: *Section A-A, illustrating the desired Spatial Environment created by Building Heights*
- Figure 8.17: *Desired Spatial Form, created by Solid and Void Space*
- Figure 8.18: *Public to Private Space Transition*
- Figure 8.19: *Newman defensible space concept*
- Figure 8.20: *Carving up the Super Block*
- Figure 1: *Applying the concept of the Super Block in context*
- Figure 8.22: *Subdivision of land parcels - cadastral map*

## LIST OF TABLES

*Table 5.1: Public conservation areas in Stellenbosch Municipality*

*Table 5.2: Private conservation areas in the Municipality*

*Table 5.3: Natural and Rural Heritage Sites in the Municipality (source: Stellenbosch EMF, 2014).*

## LIST OF ACRONYMS

BRT	Bus Rapid Transit System
EIA	Environmental Impact Assessment
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
LED	Local Economic Development
MSA	Municipal Systems Act
NEMA	National environmental Management Act
NMT	Non-Motorised Transport
NDP	National Development Plan
PSDF	Provincial Spatial Development Framework
SDF	Spatial Development Framework
SPLUMA	Spatial Land Use and Management Act

## GLOSSARY

**ACCESS:** Areas of high access are places which can easily be reached by large numbers of people.

**ACCESSIBILITY SURFACE:** The patterns of point and lines of greater or weaker access.

**ACCESSIBILITY:** The ability of people to move around an area and reach places and facilities, including elderly and disabled people, those with young children and those encumbered with luggage or shopping.

**BASIC GOODS AND SERVICES:** There are goods and services which essentially come about to support the population of the settlement itself.

**BIODIVERSITY:** The whole variety of life encompassing all genetics, species and ecosystem variations, including plants and animals.

**BOULEVARD:** A wide street in a town or city, typically one lined with trees.

**CHARACTER:** The appearance of any rural or urban location in terms of its buildings, landscape and the layout of streets and open spaces, often giving places their own distinct identity.

**CONTEXT:** The setting of a site or area, including factors such as traffic, activities and land uses as well as landscape and built form.

**CONTEXTUAL FRAMEWORK:** This is the first stage in a package of plans approach where the client expresses its understanding of the problem and non-negotiable fixes.

**COSMIC LANDSCAPE:** There are landscapes where there are few natural informants and a sense of place needs to be created through the process of settlement formation.

**DENSITY:** A measurement of the degree to which a piece of land or a site is built on. Often expressed as a number of units, or habitable rooms, per hectare.

**DENSIFICATION:** The processes by which densities are systematically increased over time.

**DESIGN CONCEPT:** An expression of one of the basic design ideas at the heart of an urban design framework, design guide, development brief or a development.

**FORM:** The layout (structure and urban grain), density, scale (height and massing) and appearance (materials and details) of development.

**FRAGMENTATION:** A formal situation where the urban fabric occurs in a number of relatively unrelated pockets.

**FRONTAGE:** The part of a building that faces public areas and typically includes the main entrance. Architecturally it is normally the most interesting part of a building.

**GATEWAY:** Elements such as bridges, buildings, spaces, junctions or landmarks that announce arrival to the town, or one of its quarters.

**GRADATION:** Progressive change.

**HINTERLAND:** The regional surrounding a settlement from which it draws its inputs and into which it releases its waste.

**HIERARCHY:** Different elements of public structure can be defined internally in terms of their levels of importance thus for example higher order movement routes are those of greatest significance.

**HUMAN SCALE:** A scale in which human beings feel comfortable with the primary relationship between the height of elements defining a space and the width of the space.

**INFRASTRUCTURE:** Basic services necessary for development to take place, for example, roads, electricity, sewerage, water, education and health facilities.

**INTEGRATION:** The collective consideration of different sectors influencing and affected by spatial structure (horizontal between sectors, and vertical between levels of government).

**LANDMARK:** A building or structure that stands out from its background by virtue of height, size or some other aspect of design.

**LAYOUT:** The way buildings, routes and open spaces are placed or laid out on the ground in relation to each other.

**LEGIBILITY:** The ease with which a place can be understood and navigated. Highly legible places have obvious routes and are easy to pass through.

**MIXED USE:** Provision of a mix of land uses, such as residential, community and leisure uses, on a site or within a particular area. A mix of uses within a building, on a site or within a particular area. 'Horizontal' mixed uses are side by side, usually in different buildings. 'Vertical' mixed uses are on different floors of the same building.

**MOVEMENT:** People and vehicles going to and passing through buildings, places and spaces

**NODE:** Node is simply a term used for the idea of an activity center or an area where traffic, money, information, or other flows come together.

**OPEN SPACE:** All open space of public value, including not just land, but also areas of water (such as rivers, canals, lakes and reservoirs) which offer important opportunities for sport and recreation and can act as a visual amenity.

**PACKAGE OF PLANS:** This is a methodological term which refers to the desirability of creating a range of plans at different scales in relation to any one problem in order to obtain consistency of thought across

scale. The highest order plan provides the minimum fixes which gives direction to the next order of plan and so on.

PERIMETER BLOCK: The preferred block structure, whereby the fronts of buildings sit to the rear of the pavement and face the street, and the backs face each other around a courtyard.

PLACE-MAKING: The physical organisation of a site prior to settlement occurring as well as actions directed at creating an uniqueness for an area.

PUBLIC GOOD: The good, welfare or interest of the community of the whole rather than a narrow sectoral group of individuals.

PUBLIC INSTITUTIONS: Buildings such as police stations, town halls, theatres and libraries, which are essential elements in the townscape.

RESIDUAL SPACE: This is space that has simply been 'left over'. It has no structural meaning and frequently leads to problems.

ROMANTIC LANDSCAPE: A landscape where uniqueness derives from the landscape itself. In these cases design follows, it does not lead.

SENSE OF PLACE: An experience of uniqueness and memorability, with a rejection of uniformity and standardisation. Sense of place is influenced by the natural landscape as well as the characteristics of urban form.

SPRAWL: An urban form where the landscape is covered by a blanket of low density settlements.

TRANSIT ORIENTATED DEVELOPMENT: Intensification of settlement around significant transportation stops or interchanges.

TREAD LIGHTLY AREAS: Areas where small amounts of development – the impact of which are very low and could be considered.

URBAN RESTRUCTURING: Bring about significant changes to the structure of a settlement.

URBAN STRUCTURE: The two-dimensional spatial organisation of settlements created by the primary elements of public structure (green space, movement of all mods, public institutions, hard urban space and utility services).

URBAN FORM: The term is used in two ways: two-dimensional and refers to the shape or footprint of the settlement; three-dimensional totality of a settlement made up of its built elements and its voids.

URBAN CORRIDOR: A thick band of continually intensifying urban fabric around an important spine carrying public transportation.

# CONTENTS

CHAPTER 1: INTRODUCTION .....	18
1.1 Problem .....	18
1.2 Purpose.....	19
1.3 Location of Study Area.....	20
1.4 Design Method .....	21
1.4.1 Design Process .....	22
1.4.2 Design Approach .....	23
1.5 Structure of the Document.....	24
CHAPTER 2: SOUTH AFRICAN URBAN CHALLENGES .....	26
2.1 Generic Challenges of South African Cities.....	26
2.2 Causes of Generic Challenges.....	27
2.2.1 Pre-1994 Causes .....	28
2.2.2 Post-1994 Causes:.....	31
2.3 Spatial Consequences .....	35
2.4 Need for a New Approach: Structure and Form.....	36
CHAPTER 3: LOCATING THE PROBLEM IN THE WINELANDS .....	38
3.1 Spatial Evolution .....	39
3.2 Contextual Background.....	40
3.3 Structure & Form .....	41
3.4 Urban Growth.....	45
CHAPTER 4: GIVING DIRECTION.....	49
4.1 Values.....	49
4.2 Ethics.....	51
4.2.1 Environmentalism .....	51
4.2.2 Humanism .....	52

4.3	Nature of Plan .....	52
4.3.1	Programmatic Approach .....	52
4.3.2	Non-Programmatic Approach .....	54
4.4	Performance Qualities.....	59
4.5	SPATIAL PRINCIPALS.....	66
4.5.1	Principles for Positive Settlement-making.....	66
4.5.2	Principles of Continuity .....	67
4.5.3	Principle of Discontinuity .....	69
4.5.4	Principle of Externalisation .....	70
4.5.5	Principle of Concentration along Movement Routes.....	70
4.5.6	Principle of Accommodating Sameness & Diversity.....	70
4.7	Legislative Context.....	71
4.7.1	Law.....	71
4.7.2	Policy Informants .....	75
4.7.3	Fragmented Spatial Planning and Land-use Management Systems.....	76
4.8	INTERNATIONAL TENDENCIES .....	76
4.8.1	Urbanisation and Global Population Growth .....	77
4.8.2	Climate Change.....	78
4.8.3	Water Security.....	79
4.8.4	Food Security.....	80
4.8.5	Fossil Fuel Depletion .....	82
4.8.6	Economic Globalisation.....	82
CHAPTER 5: STELLENBOSCH AND ENVIRONS .....		84
5.1	The Structural Evolution of Stellenbosch.....	84
5.2	Bio-Physical Analysis .....	91
5.2.1	GEOLOGY.....	91
5.2.2	TOPOGRAPHY .....	91
5.2.3	SOILS .....	91
5.2.4	CLIMATE.....	93

5.2.5	HYDROLOGY .....	95
5.2.6	BIODIVERSITY.....	99
5.2.7	COMPOSITE BIO-PHYSICAL CONSTRAINTS AND INFORMANTS MAP.....	106
5.3	MOVEMENT ANALYSIS .....	107
5.4	CULTURAL LANDSCAPE .....	108
5.5	DEMOGRAPHICS & SOCIO-ECONOMICS.....	109
5.6	Agricultural Land Potential & No-Go Areas for Development .....	120
CHAPTER 6. CONCEPTUAL FRAMEWORK .....		123
CHAPTER 7: SPATIAL DEVELOPMENT FRAMEWORK .....		129
CHAPTER 8: DETAIL DESIGN FOR IDENTIFIED PRECINCT – E .....		145
CHAPTER 9: IMPLEMENTATION.....		166
CHAPTER 10: CONCLUSION.....		170

# CHAPTER 1: INTRODUCTION

## 1.1 Problem

The urban form of many South African cities is often considered inequitable, fragmented and unsustainable. Pre-1994 South African cities were shaped by the Modernist planning ideology and Apartheid social policies that left cities with a highly inefficient urban form and structure that reflects fragmentation, separation and a high degree of lateral urban sprawl. These ideologies have led to the development of mono-functional settlements which are often fragmented and environmentally sterile. These settlements, particularly those created for the disadvantaged members of society, are characterised by low levels of service and high levels of inconvenience; they generate enormous amounts of movement at great cost in terms of money, time, energy and pollution; they are inconvenient and expensive for inhabitants and the quality of their public environments is appalling. There is little evidence of a cohesive spatial environment which integrates natural and urban activities and structures.

These formal characteristics of development are exacerbated by the current high levels of urbanisation, population growth, urban in-migration, climate change and resource depletion that many urban areas in the country are experiencing. These urban issues have major socio-economic and spatial consequences resulting in high levels of inequality, poverty and unemployment, especially affecting the urban poor who are forced to live on the peripheral areas of cities. The poor find it extremely difficult to access socio-economic opportunities, which are primarily located in urban cores and affluent areas. A major problem is inefficient and costly public transport that essentially trap many poor households in their remote locations (Jenks & Burgess, 2000). Presently, poor public transportation systems and low local thresholds are not conducive to local socio-economic generation. Consequently, South African cities are in a state of crisis and are known to be amongst the most inefficient cities in the world. In addition, as the skewed urban system generates a large amount of movement, of which most are fossil-fuel based, the country is extremely vulnerable to fuel price increases and carbon-induced climate change.

The inevitable growth and change of cities is increasingly being driven by the private sector, often with unpredictable and undesirable consequences for the city and its people (Turok and Watson 2001), causing further fragmentation of the urban structure. Current development trends are reinforcing spatial inequalities and fragmentation, with major cost implications for the poor population and the city (Turok 2001; Turok and Watson 2001).

Like many other towns and cities in South Africa, Stellenbosch is facing these crises. Presently, the town is experiencing significantly high levels of growth which has been accompanied by increasing levels of poverty, unemployment and inequality. Based on the modernist and apartheid ideologies of low density

development, the urban structure of Stellenbosch has created sustainability problems including urban sprawl, fragmentation and separation of functions, land uses and activities. Furthermore, the struggle for densification, as a result of heritage constraints, has contributed to the uneven distribution of densities that has led to an unsustainable urban form and use of space. Presently, Stellenbosch cannot provide basic services of an acceptable and sustainable standard to all its residents. In addition, uncontrolled urban development is encroaching on agricultural land and on sensitive environmental areas causing the destruction of wilderness and valuable agricultural land. This raises the question to what extent urban development in terms of urban sprawl is going to occur before local food security is diminished. Most of the environmental and social consequences that result from the form of South African cities suggest that the current pattern of urban development is not sustainable (Jenks & Burgess, 2000).

These problems, as well as the emerging global challenges of urban growth management faced by many cities around the world, exacerbate the inequitable and inefficient urban structure of Stellenbosch.

Spatial planning interventions are required to direct public and private investment in a manner which enables a more equitable and sustainable outcome. This is the purpose of the Spatial Development Framework (SDF) which aims to provide a long-term vision of the desired spatial form and structure and a plan for future growth and change, and where capital investment should be focused.

## 1.2 Purpose

The purpose of this dissertation is to guide future growth and change in the Stellenbosch Municipal area of jurisdiction. The primary aim is to provide a rational and coherent framework for the structuring of new urban development and for the restructuring of existing urban areas. The framework aims to provide ways to safeguard valuable agricultural land and to ensure that wilderness, urban areas and rural areas are functioning in a dynamic balance.

This framework will aim to enhance and preserve the unique heritage, landscape and cultural characteristics of the Stellenbosch Municipality and aim to restore degraded places while also creating high-quality places in accordance with the principles of good 'place-making' and sustainable development. The overall aim is to decrease rapid urban sprawl, reinforce structure and to decrease traffic congestion.

The Spatial Development Framework proposes an opportunistic plan which emphasizes the growth of the town with regards to the role that smart municipalities have in the new world economy. This role is to act as facilitator and enabler rather than contractor and enforcer. The SDF particularly focuses on the

idea of where development should *not* go, and aims to address the traffic congestion challenges Stellenbosch is faced with. In effect, the SDF defines the emerging 'capital web' (Crane, 1960).

The various planning frameworks presented in this dissertation do not demand that everything should be planned and controlled: they require only certain physical actions be taken to inform and guide decisions towards a more sustainable urban form (Dewar & Uytendogaardt, 1991).

### 1.3 Location of Study Area

The study area is located in the Cape Winelands region, in the Western Cape Province of South Africa. The Cape Winelands region shares its borders with the West Coast, Overberg and Cape Metropolitan regions. The town of Stellenbosch possesses a progressively vibrant village character and is surrounded by cultivated land, mountain ranges and rivers that contribute to its uniqueness. The town is also known for its high quality education, hosting some of South Africa's top tertiary institutions.

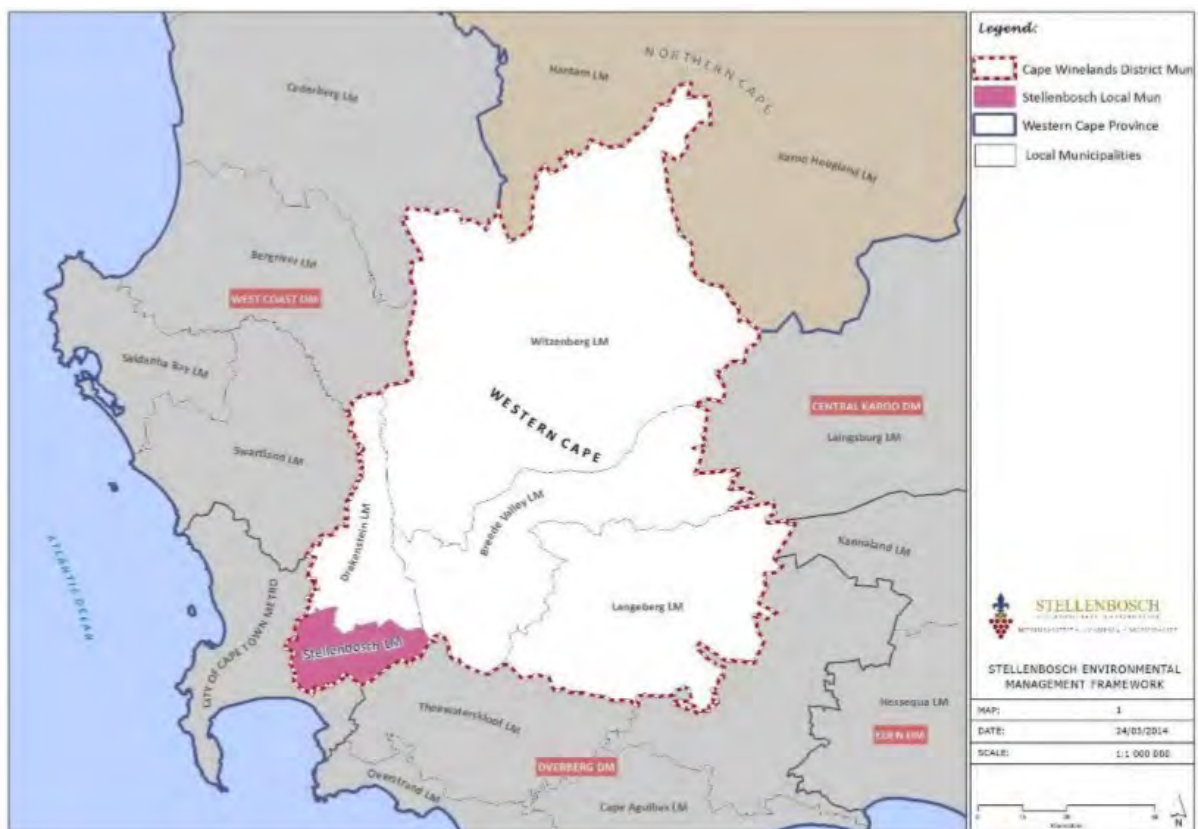


Figure 1.1: Location and context of Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

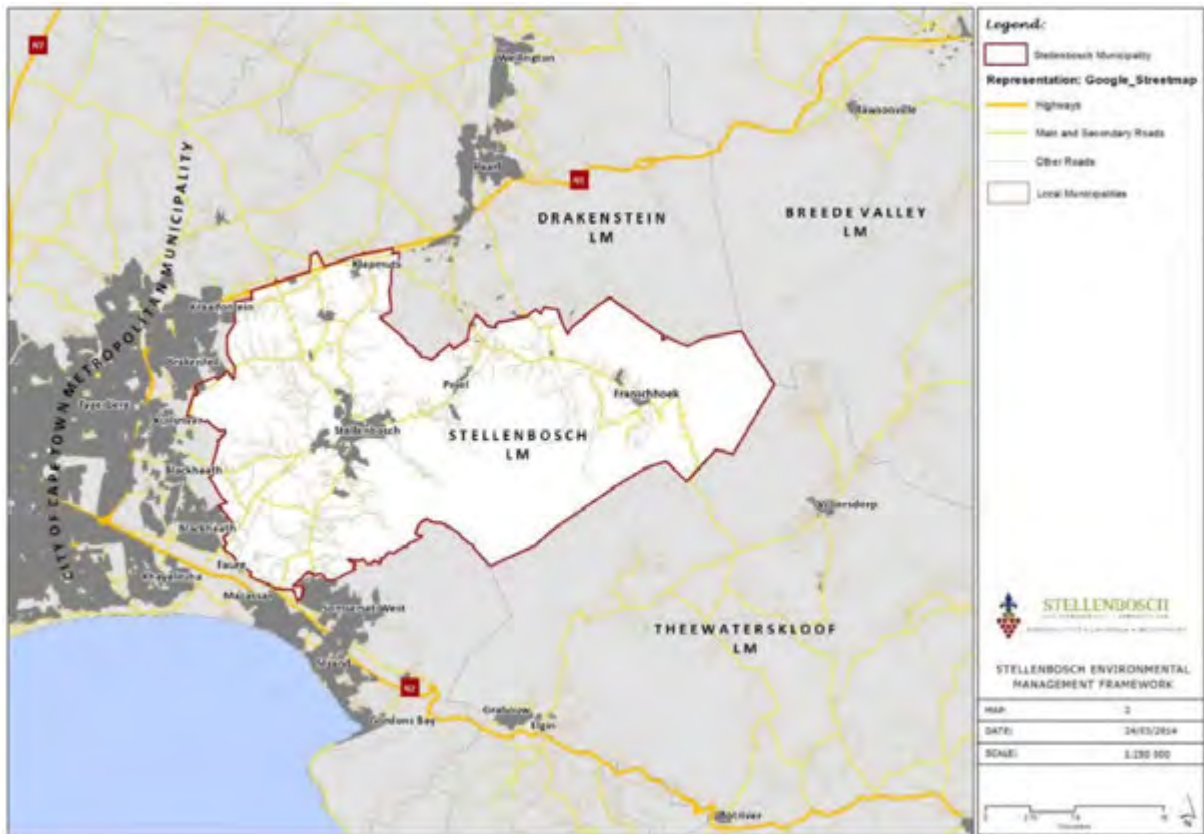


Figure 1.2: Local context of the Stellenbosch Municipality (Stellenbosch EMF, 2014).

## 1.4 Design Method

This section presents an overview of the design method, process and approach which is used in this dissertation. Design method is concerned with how things ought to be and specifies ways in which the foreseeable future can be made possible. The designer needs to be able to predict the effects of the proposed design, as well as to specify the various actions that are required to bring the proposed design into effect. The objective of designing becomes less concerned with the final product and more concerned with the process of establishing settlements and the changes that society is expected to make in order to adopt the final product and also to benefit from it (Jones, 1970). In addition, design method is fundamentally influenced by the designer's values and ethics. These values and ethics are made explicit at the start of the planning process to ensure that the design is consistent with these values and ethics (Behrens & Watson, 1996).

Human development "is focused and based on the satisfaction of fundamental human needs, on the generation of growing levels of self-reliance, and on the construction of organic articulations of people

with nature and technology, of global processes with local activity, of the personal with the social, of planning with autonomy and of civil society with the state" (Max-Neef, 1991:8). The focus of planning method and participation should be on the response to basic human needs.

#### 1.4.1 Design Process

An interrelated approach to urban development stems from a methodological sequence which underpins any physical design decision. This sequence includes the aspects of need, programme, idea, context and process. Need refers to urban actions and decisions which relate to the needs, requirements and priorities of urban dwellers and is based on two ethical pillars, namely, humanism and environmentalism (Dewar and Uytendogaardt, 1991). Dewar and Uytendogaardt (1991) state that "need" has no form, but has implications for form. To this extent, human needs are of two kinds: individual needs that should be considered in order for individuals to lead enriching lives, as well as the actions which create contexts that enable people to improve their circumstances (for example, in the face of high levels of poverty and unemployment, there is a need to generate small-scale activities - self-generated economics). As these people have limited options but to seek survival through self-generated employment in the informal sector of the economy, the "need" to find places to manufacture, trade or provide services at low overheads is vital. Another important need is concerned with access: all urban inhabitants should enjoy easy and equitable access to urban opportunities.

The second type of "need" refers to collective or group need, which uses a collective set of requirements when people live socially. A crucial starting point in terms of human needs is to begin with the 'lowest common denominator', (that is, people moving on foot, people with limited personal resources and technologies and people with disabilities). Need then gives rise to programme, which translates "need" into the language of space. As in the case of need, "programme" has no form, but rather it has implications for form (Dewar and Uytendogaardt (1991). Additionally, there are two levels of "programme". The first and highest level of "programme" is performance expectations that should guide the design. The second and lower level of the meaning of "programme" is focused on land uses and quantities (Dewar, forthcoming). It refers to the space budget which initiates the project, in this instance, land use patterns are conceptualized, separated and distributed in space. Furthermore, it involves quantitative space demands being calculated on the basis of a range of thresholds, with the end product being a land use schedule (for example, "x number of households can support y primary schools" and so on) (Dewar, forthcoming:12).

"Idea" identifies the spatial relationships, which contribute, to "need". It is considered to be the "how" of the programme: it illustrates how desirable qualities can be achieved. In other words, it is the diagram of desired spatial relationships, which underlies the spatial plan (Dewar & Uytendogaardt, 1991). "Context" is the application of idea to place and involves the translation of generic ideas into specific forms. To this

extent, it ensures that the form of specific physical and social realities of a particular context animate these ideas.

Design methodology is also process-orientated, as the plan initiates and facilitates rather than prescribes. To this extent, the plan should also indicate a minimum set of spatial interventions, rather than attempting to be entirely comprehensive (Behrens & Watson, 1996). At each scale, plans should provide the minimum strong actions necessary to give direction, while allowing maximum freedom for the ingenuity and creativity of both designers and decision-makers, in order to enrich the emerging realities. Plans should also be value driven: the outcome must be the creation of urban environments, which meet the requirement of human need and environmental sustainability. These values must be made explicit at the start of the planning process to ensure that goals, objectives and plans are consistent with these values. Finally, design methodology involves cyclical refinement, which is a shift away from a process that is linear and technical to one that is normative and critical. This ensures that the planner's responsibility is to make value-driven decisions. As with any planning process, it involves both value judgement and repetition in bringing together of all contextual and conceptual investigations, end-user participation and testing of ideas at various scales (Behrens & Watson, 1996).

This is reiterated by Dewar and Uytenbogaardt (1991) who state that although all physical design engages with these steps, it need not be done in a sequential manner. The process is thus cyclical with understandings gained in one place, feeding back into, and leading to adjustments in others.

#### 1.4.2 Design Approach

The design method used in this dissertation follows a 'package of plans' approach. Prior to formulating the Spatial Development Framework and the identified precincts, a series of analysis were undertaken at different scales to understand the holistic urban situation which Stellenbosch Municipality faces. The analysis and design-led processes are undertaken at four different levels:

- Sub-Regional context
- Stellenbosch town context
- Site and environs context
- Precinct context

This approach incorporates different design layers, starting with broader conceptual design principles leading to detail implementation proposals. It guides the reader through the boarder conceptual movement and open space systems, down towards the fine-grained detail precinct designs which incorporate potential subdivisions and building typologies.

The first layer of the design process includes the conceptual layers of the spatial framework. These incorporate: the super block structure and establishment of the activity spines, the placement of the open space hierarchy and the connection of these open spaces via the higher order movement system.

The conceptual layers are then refined to develop the spatial framework for the Stellenbosch municipality. This is presented as a set of plans depicting the open space and movement systems, the Integrated Rapid Transit (IRT) system, which includes Bus Rapid Transport (BRT) and rail way transport modes, the Non-Motorised Transport (NMT) system, the internal green system, the intensities and mixed land-use allocations; and the distribution of public institutions and public urban spaces.

The final layer in the package of plans approach is the identification and planning of a precinct area that provides a detailed design structure of space which include, green systems, institutional buildings, commercial, residential and movement of all modes. This includes the breakdown of four superblocks to a sub-divisional level and the allocation of building typologies, landmarks and densities.

The implementation procedure is the final stage within the planning process and involves an enabling strategy with key projects for bringing the various development proposals into reality.

The biggest advantage of the 'package of plans' approach is that it ensures consistency of thinking across scales and enables decisions to be made within the framework, which allows the municipality and developer to gain greater insight into understanding the most critical issues in the area. The development control for the project can also be handled in a more flexible and interactive manner, which will assist with moving larger scale projects more swiftly into the implementation phase (Wilkinson, 1994).

## 1.5 Structure of the Document

The first 5 chapters are descriptive, contextual and theoretical. Chapter 2, discusses the generic urban challenges in South Africa, the major causes of these urban problems and the spatial consequences for South African cities. It lays down the theoretical argument that gives direction to chapters 6 to 10.

### CHAPTER 2: SOUTH AFRICAN URBAN CHALLENGES

This chapter investigates and evaluates the current challenges South African cities are faced with and the causes that lead to these challenges with regards to spatial structure and form. In addition, the impact these consequences have for future growth planning is discussed.

### CHAPTER 3: LOCATING THE PROBLEM IN THE WINELANDS

This chapter analyses the dominant spatial and development trends that have informed the growth of the Cape Winelands region and the physical urban patterns that have resulted from these.

#### CHAPTER 4: GIVING DIRECTION

This chapter outlines a brief philosophical position about the values and ethics that the researcher used in the compilation of this dissertation. It further outlines the various ideas that were used in formulating the Spatial Development Frameworks, how urban growth should be approached and sets the direction of urban growth management. It seeks to define the needs that should be satisfied through urban growth management and the various urban qualities that contribute towards positive urban environments.

#### CHAPTER 5: SITE AND ENVIRONS

Chapter five focuses on analysing Stellenbosch and environs green systems, public facilities, public spaces and movement systems. This chapter includes and identifies constraints and informants for the broader site, which aims to direct areas suitable for future development.

#### CHAPTER 6: CONCEPTUAL FRAMEWORK

Chapter 6 summarises the main conceptual changes that are necessary to create a more compact and sustainable city. It also deals with the spatial concepts and principles that gives direction to the Conceptual Framework, and sub-sequent direct the SDF.

#### CHAPTER 7: STELLENBOSCH SPATIAL DEVELOPMENT FRAMEWORK

Chapter 7, is the proposed SDF for Stellenbosch and is illustrated by means of the five structuring elements.

#### CHAPTER 8: PRECINCT PLAN

This chapter identifies the precinct area, and gives a detailed plan for the identified site, as well as urban design guidelines and principles for a safe, sustainable and well run environment.

#### CHAPTER 9: IMPLEMENTATION

The implementation procedure is the final step within the planning process. It involves an enabling strategy for putting the various development proposals into reality, with some key projects that should be use as catalysers.

#### CHAPTER 10: CONCLUSTION

This chapter provides a brief overview of the Spatial Development Framework and states the way forward.

## CHAPTER 2: SOUTH AFRICAN URBAN CHALLENGES

This chapter highlights the generic challenges, causes and consequences of the dominant spatial patterns resulting from Pre-1994 and Post-1994 planning ideologies and calls for a new approach to planning. It argues that it is no longer sensible to continue with business as usual and that significant change is required to overcome the present socio-spatial inequality with which South African cities are grappling (Dewar et al, 2012).

In order to understand the current spatial patterns in South African cities, attention must be given to the historical processes that shaped them. This will be described in terms of 'Pre-1994 Causes' which are primarily based on the first two influential ideologies, namely, Modernism and Apartheid (Jenks & Burgess, 2000), and 'Post-1994 Causes' which aim to look at challenges beyond the Apartheid City and Modernist planning approach. Subsequently, this will lead to a discussion of the spatial consequences which have arisen as a result of the pillars underpinning the urban challenges that persist in South African cities today. The chapter will conclude with a problem statement proposing the need for a new approach. It calls for the restructuring of settlements with regards to structure and form.

### 2.1 Generic Challenges of South African Cities

The vast majority of South African rural and urban settlements, regardless of scale, are inherently dysfunctional (Bernstein, 1991). This is largely a response to the historical developmental paths. It is now widely recognised that these practices which have given rise to current settlement problems are unsustainable, unequitable and fragmented (Dewar, forthcoming). Nevertheless, once these settlement patterns are formed, the urban fabric outlives many generations of users and the patterns which have resulted from these historic practices represent the urban legacy of current and future generations (Dewar et al, 2012). In addition, this has resulted in a situation in which South African cities are having to grapple with the issue of informal settlements and meeting the needs of the urban poor with regards to both housing and employment opportunities.

The dysfunctional form and structure of current South African cities have been moulded primarily by five major forces. These forces are *firstly*, the planning and design ideology of modernism, *secondly*, the political ideology of separate development (Apartheid), *thirdly*, informal processes of settlement-formation, *fourthly*, widespread private developer domination (Dewar, forthcoming), and *finally* National housing policy problems. These forces are creating sustainability, equality and integration challenges (ibid.) and shall be discussed in the next section of this chapter.

An understanding of the current challenges of South African settlements is essential for any Spatial Development Plan (SDP) (Dewar et al, 2012). The main challenge facing new settlement is to contribute

towards the improvement of historical settlement performance (ibid.). Furthermore, the challenge for spatial planning in South Africa is to balance long-term visions of sustainability, integration and socio-economic transformation, with immediate needs for infrastructure and housing delivery (Odendaal, 2007). However, as noted by Harrison et al. (2007), we need to be particularly clear about what planning can, but even more importantly, cannot, achieve within the current political, economic and global urbanization realms.

Urbanization is a relatively new phenomenon for South Africa in comparison with many other countries in the developed and developing worlds. Rapid urbanization and urban growth has mainly occurred over the last 50 years in South African towns and cities. Just over a hundred years ago, only a small proportion of the population lived in cities. It is estimated that more than 60% of the total population are now living in urban areas and this figure is increasing rapidly (World Bank, 2015). An implication of these urbanization dynamics is that the rates of poverty, inequality and unemployment are very high and appear to be increasing (Dewar & Uytendogaardt, 1991). Today, the country can be viewed as an urbanized society with the majority of urban growth and development happening around the five main metropolitan areas of Johannesburg, Cape Town, Durban, Port Elizabeth and Pretoria.

It has been estimated that the unemployment rate in larger cities ranges from between 25-40% (World Bank, 2015). South Africa is also said to have one of the highest gini-coefficients in the world, which is characterised by the large socio-economic divide and the degree of marginalization prevalent in the country. The figure for the year 2011 was 65% (ibid.). The Gini-coefficient index measures equality based on the level of income distribution in a country with 0% representing 'perfect equality' and an index of 100% implying 'perfect inequality'.

Furthermore, the effects of globalization, the decline of the manufacturing sector and the growth of the tertiary economic sectors have increasingly presented further challenges to the urban poor in terms of finding employment opportunities. This points to the staggering unemployment rate of 25% (Statistics South Africa, 2015), and presents further evidence for the deep inequalities in South Africa. To this end, Smith (2003) asserts that many South Africans have no option but to seek out alternative means of livelihoods through informal self-employment and settlement formation, as they are excluded from many socio-economic opportunities as a result of the previous planning ideologies which caused fragmented employment opportunities. The struggle for employment opportunities in South African cities is furthermore exacerbated by urban in-migration and natural population increases, which together mean an ever growing population of the urban poor (Dewar, 2000).

## 2.2 Causes of Generic Challenges

This section outlines the causes which have brought about the urban challenges South African cities are grappling with. The first part of this section discusses the 'Pre-1994 Causes'; the second part moves

beyond these causes to discuss the 'Post-1994 Causes' that contribute to the current urban challenges and concerns about settlement-making.

### 2.2.1 Pre-1994 Causes

#### **MODERNISM**

The introduction of the urban precepts of modernism marked an extraordinary moment in the history of urban settlement-making. Urban modernism first took root in Europe and the USA but rapidly spread around the world, including to developing countries such as South Africa. It arguably achieved its purest articulation in the Athens Charter of CIAM in 1934 (Gold, 1998). The Charter set out a new international urban agenda. For the first time, professionals believed they had the key to the 'good urban life' and they turned their back on centuries of traditional settlement-making ideologies in order to create a new world. This alternative approach to settlement-making rested on the belief that it would unlock what was thought to be "the good life" for all and to create a "sense of community" (Dewar, forthcoming: 4).

Central to the modernist movement is functionalist thought, which is dominated by concerns with efficiency and technology. Efficiency is largely defined in technological terms, with urban settlements seen as "machines". Urban life is compartmentalised into broad categories of activity (live, work, play, movement), resulting in spatial separation of these activities.

This ideology on which the South African planners rested their practices at the time, was seen as a progressive and extraordinary radical style compared to the traditional and orthodox incremental processes of settlement-making (Dewar, forthcoming).

The urban model of modernism was based on a number of key ideas.

The first idea was the idea of land-use separation, particularly the separation of live, work, play and movement – in order to reduce functional conflict (Dewar et al, 2012). This also included the separation of vehicular and pedestrian movement with a conscious de-emphasis of the structural and spatial role of the street for walking, playing, street-based trading and social interaction (ibid.). Even the great French architect, Le Corbusier, who was one of the fathers of modernism, stated, "We must kill the corridor street". This resulted in the public domain becoming a lost space, and the street's purpose as a place of interaction between people lost its sense of zeitgeist.

The second idea was the belief that technology would set society free (Dewar et al, 2012). From an urban perspective, the most important technologies were the privately owned motor car, which allowed for relatively untrammelled lateral spread or sprawl, and the introduction of the elevator, which allowed for vertical expansion, creating skyscraper buildings with little attention given to the public realm on which it was situated. From this time on, the private motor car was seen as the primary mode of urban movement and settlements were scaled to the car, despite the fact that an increasing majority of

households never owed one. The unproblematic equation of legitimate concerns about accessibility with mobility, particularly vehicular mobility, and the consequent elevation of freeways, and other forms of limited access routes effectively built barriers across the urban fabric (ibid.). The introduction of freeways significantly changed patterns of access and movement. Unlike the arterial route where access is taken directly off the route, leading to mixed-use corridors, the freeway system access is taken infrequently at points of access and egress adjacent to, but not on, the route itself. The consequences have inevitably led to introverted space creation of forms, such as shopping centres, office parks, theme parks and the like, associated with the access and egress points.

The third idea was a deep belief in industrialization, the use of mass production and the use of materials of mass production, to create new forms suited to the future (Dewar et al, 2012). According to this idea, the world could, and should, look increasingly the same.

The fourth idea was the belief that the process of settlement-making should be based on a positivist rational comprehensive approach which entailed programmatic calculations for pre-determined quantities and locations of settlement elements (Dewar & Todeschini, 1999). This approach is firmly rooted in blue print, top-down planning which is driven by scientific 'facts', as opposed to traditional vernacular approaches to settlement-making, allowing for choice and complexity (ibid.). This is evident in South African cities where the engineering discipline still has a firm hand in urban management practice and decision making processes. The concern is that engineers are primarily driven by "technical efficiency", as opposed to spatial, social or environmental considerations (Dewar, forthcoming: 5).

In addition to the planning model which was exported around the world, two other concepts adopted from other social movements, such as the Garden Cities movement, have been widely accepted (Dewar et al, 2012). Arguably an example of this concept is the suburb, Pinelands, in Cape Town.

The first concept was the neighbourhood unit. In terms of this, large settlements were regarded as being made up of a collective of smaller discrete neighbourhood units – free standing cells evocative of the idea of an 'urban village', surrounded by countryside and linked to each other through rapid transportation (Dewar et al, 2012). In this concept, residential dwellings were clustered into discrete 'cells' or neighbourhoods, which focused inwardly on community facilities in the belief that this promotes a sense of community. It was believed that this form could capture the best of built urban and rural living (ibid.). Each cell was conceived as being relatively self-contained in terms of employment, social and commercial services (ibid.). The cells were not integrated into the broader urban system but were simply linked by movement infrastructure (Jenks & Burgess, 2000).

The second concept was suburbia for all, a strongly anti-urban ethos (Dewar et al, 2012). The idea of a single-story, free-standing dwelling on its own plot was entrenched as the image of the 'good urban life', even in the case of the lowest income communities where, for economic reasons, plot sizes have been cut to the extent that there is very little 'house' and almost no 'green' devote space (ibid.). Whereas historically, green space was public open space – as defined by a collective of buildings and their related

elements (ibid.). The low-rise, free-standing building on its own plot became the building block of settlements and became the ideology of the good urban life (Jenks & Burgess, 2000) and sense of community. In these processes of reduction, however, the model itself is seldom questioned. The concept of a single dwelling on its own plot of land, as well as separation of urban activities, have both contributed to low density urban sprawl (Dewar, 2011).

## **A P A R T H E I D**

The second dominant ideology shaping South African settlements has been the political movement of 'Apartheid'. Pre- and during the Apartheid regime, South African planners adopted urban management theories of separate development hailing from the United States of America and various other Western European countries (Dewar et al, 2012). Although, functionally, elements of spatial separation had been in existence since colonial times, the policy was formalized when the Nationalist Government of DF Malan came into power in 1948. At the heart of the policy was the idea of 'separate but equal' development. However, its practices and underlying principles would prove to be the normative base on which the Apartheid planning model was based. Separate but equal development was embedded and proved to be one of the main drivers contributing to the various urban challenges with regards to form and structure that South African cities are faced with today.

According to this concept, different race groups would be allocated their own 'homelands' in national space and develop relatively autonomously within these. Africans could only enter into 'white' areas if they had a pass signifying that their labour was required. They did so as contract labour and were repatriated to their 'homeland' at the end of the contract. Spatially, the beliefs of the modernist model accorded well with the requirements of apartheid, but the model was grotesquely distorted on a number of counts:

Firstly, the concept of separation of land uses was extended to include separation on the grounds of race (something which the modernist model never advocated) (Dewar et al, 2012). Secondly, the scale of separation was massively distorted. People were moved over very large distances (one-way commutes of over four hours were not uncommon in parts of the country) away from places of employment and urban opportunity (ibid.). Further, it was primarily people of colour who were forced to move to the peripheries of urban areas. Since there is a high correlation between race and class in South Africa, it was and still is the poorest people who travel the furthest to employment opportunities. Thirdly, the model of the 'neighbourhood unit' or 'urban village' accorded with it, in the sense that access to, and egress from, these cells occurred at limited places only and these could be relatively easily controlled and secured in the event of social unrest (ibid.). Fourthly, the suburban model of housing has prevailed, even though, for cost reasons, cuts have occurred to the point where there is almost no house and certainly almost no 'green'. Fifthly, the image of the free-standing village in the countryside was perverted into one of pockets of (largely mono-functional housing) development surrounded by 'buffer

strips' – rather than being a positive asset, the green space became desolate wastelands – frequently dangerous spaces and dumping grounds for rubbish (ibid.). Finally, rail ways, freeways, natural assets (rivers, mountains and cultivated areas) were used as buffers between the different areas, especially to segregate white areas from non-white areas. This is evident in the number of natural and man-made buffers and movement infrastructure constraints moving from the Cape Flats in Cape Town towards the north, to Durbanville.

### 2.2.2 Post-1994 Causes:

As Apartheid came to an end, it was evident that the established spatial patterns and urban form and structure would exist for some time (Smith, 2003). Smith (2003) argues that segregation would no longer be based on racial exclusions, but rather on affordability and that little structural change to the apartheid city could be expected. He further notes that "class divisions" would now expand on the racial separation inherited from the Apartheid city and would produce a city characterized by what has been referred to as "deracialized apartheid" (Smith, 2003:30). In addition, the post-1994 period in South Africa has been characterized by the mismanagement of urban planning as well as policy and institutional complexities, where a strong move toward an integrated urban management model becomes increasingly difficult.

This section highlights some of the most influential causes that contributes to the post-1994 era.

#### ***Policy and Institutional Complexities***

Since the beginning of the post-1994 period, a frantic era of policy formation, institutional actions, and post-apartheid urban policies have contributed to urban fragmentation. Spatial planning policies in South Africa are preventing any meaningful spatial integration, and are increasing the fragmented nature of South African cities. In the form of Green & White papers and legislative frameworks relating to urban development, the lack of integration between legislative documents, lead to multi-dimension developmental approval processes (Dewar & Todeschini, 2004). Broad statements from policy-makers about the need for urban integration are not being translated into consistent action because of a lack of political will and institutional capacity (Turok, 2001). In addition, the vast amount of "red tape" is hindering the transformative processes towards integration.

Institutional practices and market forces reinforce spatial divisions, which has costly implications, particularly for the urban poor, who constitute the majority of the population, and the wider urban economy. Dewar & Uytendogaardt (1991) argue that institutional complexities in terms of urban management in South Africa result from the fact that different line-function departments operate in isolated silos, with little integration or communication taking place. Pieterse (2009) reinforces this argument. He argues that the contradicting and competing roles of sectoral departments, such as, transport, housing, primary health care, and economic development are driven by powerful national

government departments who often operate in isolation and are not well integrated with one another. As a consequence, while the rhetoric has changed, there has been little operational change.

The fact that South African planning authorities use mono-functional planning mechanisms for land use such as "zoning" as a primary tool to regulate urban management, reinforces the prescriptive and technical approach. It stems directly from the rational comprehensive approaches to planning, which have failed to create more integrated and vibrant cities.

### ***Housing Policy***

South African housing policy continues to reinforce the apartheid low-cost housing suburban model which results in low-densities, segregation, fragmentation (Wilkinson, 1998) and urban sprawl with mono-functional separation of land-uses. Housing policy still promotes the one-house-once-plot housing typologies and creates a sterile, fragmented and inhumane environment (Dewar & Todeschini, 2004:25). In addition, the model results in infrastructural inefficiencies for servicing and maintenance.

Many low-income settlements provide evidence of this as they take the form of a sprawling, non-differentiated "blanket" of housing. There is a lack of integration between dwellings and street space and, fundamentally, a total lack of concern about urban space. Low-cost housing is still primarily located on peripheral areas of land on the outskirts of South African cities as a result of housing agencies seeking the cheapest possible land for optimising profits (Huchzermeyer, 2001). Vacant land parcels are a common sight in these neighbourhoods due to a lack of funding and mono-functional zoning for public facilities such as education, health-care and industrial uses.

Contributing to this is unrealistic promises by the national government regarding the roll-out of housing. The once-off housing subsidy and limited capacities of the public sector have led the local government to focus on quantity rather than quality in meeting the housing demands of the urban poor (Huchzermeyer, 2001). This results in major cost cutting per dwelling unit which ultimately leads to sub-standard housing with high maintenance and administration costs. Capital subsidy schemes also usually fall short of providing dignified housing with reasonable living space and privacy (ibid.). There is a need for an alternative approach where the people have greater choice, "to decide what their needs actually are rather than some public agency" (Wilkinson, 1998: 227). The National Planning Commission (2011) which recognizes the need for settle restructuring, as well as the influential 'Breaking New Ground' document (2004) which calls for fundamental changes to settlement structure (Dewar, Louw & Povall, 2012). This is reinforced by Huchzermeyer (2001) who states that the most commonly applied version of subsidized housing in South Africa requires home-ownership of a standardized housing unit which is translated into large-scale developments of uniform, free-standing houses in a standardized township

layout, located on the urban periphery. Therefore, the need for mixed-use intensification is central to overcoming mono-functional zoning.

### ***The Property Market***

The South African property market contributes to the already fragmented urban form of South African cities. High rates of urbanization and population growth lead to housing prices increasing sharply. This rising demand creates a 'steep price gradient' which makes upwards mobility nearly impossible for the poor who cannot afford to reside in higher income areas with better access to socio-economic opportunities (Turok & Watson, 2001). This in turn leaves the urban poor stuck in a poverty trap on the periphery of South African cities (ibid.).

### ***Processes of Informal Settlement Formation***

Because of the inflexible apartheid policies of segregated development and the inability of the state to meet the rising demand for housing, the extent of informality in South African cities is increasing. This situation is worsened by rapid urbanization and rising unemployment. The process informing the current structure and form of South African cities has been that of informal settlement formation.

Generically two very different types of processes can be identified. The first type is land occupation which has occurred within the main city structure. This has taken the form of backyard shacks, located within existing cadastral boundaries of plots in formal townships, sometimes for rent but frequently free on the basis of kinship and social ties. The second type of process has been the illegal occupation of large land parcels on both public and private land. The dominant locational imperative of these settlements has simply been land availability or the desire by the occupants to avoid harassment by authorities, as opposed to being logical locational responses to urban structure (Dewar, forthcoming). Frequently, once established, these settlements have elicited an infrastructural reaction by public authorities, primarily for public health reasons. In a real sense, they are shaping the form of the evolving city structure, as opposed to simply being responsive to it. The reason underpinning the processes of informal settlement formation area is commonly that it represents the cheapest and only entry point into the housing markets (Dewar & Todeschini, 2004).

### ***Private Developer-led Investment***

Economic globalization and neo-liberal policies have brought changes to the allocation of land-use rights in South African cities with the controls continuously becoming more market-driven. These changes have given private developers greater freedom to disregard the public good and to exploit and maximise profits (Dewar, forthcoming). As developers tend to develop gated communities, living

opportunities and the flow of people through urban space are minimised, isolating the development from its context and continuing with the modernist planning model of introverted communities.

Turok & Watson (2001) assert that in the post-apartheid years, even though local plans and policies aimed to create integrated and equitable urban areas, private investment, in both the services sector and in up-market real estate, avoided the poorer areas (ibid.). Developers aim to maximise profits by seeking out the cheapest land available, normally located on the periphery of cities, or even outside the urban edge (such as the case of Wes-Cape in Cape Town). Private investments gravitate to upper class suburban areas and a few centralised locations such as business parks, resulting in further fragmentation (Turok, 2001) and has grown in affluent suburban areas, which benefit from freeway access and attractive scenic views. This in turn, contributes to urban sprawl, fragmentation and the loss of arable land & wilderness.

This type of development, driven by the private sector, inclemently leap frogs' poorer areas, forcing development away from these areas, despite the best efforts of Spatial Development Frameworks to attract private investment to poorer areas (Turok & Watson, 2001). This has resulted in an increasing division in terms of economic and social development in South African cities. Fragmentation, which increasingly presents difficulties for the poor to access these opportunities, illustrates the way in which public investment continues to be concentrated in high income areas while low income subsidized housing is focused on low income areas (Turok, 2001).

Turok (2001: 2358-2360) argues that these practices are driven by four generic dynamics:

- Decentralisation, where private-driven investment shifts away from the traditional CBD areas towards suburban centres such as Century City in Cape Town and Sandton in Johannesburg.
- Deconcentration which involves a net shift in economic opportunities away from established business centres towards a more dispersed pattern of development.
- Northern drift where centres of economic opportunities tend to gravitate northwards from the traditional economic centres of South African cities.
- Differentiation, where there is a growing tendency for economic centres to specialise in different sectors and to locate in the areas which fit their market profile.

### ***Continuing Emphases on Investment in Road Infrastructure***

The continuing emphasis on investment in road infrastructure exacerbates the skewed urban form of South African cities. Public sector investment in road infrastructure is aimed at giving the poor access to economic opportunities rather than implementing integrated infill low-cost housing developments which places the poor closer to places of employment opportunities (Turok & Watson, 2001). This is taxing, as

the poor have limited access to private motor vehicles and is the largest user of public transportation, such as railways, buses and mini-bus taxi's. In addition, the public transport system, which does not meet the purpose of providing appropriate and affordable public transport to and from 'live', 'work' and 'play' opportunities, is the consequence of the sprawling, fragmented urban form.

## 2.3 Spatial Consequences

This section identifies some of the most pressing consequences caused by the prevailing spatial problem of space, fragmentation and separation.

The low density sprawling form of development has driven over agricultural and wilderness landscapes, destroying potentially productive land and land of high amenity at an alarming rate. Densities are too low to support adequate levels of social facilities and other forms of social back-up. In terms of the widely employment neighbourhood unit concept, each cell is dependent on its own internal resources for social and commercial support. When the population of the cell is almost ubiquitously poor, levels of support, are by definition, low and, in the event of not having a facility, it is difficult for the people to access essential social services in other cells. Of particular importance is the fact that densities are too low to create vibrant local markets, which are pre-conditions for the emergence of rigorous growth in micro and meso-cell generated economic activity and for the diversification of urban economies. This is particularly worrying at a time when structural unemployment is increasing globally and where increasing numbers of households will have no option but to generate their own livelihoods through their own ingenuities and efforts. Facilities are embedded, not exposed. Additionally, as the demographic structure of the cell changes over time, the demand for facilities changes. Unsurprisingly, a feature of the urban landscape in South African settlements is the phenomenon of some facilities being overcrowded, while other are under-utilized.

The current urban form and structure generates enormous amounts of movement at great cost in terms of household budgets, productive time, infrastructural investment, freight efficiency, air pollution and greenhouse gas emissions. Further densities are too low and sprawling to enable the provision of viable and efficient public transportation. Most of the movement generated is road based, particularly in private vehicles, which is the worst possible form in terms of greenhouse gas emissions (Assaf, 2011), traffic congestion and movement-related mortalities. The use of mini-bus taxis as a viable means of public transport is only slightly less inefficient and pollution generating.

Transport cost assume a disproportionately high amount of household budgets, negating alternative investment opportunities such as housing. Ironically, it is the poor who have to move the furthest. The choice faced by poor people is stark. On the one hand, they are virtually forced to purchase a car. However, many households are unable to afford the purchase prices of vehicles. In addition, almost by definition, the vehicles which the poorest can afford are the oldest and least efficient in terms of energies

consumption and green-house gas emissions. Frequently, many of the household are literally trapped in space. They are unable to travel even to seek out employment opportunities or to pursue the opportunities of the city. They are almost entirely excluded from the city. In short, settlement form is significantly aggravating the key societal problems of poverty and inequality which underpin most development challenges in the country.

What has become clear, however, is that market forces are not going to reverse these tendencies without conscious, overt intervention – if anything, these forces are aggravating the problem. The situation is clearly non-sustainable. This is increasingly widely recognized. The recent National Plan produced by the National Planning Commission, recognizes the imperative for settlement restructuring (2011). Similarly, the influential “Breaking New Ground (BNG)” document reviewing housing policy (2004) calls for fundamental changes to settlement structure.

South Africa is not alone in facing problems associated with sprawl, fragmentation and separation. What is not adequately realized, however, is that the problem in South Africa is amongst the worst in the world. A recent United Nations Review of the World Cities (2008) found that South African settlements are the most inequitable and (by implication) the most inefficient in the world.

## 2.4 Need for a New Approach: Structure and Form

It is clear that urban settlements in South Africa are not responsive to the economic realities of the majority of people: in this sense, they are non-sustainable. A new approach to planning is necessary in South African cities today and is discussed in this section.

With the advent of the “new South Africa”, it is imperative that the effects of these ideologies are reversed. The great challenge facing urban decision-makers is to restructure settlements, at a variety of scales, to make them more efficient, equitable and sustainable (Dewar et al, 2012). To achieve this, significant improvement in urban performance must be made. It involves inter alia the following interrelated dimensions: compaction of urban settlements to contain sprawl; increases in densities to support economic and social opportunities; intensification in a structural way to ensure the viability of public transport; integrating neighbourhood unit structures by promoting activity routes which re-link urban grain and fabric together; integration of different modes of transport to ensure efficient switching of modes and to ensure that each mode plays the role it is geared to do; and the formation of a more decentralised pattern of social and economic opportunities (Dewar and Uytendogaardt, 1991; Dewar & Todeschini, 2004; Dewar, 2009). These achievements are not a short-term proposition, it will take decades to be realised. They are, nevertheless, achievable and will require sustained investment over a long path.

The challenge is to create a framework for settlement-making which will enrich life in settlements and serve as an instrument for urban reconstruction and development. This has already been accepted in

policy terms. The government's Urban Development Framework (South Africa, 1997) calls for "the physical, social and economic integration of our towns and cities" and stresses the need for higher density, more compact and, in terms of land use, more mixed-use settlements.

## CHAPTER 3: LOCATING THE PROBLEM IN THE WINELANDS

Stellenbosch is a town of extremes and in many ways reflects both the best and worst of South Africa and the legacy of the past. The winelands region is faced with a number of challenges. Foremost, social imbalances caused by the fragmented urban fabric of the apartheid and modernism planning model, need to be addressed. Additional challenges include urban sprawl, lagging performance as well as political instability. Urban reform in the region needs to achieve multiple objectives which include but are not limited to: the restructuring of settlements, the protection of valuable agricultural land, the re-evaluation of existing public transport routes and ensured growth in employment opportunities.

The current situation in the Stellenbosch is unsustainable, as sectors, system and structure do not integrate in a suitable manner. Figure 3.1 illustrates the consequences and effects of urban sprawl on the environment as a whole.

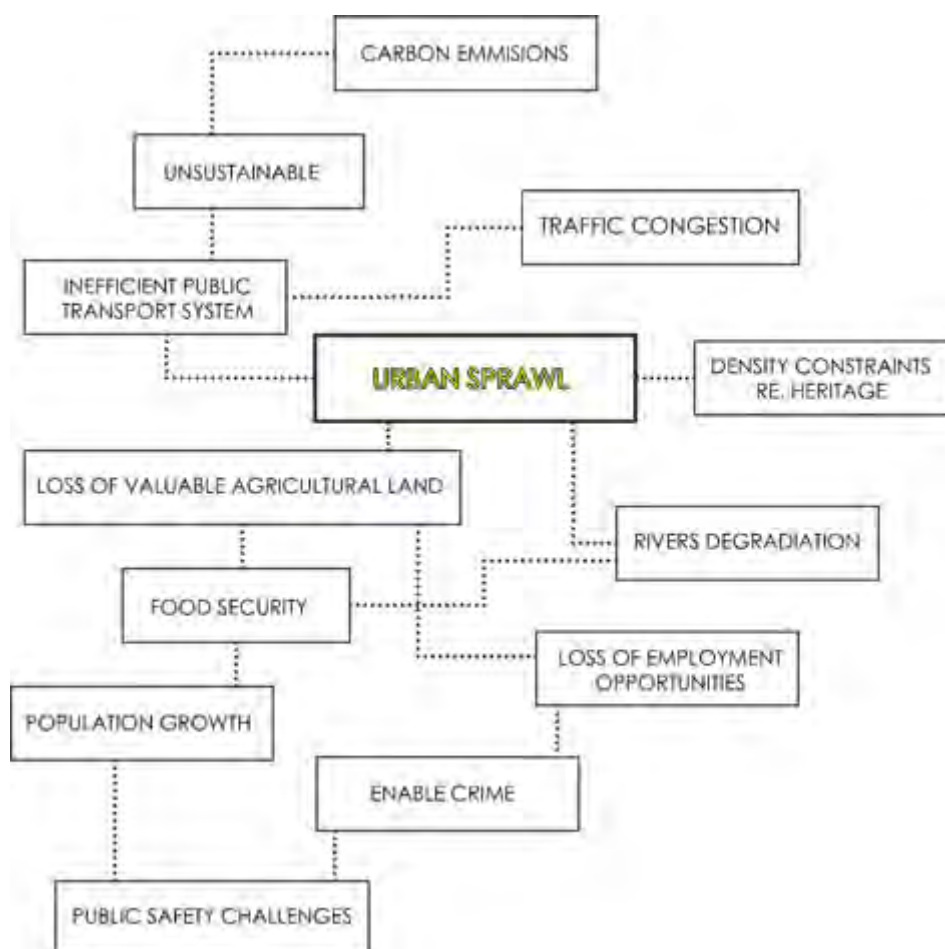


Figure 3.1: Diagram indicating the challenges faced by the Cape Winelands region (source: Author, 2016).

### 3.1 Spatial Evolution

One of the key features of the Winelands is the historic pattern of locating settlements along transport and river systems. In 1679, the search for more arable land around Cape Town led to the discovery of the valley which Stellenbosch is situated in today (Stellenbosch Drie Eeue, 1979). Simon van der Stel came across the Eerste River where he set up camp on an island formed by a double course of the river. The diversity of the hills, the richness of the grass, the patches of evergreen forest trees and the river of sweet water, all delighted his eye and mind. He called the site *Van der Stel se Bosch* (*Van der Stel's bush*), and was determined on founding a settlement in an area so obviously suited to habitation of man. Within a month, the first settler arrived and subsequently the hamlet became a prosperous farming area. The first farmers settled around the Eerste River in 1683 where after the area was classified as an agriculture colony without any town centre at the time. Two years later, in 1685, the town of Stellenbosch was declared (Stellenbosch Municipality, 2014). After the arrival of the farmers, a group of French colonists arrived in Stellenbosch bringing with them an advanced knowledge of viticulture. Over the years, wine production in the area grew significantly and ultimately ensured that Stellenbosch became the centre of the South African Wine industry and contributed to the local economy.

Figure 3.2, illustrates the growth of Stellenbosch from 1679 up to circa 2000. This growth pattern is arguably shaped by the topography and river corridors, and created a star-form urban pattern.

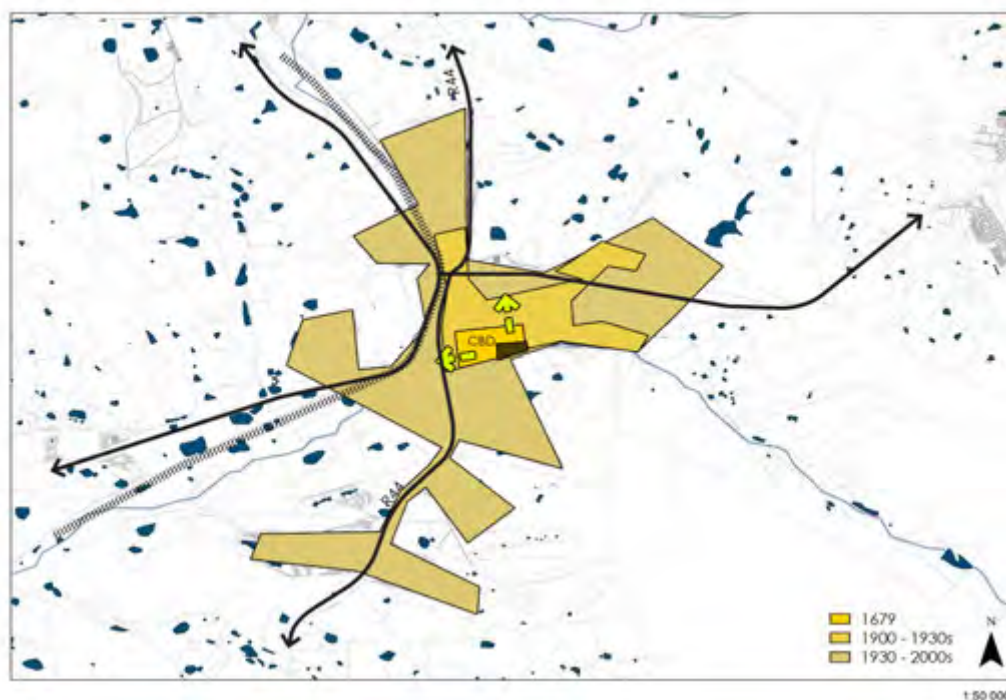


Figure 3.2: Urban growth of Stellenbosch (source: adapted from CNdV Africa, Urban Dynamics & GLS, 2004).

## 3.2 Contextual Background

The Cape Winelands District Municipality is the second largest centre of economic activity in the Western Cape Province. The region is large, comprising an area over 22 000 km<sup>2</sup>, and contains 91 demarcated wards, with a population in excess of 600 000 people (Stellenbosch Municipality, 2012).

The Cape Winelands is an area well known for its natural beauty. It also has a strong agro-processing industry which makes up more than a quarter of all agro-processing in the Western Cape. The Winelands is an agri-based economy, with more than 40% of the total land area having been modified through cultivation (Stellenbosch Municipality, 2014). Set within this network of agricultural and conservation areas, is a network of urban settlements. The municipality has two major towns—Stellenbosch and Franschhoek—and a range of other formal, more rural and informal settlements (SM 2015). Stellenbosch is the largest of the municipality's fourteen official urban nodes and is the urban centre around which the local economy is anchored (IIC 2014b). The Stellenbosch Municipality constitutes some of the country's highest yielding agricultural land (in terms of income and employment generation). The areas of high agricultural potential are scattered throughout the region with the largest concentration of such land situated in the Franschhoek Valley and around Stellenbosch town. This area of high potential also extends to the Ida's Valley in the vicinity of Pniel and Kylemore. High potential areas also occur to the east of Stellenbosch town, in the vicinity of Raithby and in portions of the Bottelary Hills. The region's extensive agricultural areas, particularly those of vineyards and orchards, also attribute scenic value and character to the region, which is valued by both the local inhabitants and visitors. The fertile soils of the sub-region Stellenbosch produce the region's largest export products, namely wine and vegetables. If the tourism sector, which is largely built on wine tourism, is included the importance of agriculture to the region cannot be overemphasised. The majority of arable land is land used for the production of wine, with only a small proportion of the region's food being produced locally. This is a significant contributor to the value of the area as one of South Africa's premier tourist destinations. Tourism in its various forms (e.g. culture tourism, nature-related tourism, wine related, and general hospitality) represents a viable economic sector. It is therefore imperative that all land-use decisions should enhance the integrity of both the natural and the cultural environment as an important form of capital.

The many faces of Stellenbosch deliver vastly incongruent experiences for residents, employees and visitors. And despite Stellenbosch's apparent prosperity, its flourishing tourism, manufacturing financial and agricultural sectors, "this picturesque town has its fair share of 'ugly' poverty" (Ewert 2013: 1; Nicks 2012). This highly divided town thus reflects a microcosm of the wider patterns of inequality within South Africa, and indeed, those institutionalised in global patterns of disproportionate production and consumption (Swilling & Annecke 2012). Despite this seemingly dismal set of circumstances, Stellenbosch is also endowed with "extraordinary intellectual capacity with the university at the heart of the community, social diversity, financial resources, creative potential, high value eco-systems, spiritual energy and some of South Africa's most vibrant grassroots social movements in its poorest areas" (Nicks

2012: 31). It is widely recognised that Stellenbosch and the greater Stellenbosch region is characterised by a remarkable and unique concentration of capabilities, resources and opportunities, a favourable position from which to contend with these development challenges (Swilling et al. 2012).

The University of Stellenbosch is located in the heartland of the District and serves as a source of skilled labour and technological advancement. In addition, the District is located close to the City of Cape Town (the largest market in the Western Cape), as well as two major export harbours at Cape Town and Saldanha Bay.

For the past century one of Stellenbosch's core economic sectors was higher education. In many perspectives, the town is synonymous with the University of Stellenbosch. Occupying the centre of the town, the university's students lend a youthful vibrancy to the historical old core of Stellenbosch. The university also serves as an intellectual hub, attracting an active group of academics and professionals. Their impact on the town's culture can be subtly detected in the art galleries, cultural societies and architecture. However, Stellenbosch is not about lofty intellect only, it has a surprisingly large manufacturing sector. This stems mostly from the wine farms surrounding the town in need of further processing of their grape harvests. The lion's share of Stellenbosch's factories find themselves in the food processing industry – producing wines, brandies, and coolers for an international market. The wine farms also serve as a catalyst for the tourism sector.

Economic activity in the region is fairly diverse with tourism, agriculture, manufacturing and a growing financial services sector all featuring in the region. However, given the large area that the region comprises, the economic performance of the region is not uniform across all municipalities, with some municipalities lagging behind, causing inequality with regards to employment opportunities. One part of the population is highly skilled and affluent and their desire to live in the well-established towns has led to rapid increases in the value of land for housing and farming. This is contrasted by a significant low-income population which experiences poor service access and low living standards. Recent retail and housing developments (e.g. De Zalze Golf Estate, Welgevonden Estate and Techno Business Park) predominantly cater to the needs of high income earners and car owners and the divide between the two groups has widened as a result.

### 3.3 Structure & Form

The urban structure & form of Stellenbosch is not legible and neighbourhoods are not integrated. The following development challenges have been identified, 1) development detracts from the quality of the public realm and public spaces, 2) development does not promote safe and secure communities 3) opportunities and public facilities are inaccessible because of the inefficient movement system, 4) development lacks critical mass of intensity, diversity and adaptability, 5) the public realm lacks enclosure and positive interfaces 6) informality is not recognised and responded to in development proposals 7)

development devalues and threatens the natural environment and 6) development undermines the heritage character of the Cape Winelands.

### ***URBAN SPRAWL***

Urban sprawl type growth is a critical challenge faced by the region. Occurring since the 1970s and continuing until the present, large tracts of agricultural and scenic land are being developed as low density suburbia. Urban sprawl suburbia are not tightly linked into the linear movement system along which either rail or road based public transport services can operate. The far flung portions of the suburbs in this pattern are dependent on private motor vehicles for access and contributes to the high number of privately owned vehicles that cause traffic congestion. Congestion has increased significantly in recent years, and most of the vehicles on the road are from within municipalities as opposed to from outside.

Development patterns in recent years have also seen the growth of unplanned informal settlement development (e.g. Kayamandi) and low-density suburban sprawl situated far away from public transport routes, both of which place unnecessary pressure on wilderness, eco-systems, arable land and other natural resources.

Several factors such as inappropriate rezoning of high value agricultural land and the diminishing financial returns on farming have caused the sector to experience difficulties in attracting capital. While significant investments have been made in the farming sector, not all are related to productive uses of the land. This has led to fertile land being rendered unproductive and this, in turn, has diminished employment opportunities for low skilled workers and increased reliance on food imported from elsewhere.

Figure 3.3, indicates the direction of urban sprawl in Stellenbosch.



Figure 3.3: Diagram indicating the direction of urban sprawl in Stellenbosch (source: Author, 2016).

### **FRAGMENTATION OF FORM**

The urban form of Stellenbosch can be considered as a fragmented. Fragmentation of this form is caused by the Apartheid ideology of separate development, and the Modernist ideology focusing on introverted neighbourhood cells linked by transport routes. It is important to note that the river system, and rail system also contributes to the fragmentation of Stellenbosch, in addition to the roads.

The town is one of South Africa's oldest formal settlements and like most South African communities, it exhibits considerable inequality (Ewert 2013). It also has to contend with many of the same challenges (Nicks 2012). The town's urban fabric is reminiscent of the "suburban dream of apartheid planning" given its fragmentation and physical segregation", even so, Stellenbosch "offers an urban experience of a quality and intensity unique amongst South African towns" (Nicks 2012: 24).

Figure 3.4, illustrates the neighbourhoods in yellow, and a clear fragmentation in the form is visible.

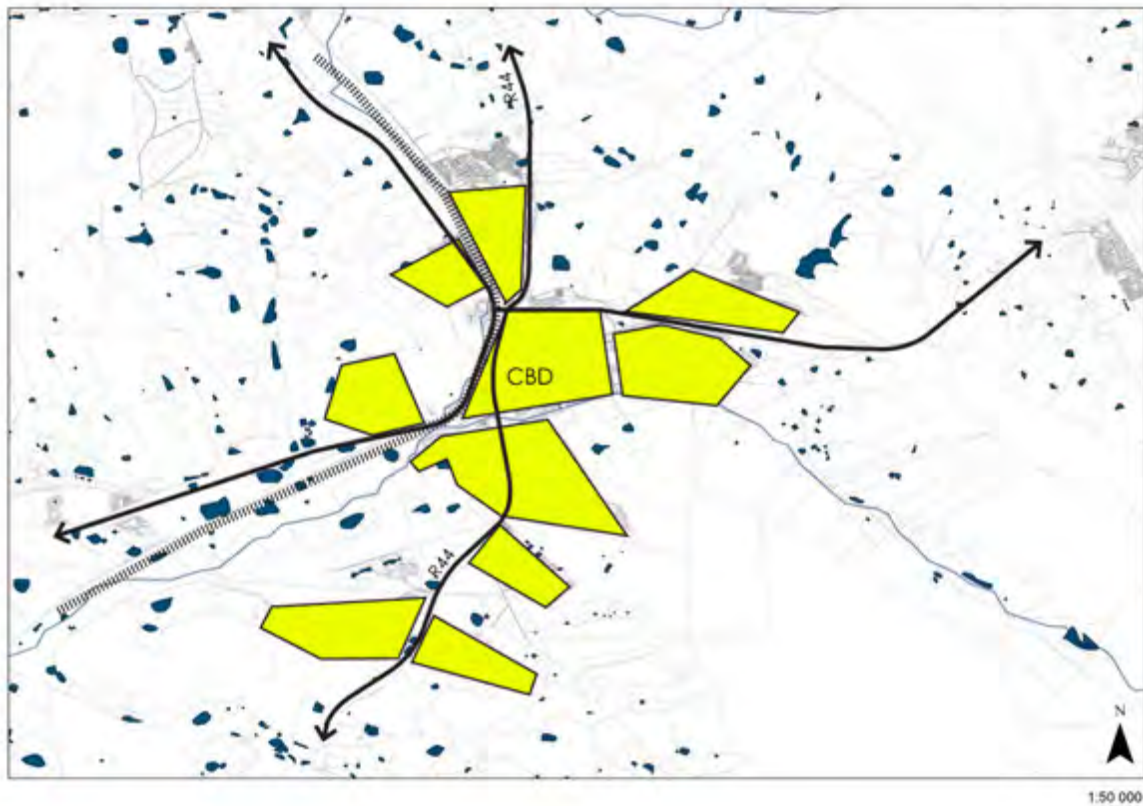


Figure 3.4: Diagram indicating the fragmented urban fabric in Stellenbosch (source: Author, 2016).

### **UNSUSTAINABLE MOVEMENT SYSTEM**

The current movement of system in the region is unsustainable. This is because of far flung neighbourhoods which contribute to the urban sprawl situation and increase the amount of motor vehicles on the roads. The large number of vehicles has a negative effect on the environment, due to the increased amount of carbon emissions.

Currently, Stellenbosch can be described as five threads, each representing a road, that are tightly tied into a central knot (refer to Figure 3.5). The problem is that the knot is already so tight that it is difficult to loosen or reverse the course that lead to the present situation. Figure 5, illustrates the knot in yellow, with the five roads tying into the center of Stellenbosch. Alternative threads might be the answer to decrease the pressure experienced by the knot.

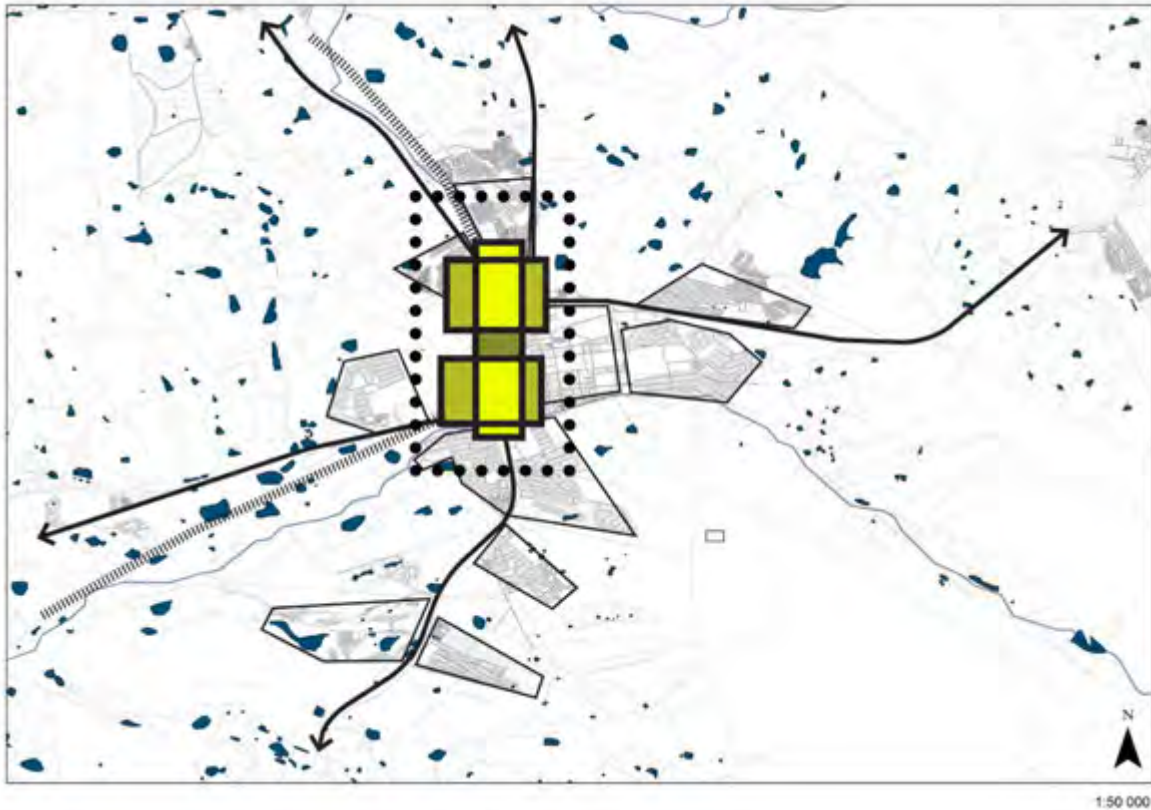


Figure 3.5: Diagram illustrating the center of gravity causing traffic congestion in Stellenbosch (source: Author, 2016).

### 3.4 Urban Growth

Stellenbosch is no longer a slow growing town, in fact it has been growing faster than the country or the province in the last decade (BER, 2013). This growth was in terms of population as well as the town's economy, and along with the growth came its virtues as well as its vices. Since the Ruperts, the super wealthy have started to establish their headquarters in Stellenbosch. Along with them came the poor, seeking for the spin-off job opportunities. Over the years this process resulted in a polarised society where the wealthy and poor are confronted with each other on a daily basis. As expected, the huge wealth difference is a recipe for crime, with more criminal activity relative to its population is recorded compared to Cape Town or South Africa (ibid.).

## ***ECONOMY***

Stellenbosch remains a boat in the South African ocean: vulnerable to the national and international socio-economic climate. The town did not escape the wave of unemployment which hit South Africa. In only five years, the number of unemployed people in Stellenbosch has doubled (BER, 2013). The majority of the newly unemployed lost their jobs during the international financial crisis when South Africa was adversely affected. On its own this unemployment created a number of social problems: poverty, housing, crime, health and political. Given the nature of the economy, which is services sector driven and requires specialised skills, the economy cannot absorb a high number of unskilled population (ibid.).

There is a probable correlation between unemployment and property crime and given the fact that the absolute numbers of unemployment in the Stellenbosch region have risen very significantly it implies that crime might well continue climbing. Crime is a cost to society that negatively influences both income levels and investment. Given the fact that local crime levels are significantly higher than both the provincial and national levels (BER, 2013), this is a serious challenge as to the longer term sustainability of the Stellenbosch.

The economy is not highly diversified. Instead, the economy is highly dependent on a handful of economic sectors, namely manufacturing, trade, finance and government services (BER, 2013). This leaves the economy highly vulnerable to the impact of exogenous variables that may destabilise the economy, i.e. drought, heavy rains, windstorms, extreme temperatures, economic recessions, low domestic and in international demand, commodity price fluctuations, interest rate hikes, low consumer spending, inflation, power failures, labour strikes, student strikes, and adverse environmental/ geological factors (ibid.).

## ***HERITAGE & CULTURAL LANDSCAPE***

Stellenbosch Municipality is a compilation of a unique set of natural and cultural components or constructs. The Winelands region is derived from a long agricultural and academic history coupled with well-preserved architecture and endemic biodiversity. These collectively create the sense of place which characterises the area and contributes to its unique heritage landscape. Uncontrolled expansion of urban areas, including unplanned informal settlement development and inappropriate densities that lead to urban sprawl, as well as industrialised agriculture into indigenous ecosystems threatens the unique cultural landscape and may diminish the appeal of the area.

## ***ENVIRONMENTAL THREATS***

The environmental threats of agriculture vests firstly in the loss of the intrinsic value of the cultural and natural landscapes. Well-maintained vineyards or pastures in suitable areas, and appropriately designed

farmsteads are key components of the much valued Stellenbosch Winelands cultural landscape. However, cultivation undertaken in visually-prominent areas (e.g. mountain slopes) and unattractive infrastructure such as hydroponic tunnels are often visually-intrusive and detrimental for the aesthetic quality of the cultural and natural environment. Secondly, the loss of irreplaceable natural habitats due to urban and agricultural expansion threaten scarce endemic species. In terms of SANBI's criteria, much of the Stellenbosch Winelands is considered to be Critical Biodiversity Areas (CBAs) that that are highly irreplaceable. The cultivation of land for agricultural purposes, the various forms of agricultural pollution, agri-induced alien plant infestation and alterations to the natural fire regime are all major causes of habitat destruction. Agriculture often results in inappropriate management, of scarce water resources. Efficient catchment management is often neglected as illustrated by illegal stream diversion and obstructions, uncontrolled abstraction, water wasting resulting in inappropriate irrigation systems and stream pollution. The Upper Berg River is a pertinent example of inappropriate catchment management.

Lastly, poor agricultural practices and inefficient water and waste management systems pose a serious threat to water and soil conservation. In many areas, soils and surface and ground water are being contaminated with untreated winery and industrial effluent, Furthermore, salination of soils has occurred in some areas, in particular along the Berg River, as a result of irrigation from agricultural activity. In addition, the microbial life in soil is significantly reduced by conventional agrochemical based agricultural practice, which is the most common form of farming in the Municipality (Stellenbosch Municipality, 2014).

At the same time, poor management of solid and liquid wastes in industrial and informal settlement areas is causing the pollution of rivers and groundwater. This includes run off from roads, substandard releases from waste water treatment works, leachate from poorly designed and operated landfill sites and poorly designed and maintained on-site domestic sanitation. Waste management challenges are discussed further in the following section.

### ***UTILITY INFRASTRUCTURE & SERVICES CHALLENGES***

Stellenbosch municipality's seven waste water treatment works (WWTW) and sewage reticulation system cannot meet the needs of the current population, let alone support future development (Stellenbosch Municipality, 2014). Regular sewage leaks and overflows into rivers and groundwater result in eutrophication, ecosystem degradation and the spread of disease, threatening the health of communities and reducing the quality of life.

The Municipality's solid waste system is at maximum capacity. The current landfill site at Stellenbosch town is over capacity and the new cell being constructed in August 2012 will only provide additional capacity until 2017 (Stellenbosch Municipality, 2014).

In addition to service challenges related to waste management, much of Stellenbosch' key water supply infrastructure is in a state of disrepair. This is severely constraining the municipality's ability to deliver

uninterrupted fresh water services to its residents and preventing future development (Stellenbosch Municipality, 2014).

The Stellenbosch Municipality is entirely dependent on the Eskom grid for electricity. The current challenge faced by Stellenbosch town is to reduce its consumption by 10% to avoid overstepping supply while still improving access to the poor (Stellenbosch Municipality, 2014). Furthermore, the provision of housing and economic growth are directly affected by the availability of electricity.

Most of Stellenbosch's building materials are sourced outside the municipality, increasing the load on the already congested transport system whilst contributing to CO<sub>2</sub> emissions and depleting fossil fuels. Many of these materials also require vast amounts of electricity to produce.

Achieving a sustainable future for the Winelands will depend on its ability to make best use of available resources for the benefit of all.

### ***HUMAN SETTLEMENTS CHALLENGES***

Stellenbosch faces a shortage of circa 20 000 housing units, and meeting this need will require doubling the current stock (Stellenbosch Municipality, 2014). An estimate of 20 000 new residential units for Stellenbosch municipality will require a doubling of infrastructural service points over the next 10 years or more (ibid.). The infrastructure backlog equates to a funding requirement of R1 billion (ibid.). This implies an annual requirement of approximately R400 million for 5 years (ibid.). Current budgetary projections indicate that no more than R200 million will be available under the most optimistic scenarios implying that it is not possible to fund the infrastructure investment (ibid.).

Resolving inequality and growing the economy will require access to energy, water, waste and sanitation services. The potential for large scale upliftment and development is severely hampered by the lack of attention to necessary infrastructure in the past.

## CHAPTER 4: GIVING DIRECTION

This chapter deals with the most important aspects that give direction to plan-making. The chapter departs with the set of values and ethical positions that are used to direct the structure and form of the Spatial Development Framework. Thereafter the approach undertaken in this dissertation and the reason for this approach is explained. The chapter then deals with the specific performance qualities used to create a positive settlement performance and concludes with the legal position and legislative material that influence the process and outcomes.

### 4.1 Values

The aim of values is to create a sustainable urban structure and form that is based on ethical and normative derived performance qualities (ref). The most frequently used and best understood definition of sustainable development comes from the Brundtland Commission report of 1987 that states that:



*"...sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*

(Mebratu, 1998).



Figure 4.1: Diagram illustrating the Triple Bottom Line of Sustainable Development (source: Author, 2016).

The assumption is that development needs to balance economic, social and environmental needs simultaneously. This is also known as the triple bottom line model (refer to Figure 4.1). This model of sustainable development has, however, experienced considerable criticism (Pieterse, 2010).

A major weakness of this model is that it assumes that the economy, society and environment are independent of each other and leads to assumptions that trade-offs can be made among the three spheres (Giddings et al, 2002). The separation of environment, society and economy has led to a techno-centric approach where issues of society and the environment are disregarded (ibid.). It focuses on pollution control, lowering resource use and greenhouse gas trading rather than tackling the deeper issues or seeing the connections between society, economy and the environment (ibid.)

Another problem with this model is that it is too abstract to understand how sustainable development transpires at the urban level and it does not acknowledge the political dimension of processes. To understand what sustainability means and how it affects cities, a more holistic vision of the concept is required. Environmental, economic and social dimensions still apply but with the increase in urbanisation world-wide, the *built environment* also needs to be recognised as a central component of sustainability. In addition, for cities to achieve sustainable forms of urbanisation it is critical that institutional and political decisions promote the cooperation of different stakeholders with one another (Allen, 2009).

The development framework makes use of the sustainable urban development model developed in the work of the scholar Adrian Allen who acknowledges that urban development will only be acceptable and in the public interest if it is economically viable, ecologically justifiable, socially equitable, physically integrated and politically sustainable (Allen, 2009).

#### ***FIVE DIMENSIONS OF URBAN SUSTAINABILITY***

- Economic sustainability: the ability of the local economy to sustain itself without causing irreversible damage to natural resources and without increasing the city's ecological footprint (Allen, 2009).
- Social sustainability: a set of actions and policies aimed to improve the quality of life but also committed to fair access and distribution of rights to use the natural and built environment (Allen, 2009).
- Ecological sustainability: the impact of urban production and consumption on the health of cities and the global carrying capacity (Allen, 2009).
- Physical sustainability: the capacity and ability of the built environment to support human life and productive activities (Allen, 2009).
- Institutional sustainability: the quality of governance systems guiding the relationship and actions of different actors among the four dimensions. It involves the participation of civil society in all areas of decision making (Allen, 2009).

## 4.2 Ethics

Dewar and Uytendogaardt (1991) identify two ethical pillars in which planning needs to be rooted, namely humanism and environmentalism.

### 4.2.1 Environmentalism

The first pillar relates to nature which provides the resources on which human life depends. Conservation does not simply mean to 'preserve' or to 'prevent change' (Dewar & Uytendogaardt, 1991); rather, it incorporates the following three principles:

#### ***BALANCE***

There is a need for balance between human activities and the natural resources which are affected by these human activities. Any human action needs to take these natural resources into consideration and respect them (Dewar & Uytendogaardt, 1991).

#### ***REGIONALISM***

There is an interdependence between the characteristic of a place, people's activities in that place and the emergence of culture (Dewar & Uytendogaardt, 1991).

#### ***PLACE-MAKING***

The importance of the creation and protection of the qualities of a place. The values of people are influenced by the places in which they live. Different landscapes are all important and therefore design needs to retain and work appropriately with these different landscapes which make up a place (Dewar & Louw, forthcoming).

#### ***RESOURCES***

It is recognised that nature provides resources which should be used to improve human life. These resources are important and therefore need to be utilised in a sustainable way. Wherever possible, the use of renewable resources should be promoted (Dewar & Louw, forthcoming).

The conclusion from these ethics is that planning needs to be creative. It is not about giving people what they want as people's expectations are largely determined by their experiences. It is the role of planning to show possibilities and opportunities. As Dewar and Uytendogaardt (1991: 13) state "...it is only through this search for possibilities that planning can genuinely enrich society."

## 4.2.2 Humanism

The second pillar is humanism. Dewar and Louw (forthcoming) state that humanism recognises that the basic function of settlement design is to improve the lives of people and to meet human needs. The human-centred approach emphasises that a central purpose of planning is to ensure that the developmental needs and activities of people living in settlements are facilitated for and, in particular, that opportunities for people to achieve their full potential through their own efforts are maximised by enabling environments. This approach, rather than being purely cost - or technologically-driven, is people-driven and democratic (CSIR, 2000). This concern with making human settlements occurs in a context that is dominated by rapid population growth, urbanisation and technological changes. Humans have two different kinds of needs:

### ***INDIVIDUAL NEEDS***

The first is individual needs that have to be met to enrich the lives of people. This can be done by creating contexts which give people freedom to improve their own circumstances (Dewar & Louw, forthcoming).

### ***GROUP NEEDS***

The second is group needs which arise when people live socially. This collective set of concerns places design within the theoretical field of 'development' (Dewar & Louw, forthcoming). In satisfying these human needs, the starting point is people with disabilities, people that move on foot and people that do not have access to resources. If these conditions are not met, then settlements will perform poorly and it is usually the most marginalised who will be affected the most (Dewar & Louw, *ibid.*).

## 4.3 Nature of Plan

The nature of the plan is an essential dimension impacting on the quality of settlements which results from the design process. To explore this, it is necessary to distinguish between two very different approaches to planning and design: programmatic and non-programmatic approaches.

### 4.3.1 Programmatic Approach

Programmatic approaches have been the most common form of plan-making under modernism (Dewar & Louw, forthcoming). They are based on the principle of comprehensive rationality and their focus is land-use (*ibid.*). Idealized land-use patterns are conceptualized, neatly separated and distributed in

space. This approach is essentially quantitative. Space demands are 'scientifically' calculated on the basis of range and thresholds and a land-use schedule is generated (x number of households can support y primary schools, z secondary schools, so many meters of commercial space and so forth)(ibid.). Planning and design then becomes the more or less rational distribution of the parts or elements. In this conception, settlement-making is seen as a rational comprehensive, highly controlled process leading to balanced end-states (ibid.).

The central problem with these approaches is that the environments which result from them are inevitably sterile. There are two main reasons for this. Firstly, the 'science' of prediction upon which these approaches are based, is notoriously unreliable (Dewar & Louw, forthcoming). The result is environments which appear permanently incomplete, with large amounts of residual space lying around waiting for events to 'catch-up' (the practice of reserving space). This, in turn, dilutes thresholds and frequently ensures that events never do catch up. Secondly, in this approach, plan-making is essentially driven from the bottom-up: from the parts (ibid.). For example, when this approach is applied to housing – particularly low income housing which is a major growth component of towns and cities in the developing world, like South Africa, - it plays out in the following manner; shelter is viewed as the highest priority and the individual dwelling unit – usually the free standing, single storey unit – is seen as the basic building block of urban environments. The first task, therefore is seen as the need to service the site (with water, sewage disposal, storm water run-off, road access, and electricity) and, in relation to this task, concerns of engineering efficiency, as opposed to any social or environmental considerations, dominate. Collections of individual units are then arranged into discrete clusters or cells, which are seen as relatively self-contained entities in the belief that this promotes 'community'. They are frequently scaled by the requirements of machines, particularly the motor car (even though the majority of people do not own cars and will not of so within the foreseeable future). These collections then give rise to a notional program of standardised public infrastructure. Space for these is distributed relatively evenly within the cells or neighbourhood units to optimise 'access' and 'equity'. In short, settlements are built from the bottom up.

The reality in all developing countries, including Southern Africa, however, is that public financial resources are woefully limited relative to the demands being made upon them. In this context, a number of consequences inevitably result from this approach. Levels of housing assistance, even to those who gain access to such assistance, are continually cut back (plots get smaller and levels of shelter and utility services are reduced to a point where the most common form of provision is a minimally serviced site), but within the same model centred on the concept of the free-standing unit.

A continually smaller portion of households gain public housing assistance. 'Islands of privilege' are created and these, in turn, give rise to waves of negative social practices (downwards raiding, warlording, bureaucratic corruption, and political patronage).

Cuts also occur in terms of social service: on the one hand, not all the planned social infrastructure (such as schools, health facilities and so on) can be provided; on the other, those facilities that are provided are cut to a point where their operations are severely impaired. For example, in the case of schools,

libraries are frequently minimally stocked, science laboratories are poorly equipped, sport fields are not maintained etc. The 'equitable', 'accessible' patterns becomes inequitable and inaccessible since the facilities which do exist are embedded. They are located to serve specific local communities exclusively and many households can only gain access to essential social services with great difficulty and considerable expense, if at all. Since there is no way in which individual households can substitute for these essential public services, the degree of disadvantage is significant. In addition, the (usually excessive) spaces allocated for facilities that do not materialize, fragment the urban fabric and frequently becomes dangerous and environmentally negative.

Spatially, therefore, the inevitable consequence of programmatic approaches is sterility, as nothing holds the whole together. It is clear that if significant improvements to urban quality are to be achieved, a paradigm shift is required. This needs to occur on two fronts. The first is embracing an urban as opposed to a suburban modal of development. The second is replacing programmatic approaches to settlement-making with non-programmatic ones.

#### 4.3.2 Non-Programmatic Approach

Non-programmatic approaches are different in a number of important respects from the programmatic approach.

Firstly, they are driven by a concern with the performance of the whole not the maximisation of the part. They are based on the central realisation that, for the whole to work well, no part can be maximised, for compromises are required (Dewar, 2011). Secondly, their focus is not on land use, but upon the accommodation and celebration of human activity of space (ibid.). Thirdly, in seeking this, the emphasis is not on idealised forms but on thinking from first principles, based on the two ethical legs of environmentalism and humanism (ibid.). This thinking process starts, not with assumptions about technology, but with the lowest common denominator: its needs of people on foot (ibid.). Fourthly, they do not seek to determine spatial distributions of activities directly through autocratic top-down directives but through manipulating the logic of access, to which all activities respond, in order to generate broadly predictable outcomes (ibid.). Finally, they do not attempt to define the 'good urban life', applicable to all people, but concentrate on the creation of choice. In this sense the way of thinking it is enabling, and not prescriptive (ibid.).

The concepts of structure and minimalism are central to non-programmatic approaches (Dewar, 2011). This approach requires that the minimum number of strong actions necessary to give direction to the settlement-making process be clearly defined in the framework plan. The concepts of structure, space and minimalism is discussed in further detail below.

## **STRUCTURE**

Spatial structure is a concept used to order the landscape. The spatial structure of a settlement results from an interplay between the formally planned (or programmatic) and the spontaneous (or non-programmatic) dimensions of settlement-making. It is the design device traditionally used in settlement-making to order the landscape. It requires the identification of the major elements of land use and the development of a land and engineering services budget.

By contrast, the spontaneous, or non-programmatic, spatial structure is essentially qualitative, having at its core a concern with the whole rather than the parts. It reflects how people, over time, have addressed the making of a place to meet their needs and enrich their lives. Spontaneous environments reflect the timeless qualities referred to above. They do not depend on particular levels of technology, or minimum levels of personal means, to operate well.

The term "structure", as used here, refers to the creation of the elements of public structure: that realm which is shared by all inhabitants, as opposed to the private realms of individual households and businesses (Dewar, 2011). In investment terms, this usually equates with public investment in the spatial structure, to which private investment and decision-making responds.

It is important to identify the structural elements with regards to settlement-making because a failure to clearly define the minimum actions required will almost certainly destroy the quality of the whole. Essential public and private sector investments may not materialise, leading to unfavourable and unintended outcomes and failure of the plan. However, if the plan for settlement-making goes too far, freedom, and thus complexity, will be reduced. A hallmark of positive environments is that they are complex. Complexity, however, cannot be designed. Diversity results from freedom of action and the iterative application of the ingenuity of many decision-makers and actors in meeting their particular requirements, as well as the needs of their fellow human beings.

Spatial structure, in a sense, can be seen as the enabling "constraint" which gives direction, and some predictability, to settlement-making processes, without defining their precise form or outcomes. It is the function of structure to generate a range of opportunities to which individuals and groups can respond, and around which a diversity of human activities can take root. While growth and development processes take many forms and are not always predictable, an enabling plan should nevertheless be aimed at unlocking the energies, ingenuity and resources of settlement builders and implementing agencies. These include individuals, groups, communities, small and large developers, utility companies, investors, semi-governmental organisations and a range of governmental institutions and agencies.

Spatial structuring elements are further used to guide urban renewal and future growth and development. These are practical tools to help shape and organise space into settlements that are sustainable and to ensure a high quality living environment for its inhabitants.

The art of planning and design is to arrange the elements of structure into a system of references that supports the processes of living and which establishes a spatial logic eliciting responses from the many actors who contribute to settlement-making. Settlement plans should therefore be able to accommodate uncertainty and change, rather than simply accommodate the initial development programme that necessitates the plan in the first place. In terms of this, the main elements of public structure are generically, space, place, movement, institutions and services. More commonly these translate into green space, all modes of movement including walking, public urban space, social facilities and utility and emergency services. These structuring elements are manipulated and co-ordinated to create a geometry of point, line and grid. The geometry generated by the way in which these elements are brought into association creates a logic to which all activities, large and small, formal and informal, public and private, respond in their own interests.

The key to understanding the spatial logic of structure lies in the concept of access. In effect, the geometry created through the co-ordination of the public elements of structure generates an 'accessibility surface' across landscapes: it creates a reference system of points and lines of greater or lesser accessibility. Furthermore, the system is a hierarchical or differentiated on it creates different levels of access to different types of opportunities (greater or lesser access to green space, for example, is defined by the relationship of land parcels to the pattern of green space).

The elements of structure are described in terms of movement of all modes, open spaces, institutional, and public utilities (engineering services) (Dewar, 2011). The elements of public structure are the components of settlement that are delivered by the public authority and serve the collective needs of society (Lynch, 1981) it typically comprise a combination of: movement, green space, public space, public facilities, and public utilities. Public structure gives order and identity to an urban area through their spatial arrangement that opportunities emerge which allows efficient, legible and equitable environments - qualities that are particularly important in informal contexts, such as South Africa. This dissertation follows the planning approach of minimalism, with regards to structure, which allows the growth of development over time for public and private capital investment. In summary, structural elements is an important part of settlement –making. It is the relationship between these public elements, rather than the individual characteristics of each that creates a sense of place in urban environments.

## **SPACE**

Space lies at the heart of the non-programmatic approach to settlement-making. It is not just one element of a settlement programme, such as "public open space" (as designated in town planning schemes), but should be approached as part of thinking about the whole. Soft open spaces take the form of parks and recreational walkways and are usually landscaped with trees in order to soften these spaces and to add visual qualities which enhance the comfort of urban environments (Behrens & Watson, 1996).

The primary structuring element for achieving place-making is through the placement of public institutions and facilities around public spaces, which serve as a focal point in urban environments (Behrens & Watson, 1996). These public spaces take different forms (for example, hard open spaces to accommodate informal activities, squares and public markets). Public spaces are the meeting places of people in settlements. The public spaces comprise the urban "rooms" and "seams" of connectivity. Furthermore, streetscapes provide the focal points for social interaction, community events and street trading.

There also exists a continuum of spaces, which represents a transition from more public to more private living. The order in settlements thus not only relates to access, but also to degrees of publicness and privacy. A similar order of publicness and privacy exists in relation to social institutions and activities, and places of perceived value.

At the heart of settlement-making lies the creation of a continuum, or hierarchy, of public spaces and movement systems, which attract, and give order to, activities, events and elements in accordance with their need for publicness or privacy. Space becomes particularly significant when one is considering movement at a local scale. At this scale the concept of "road" needs to be replaced by the concept of providing spaces which are comfortable for people to be in, and within which movement can take place. In spaces so conceived, neither the pedestrian nor the vehicle has complete dominance or right of way.

Settlements are characterised by diversity. They are many-placed places. Some parts are more public, others are more private, while others are more neutral, serving broader, more diverse sets of citizens and urban activities. It is apparent, therefore, that there is a structural order in settlements.

In terms of the human-made environment, quality of place recognises that there are points where elements of settlement structure, particularly the movement system, come together to create places of high accessibility and special significance. These are the meeting places of the settlement. Business and commercial activities, schools, clinics, libraries, community halls and other facilities and activities requiring exposure to large numbers of people are associated with these places. In the best cases, the importance of these places is recognised in that they

become the focus of public investment, aimed at making them attractive, user-friendly, and comfortable to experience. They also become the places that accommodate symbolic statements, such as objects of remembrance. These, then, become the memorable places, which shape lasting impressions of a settlement. Their significance is strengthened by their dominant locations in terms of the movement network and from the significance of the social events or rituals they accommodate.

Quality of place is attained by embracing uniqueness as opposed to standardisation. In terms of the natural environment it requires the identification of, a response to and the emphasis of the distinguishing features and characteristics of landscapes. Different natural landscapes suggest different responses. Accordingly, settlement design should respond to nature. In addition, quality of place can be achieved by site-making actions, including topographical moulding in areas where soil is easily movable, to create greater diversity in the land form for example, tree planting, to provide areas of shade and recreation; the use of supplementary sources of energy and building materials; wind protection and space definition; the creation of water bodies as recreational features, sites of aqua-culture and visual relief; and creating choices of living condition.

The role of public spaces in the lives of the urban poor is particularly critical. The public spaces and places are the primary areas within which people engage in, and experience, urban life. **When people are poor, the full range of a household's needs cannot be adequately met by the individual dwelling.** Accordingly, a significant part of their lives is played out in public spaces. If properly designed, these spaces can give dignity and a sense of permanence to environments. They are places where many social experiences occur and, in a real sense, they operate as extensions to the private dwelling. The implication is that all public spaces, of which the residential street is one of the important forms, should be viewed and constructed as social spaces. It is the integrated framework of public spaces that enhances the sensory qualities of settlements.

## **MINIMALISM**

Minimalism is central to the way of thinking spatially. At each scale the search for minimalism should identify the minimum strong actions necessary to give direction to the plan. In contrast, these elements should allow maximum freedom for the designers and decision-makers to enrich the emerging reality.

There are two main reasons why minimalism is important. The one relates to complexity, and the other to the processes of urban development as an opportunity for income generation (Dewar et al, 2012). Positive environments are complex. Complexity, however, cannot be designed. It

results from process. Sterility and monotony are the inevitable outcomes when the design process is dominated by too few people, regardless of how talented they may be. The larger the project, the truer this is. It is necessary, therefore, in the words of David Crane, to create 'a city of a thousand designers' (Crane, 1960).

The second reason why minimalism is important is that processes of urban development have always created opportunities for income generation (Dewar et al, 2012). It is imperative, particularly in the context of developing countries, like South Africa, that these opportunities are spread as widely as possible over society and, particularly, that they include the smaller scale developer and builder. Positive environments are thus enabled by a minimum number of fixed elements, and, through, complexity and process, they develop.

#### 4.4 Performance Qualities

The performance qualities discussed in this section, aims to drive the design process. These qualities are an expression of the normative values which are considered to be important to the context. Performance qualities can be evaluated and assessed at two levels. The first level is the qualities that the plan is seeking to promote in its particular context and the second is how well the framework promotes the qualities which are considered to be central (Dewar et al, 2012).

##### **BALANCE**

There are two forms of balance. The first form relates to balance between society and the three landscapes, (urban, rural and wilderness) and the interaction between them. (Dewar & Kiepiel, 2012). The second form of balance refers to the association between people and settlement opportunities (ibid.). Here, the concern relates to achieving balanced settlements in which everyone can obtain relatively convenient and equitable access to a full range of urban opportunities and activities which are vital for an enriching and enabling life. From a structural perspective, this involves maintaining contact with the natural context within which development occurs.

The criteria of balance over-arches all other performance qualities. Balance is achieved through the design and implementation of development parameters to contribute to the protection of the biodiversity. Since cities are dynamic organisations, they are constantly growing and changing, as a result of population growth and urbanisation (Dewar and Uytendogaardt, 1991). In *South African Cities: A Manifesto for Change*, Dewar and Uytendogaardt (1991) state that the concept of balance branches out into three hierarchies. The first is the relationship between society and cosmos (ibid.), which explores the establishment of human settlements which are guided by "spiritual concerns and symbols" (Dewar

and Uytendogaardt, 1991:18). The second deals with society and nature; how we use natural resources and manipulate the Earth's natural systems (ibid.). The third hierarchy is the "relationship of people, as expressed through urban activities" (Dewar and Uytendogaardt, 1991:19). Here, balance relates to promoting easy access to places, cheap and efficient transportation and equal access to socio-economic opportunities (Dewar and Uytendogaardt, 1991).

### ***EQUITY OF ACCESS***

Positive urban environments allow for optimal levels of access and convenience. It is primarily concerned with equity of access that ensures all people have relatively easy access to a full range of urban and natural opportunities (Dewar, forthcoming). Structurally, this involves the integration of the local road network with the surrounding movement system, an efficient and effective public transportation system and an urban structure which prioritises pedestrian movement. These initiatives will essentially improve integration among different neighbourhoods and allow for multi-functional resource uses. Furthermore, it brings socio-economic benefits in terms of reduced time (from long-haul distances) and costs of travel for low-income households.

A further structuring element which results in a more equitable and accessible settlement form is efficient public facilities and mixed land-use patterns (Behrens & Watson, 1996). This involves integrating different land uses and transportation modes, the strategic location of public facilities, the clustering of facilities and a more integrated transportation network.

It is neither possible nor desirable for all parts of settlements to be the same. The reason for this is that clustering tendencies emerge in the structure of settlements as they grow. Activities requiring public support tend to cluster at the most accessible places. Nevertheless, it is important that all people have reasonably equal access to the opportunities and facilities which support living in settlements and to create diversity.

People come to settlements to improve their personal welfare. The opportunity to improve one's lot derives from the economic, social, cultural and recreational opportunities resulting from the physical agglomeration of people in settlements. However, the capability of settlements to generate opportunities is not only determined by numbers of people, it is also affected by how settlements are ordered and made.

Of importance in developing countries, such as South Africa, is the need to create opportunities for small-scale economic activity. The reality is that, within the foreseeable future, large numbers of people will not be absorbed in the formal economic sector but will have to generate their own survival activities, via the small-scale - and often the informal - economic sector.

There are a number of ways in which spatial conditions in settlements create opportunities for economic activity.

The first is intensification. This requires the promotion of higher unit densities than is the norm under the current model of settlement development. The case for increasing densities rests on a number of grounds. Higher densities create more opportunities for interaction and produces a climate in which economic activity - and small-scale economic activity, in particular - can thrive. A further effect of increased densities is an increased local demand for goods and services, promoting increasing specialisation and diversification in the small business sector.

The promotion of economic activity is also affected by the efficiency of movement systems. Efficiency of movement creates higher levels of support for goods, services and social facilities, simultaneously ensuring a wider range of goods and social facilities and increasing the viability of the services provided. In this way, higher densities play a crucial role in achieving higher levels of convenience leading to increased support for public transport systems and improving their viability. By lowering unit costs, higher densities can also contribute to the more efficient use of infrastructure. Finally, higher densities can contribute to the efficient utilisation of land, the counteracting of urban sprawl, a reduction in travelling and a reduction in energy consumption and pollution.

A second way in which settlements maximise opportunities is by integrating the different parts of the settlement so that they contribute to each other. When a settlement is fragmented into a number of smaller, inwardly orientated parts, each part is largely reliant on its own internally generated resources. Consequently, levels of service and convenience may be low. By contrast, when the parts of a settlement are integrated, each part benefits from a much larger area. New settlements should accordingly not be viewed as ends in themselves only. They should also be viewed as instruments of restructuring, in the sense that they can be used to integrate a fragmented settlement environment.

The above has implications for our thinking about movement. The challenge is to establish and maximise continuity of movement systems, tying local living areas together. Movement systems need to be viewed not just as movement channels, but as spatial structuring elements. This line of thought leads to the conclusion that maximising access is as important as maximising mobility.

A third way of increasing opportunities is by enabling the evolutionary development of more complex settlements. When this occurs, a diversity of large- and small-scale activities can find viable locations within the settlement system.

A fourth way of creating opportunities is by using the generating power of larger activities to attract smaller activities, both of which benefit from the movement flows that result from the presence of the other.

## **INTEGRATION**

A settlement should also be carefully tied into the city-wide movement, water and green systems. This allows for a movement structure that is highly permeable and for a large amount of activity to mix, both vertically and horizontally. When human settlements perform positively, it reflects a high level of integration between parts and elements of the settlements (Dewar and Uytendogaardt, 1991). As such, this criterion is an important one in the performance of cities and towns. Dewar and Uytendogaardt (1991: 21) argue that no citizen should be excluded in urban settlements and each citizen should be "provided with a range of opportunities and facilities can be generated by their operating in isolation".

## **CHOICE**

The most positive environments are those which offer a wide and diverse range of choices to people. It is thus essential that the choices available to end-user communities be maximised (Dewar, forthcoming; Behrens & Watson, 1996). These choices relate to "housing consolidation, service provision, urban surroundings and movement modes" as well as choice of life style (Behrens & Watson, 1996:86). Environments which are rich in choice do not dictate "either-or" choices; it implies that choices should be within an acceptable range of mix. Choice can therefore be created by providing "contrasting urban spaces of release and relaxation in intense urban environments and spaces of exchange and interaction in quieter areas" (Behrens & Watson, 1996:86). This is reiterated by Dewar (forthcoming: 11) who states that the central choice in settlement should be made from very public and intense, to very quiet and private. In addition, choice also refers to a wide range of housing forms (which vary in terms of location, density, size, shape, height and levels of privacy) and housing entry levels (Behrens & Watson, 1996; Dewar, forthcoming).

Settlements which perform well are multi-faceted places. They offer a diversity, and thus choice, of places, lifestyles, activities and opportunities for individuals. On the one hand, positively-performing settlements offer opportunities for human contact and interaction. Their activities and events play a major part in shaping the identity of the settlements. Importantly, settlements provide opportunities where people can live on their own but not be alone. They also provide people with choices regarding the extent to which they wish to engage in social activity. On the other hand, people also require places which are private, particularly in the sense of knowing who "the locals" and who the strangers are. The degree to which people wish to live in intensive and vibrant environments - or quieter, more private, places - varies from person to person and over the lifecycle of households.

Sustainable and successful urban settlements provide its users with a range of activities and alternatives (Dewar, forthcoming: 11). Choices should not be "impositionary" (ibid.). "People should not have to choose, for example, to live in an area which is very intense and convenient, but which offers no access to green spaces" (ibid.).

## ***SENSE OF PLACE***

Making urban environments involves the creation of a unique sense of place and a rejection of uniformity and standardisation. There are various structural factors which constitute principles of place-making. The first factor involves nestling the form of the settlement to the characteristics of the landscape (for example, the climate, landform and water flows). The second contributory factor to a sense of place is the quality and coherence of the public spatial environment. The third factor is the clarity and legibility of the public urban structure and the use of landmarks to promote orientation. Lastly, place-making is concerned with the creation of "special places", where everyone is treated with equal dignity (Dewar, forthcoming).

'Sense of place' is described as the 'degree to which a place can be clearly perceived and mentally differentiated and structured in time and space by its residents, and the degree to which that mental structure connects with their values and concepts'

(Lynch, 1998).

In evaluating a sense of place, one needs to recognise that there are various 'components of sense' that, together, provide a particular environmental quality for the observer. 'Sense of place' is based upon the sensed quality of the unique 'components of sense' of a particular place, including its identity, character, structure, local climate, topography, vegetation, building materials, building practices, and local authenticity.

In practice, in the preparation and consideration of development applications (including architecture and placement of new infrastructure), it is important to ensure that the above 'components of sense' are incorporated into the planning and design. This implies that development should, among others, reflect elements of the traditional vernacular of the area, make use of local natural building materials, and reflect a strong sense of local authenticity. Stellenbosch Municipality should, through its architecture and construction methods reflect a distinctive and authentic sense of place.

## ***SAFETY AND SECURITY***

An essential concern is the creation of settlements which are safe and secure. This has broad implications and can refer to: security of tenure; food security; safety from hazards (fire and floods) and safety from vehicular accidents and safety from attack. However, with reference to the urban form of settlements, the essential concern is surveillance (Dewar, forthcoming). Soft open spaces, such as sports and playing

fields, should be clustered with schools and sports clubs, to encourage multi-functional use and activity as this ensures long hours of and increased surveillance and visibility.

### **EFFICIENCY**

This term efficiency refers to the 'efficient' use of resources within urban settlements. "This requires achieving a satisfactory compromise between the potentially conflicting requirements for mobility...and greater accessibility" (Dewar, forthcoming: 11). Dewar (1998) refers to efficiency of cities as a means of variety of choices for the users of urban spaces. It also refers to as the efficient use of resources. According to Behrens and Watson (1996), efficiency is promoted by the clustering of public facilities according to their functional relationships which allows for the sharing of resources between user groups and reduces costs and time to reach more services, facilities and employment opportunities. Dewar (2000) claims that in terms of urban settlements, compact cities are a better approach to the current spatial city structure (in South Africa for example) because compact cities provide cluster of facilities within a close vicinity.

In compact cities, however, a compromise is required between the conflicting requirements for mobility (rapid movement) and greater accessibility (reduced aggregate amounts of vehicular movement) and the dominance of NMT and public transportation over private vehicular movement (Dewar, forthcoming).

### **SUSTAINABILITY**

While the principle of sustainability has many dimensions, it primarily refers to the efficient use of resources. At the most fundamental level, it recognizes that settlements are similar to metabolisms in that they have inputs, throughputs and outputs (Gasson, 2000). Sustainability requires that in, terms of inputs, maximum use is made of renewable resources and that both the impact on productive land, land of amenity and the ecological footprint be as small as possible. In terms of throughputs, sustainability refers to the way in which resource energy flows are optimized. Outputs refer to the disposal of waste with minimum ecological and human impact and where feasible, that they are recycled productively (Dewar, forthcoming). Essentially, this requires the use of natural resources so that ecological processes are not impeded and that natural environments can be sustained. Urban sustainability is thus concerned with promoting balance of urbanity.

There are two main dimensions of urban sustainability. The first is the need to work harmoniously with the natural landscape, rather than causing breakdowns in natural systems, such as filling in wetlands to obtain developable land rather than developing higher lying ground. This issue is the need to recycle wastes to the greatest possible degree. For example, stormwater runoff can be used for irrigation purposes, and treated sewage as fertiliser. (CSIR, 2000). The second dimension of urban sustainability is

the degree to which the settlement reflects, in its structure and form, "timeless qualities".

Sustainable settlements accommodate growth and change well, and are in turn enriched by processes of change. They have three primary characteristics; they are scaled to the pedestrian, they reflect a structural order, which allows logical reinterpretation by successive generations, they have a strong spatial feel, with defined and generously made public spaces, which are not determined only by immediate development needs, but, are recognised as important in its own right (CSIR, 2000).

## **CONVENIENCE**

Access lies at the heart of convenience. In this regard, access needs to be conceived of in terms of movement modes (CSIR, 2000). The first mode is pedestrian movement, which is the lowest common denominator of movement and which describes the primary movement mode of large numbers of people (ibid.) in South Africa. The second is motorised movement in the form of public and private transport (ibid.). Not all human activities and interaction opportunities exist within walking range. When this occurs, motorised transport becomes the more convenient movement mode.

Two forms of access are central to promoting convenience. The first form is access to the economic, social, cultural and recreational benefits which result from the agglomeration of people (CSIR, 2000). This requires the intensification of settlements, the generation of opportunities for a greater range of activities and choices, promoting more complex levels of spatial order and encouraging a greater range of development processes. Movement is the integrating structural element underpinning the above. The second is access to nature (ibid.). Since settlements are, as a rule, places of intense human activity, the opportunity to escape from this intensity and to experience nature is of great importance. For many, for reasons of affordability, contact with nature has to be collective contact as it cannot always be provided adequately within private gardens. In addition, the productive capacity of the land can be a vital settlement resource. For many settlement dwellers, the opportunity to use the land productively, or to engage in lifestyles which incorporate dimensions of both urban and rural living, is crucial to their survival.

## 4.5 SPATIAL PRINCIPALS

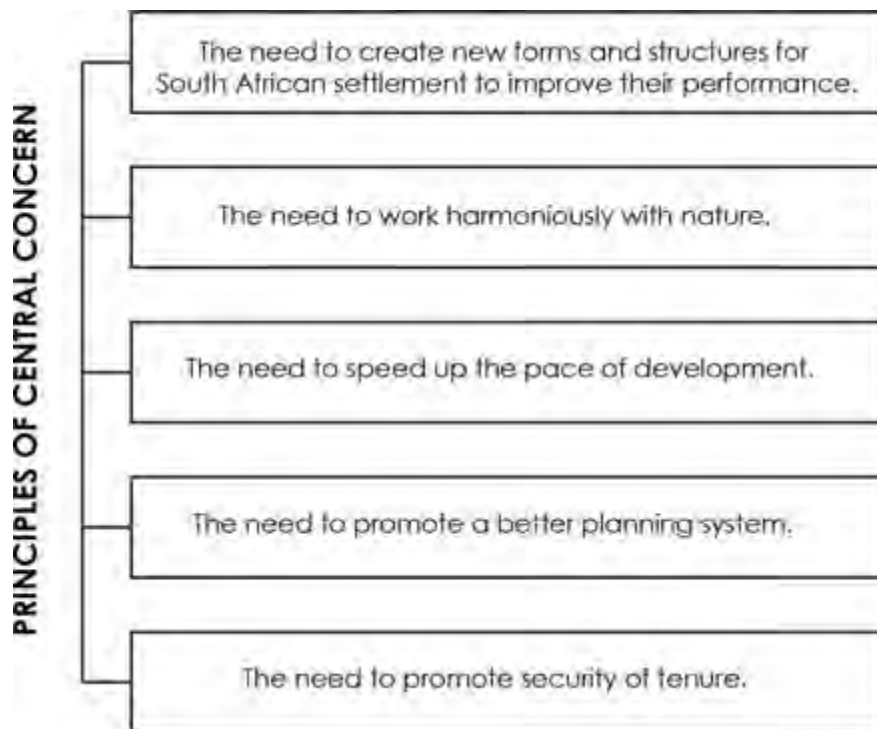


Figure 4.2: Principles of Central Concern (source: adapted from Dewar et al, 2012).

### 4.5.1 Principles for Positive Settlement-making

There are four spatial principles, which are central to creating positive settlements (CSIR, 2000). These are definition, scale, flexibility and intensity of space-use (ibid.).

#### **Definition**

In positive environments, the public space is defined by buildings and other space-defining elements, such as walls and planting (CSIR, 2000). This creates a sense of enclosure. The contrast is free-standing elements in a formless sea of space.

#### **Scale**

Scale refers to judgement about relationships such as size, distance and height (CSIR, 2000). In settlement terms, reference is usually made to a "human scale", which is the scale that human

beings feel comfortable with (ibid.). Although a quality that can be difficult to define, it is one that should be striven for in modest, as well as bold, settlement-making processes.

### **Flexibility**

Positive environments reflect flexibility in their spatial structures. The principle of flexibility thus refers to the creation of spatial structures which can accommodate the unexpected demands made upon them over time (CSIR, 2000). The importance of fixed guidelines is used in this precinct to ensure that the space remains in tack with the desired outcome, creating a mixed use of activity with sufficient public transport routes, pedestrian movement paths, and hard and soft public spaces.

### **Intensity**

Land should be used as intensively as possible as this has positive spin-offs for settlement-making. These include: the creation of higher levels of support for economic and social goods and services; the establishment of an economic climate in which economic activity can thrive; the creation of the preconditions for viable public transportation systems; the efficient use of infrastructure; and the achievement of better utilisation of the land, contributing to compact urban environments, reduced travelling and energy consumption, as well as a reduction in pollution (CSIR, 2000).

Intensification does not imply a standardisation of living conditions, or uniform densities. In the context of the minimalist approach, a choice of living conditions, which is an important objective of settlement-making, is facilitated in a number of ways, such as: by encouraging the development of areas of different character throughout the settlement; by the presence of contrasts within the structural system, with respect to space that is private and space that is public; by the natural development or evolution of a range of urban densities; and by an evolution of configurations of plot shapes and sizes, which result in the promotion of different housing types (CSIR, 2000).

## 4.5.2 Principles of Continuity

### **Continuities of Green Space**

Human society functions in a landscape that consists of the primeval natural landscape (wilderness), as well as rural and urban landscapes (Dewar et al, 2012). Access to all elements can be considered a basic need for human beings. As a result, establishing continuities of green space becomes an important element in the settlement-making process (ibid). Apart from

fulfilling an important human need, this principle also promotes ecological diversity. Ecological systems are complex, with the migration of species and their exposure to different habitats forming integral components of the systems. Natural habitats should thus be continuous to allow for this to occur. At a larger settlement scale, the promotion and protection of such continuous systems become important planning principles. At a smaller scale of settlement, green spaces in new developments should contribute to emerging continuous green systems. (CSIR, 2000)

Two additional points can be made about green space, firstly, green space within settlements should be productive space. Green space requires maintenance. If maintenance becomes too expensive or, for any other reason, breaks down, the space becomes environmentally negative. In addition, in many areas, urban agriculture has a vital role to play in the support of urban systems. In this role green space is an important supplementary source of nutrition and income for poorer people. Secondly, green spaces can absorb outputs from settlements. In this regard they can be used for evaporation ponds to remove partially treated wastewater; and as stormwater-retention systems.

### **Continuities of Movement**

The movement, or flow, of people, finance, goods and services is the energy network of settlements. Activities requiring the greatest degree of exposure will tend to gravitate towards the most accessible points and links in the energy network. The movement network exhibits its own ordering structure. At the settlement level the energy potential contained in the network is released through stopping, not through movement. Different movement modes have different patterns of stopping. Pedestrians and cars can theoretically stop anywhere along a route, bus stops may be spaced at 500 m to 800 m intervals, and train stations at intervals of 1,5 km to 2 km (CSIR, 2000). Accordingly, these modes establish different rhythms of accessibility. The coordination of different modes enables certain points to be strongly reinforced, thus attracting and creating opportunities for the clustering of activities.

By definition, routes which do not allow stopping, such as freeways, have little positive structural impact at the local level. They serve as the integrators of space at the inter-settlement level. At the local level of settlement they tend to emphasise points of exit and entry, rather than lines of accessibility. At this level they segregate - rather than integrate - space.

The application of the principle of continuity consists of the creation of a complex and diverse pattern of movement and accessibility. This will enable all settlement activities, large and small, formal and informal, to find a place within the structural system. The resultant land-use pattern will be highly synergistic, with each part of the system benefiting - and being benefited by - the other parts.

### **Continuity of Built Form**

New parcels of development should be integrated with existing development to obtain agglomeration economies (CSIR, 2000). There is, however, a scale dimension to this. At places, the continuity should be consciously broken to ensure convenient access to green space as well as the natural and rural landscapes.

### **Continuity of Public Space**

As discussed earlier, public spaces should make up a continuous network of space. Achieving a sense of enclosure and definition is important in this regard. Every building, either through the building itself, its walls, or planting, should contribute to defining the public space it abuts.

## 4.5.3 Principle of Discontinuity

In the settlement-making context the principle of discontinuity refers to the promotion of breaks in particular components of the urban system, to achieve particular effects (CSIR, 2000).

### **Discontinuities of Movement**

Along higher-order routes, discontinuities can be used to create special places, such as public squares and parks. The discontinuity principle can also be used to integrate natural and rural areas and existing features into the urban landscape (CSIR, 2000).

Discontinuities of movement on lower-order routes can be used to create qualities of secrecy or privacy, particularly in that through-traffic is discouraged.

### **Discontinuities of Built Form**

Public space, such as a square or a park, can be used as a device to interrupt built form, thereby creating visual diversity in the built environment (CSIR, 2000).

#### 4.5.4 Principle of Externalisation

Social facilities and higher-order urban activities should not be “embedded” within residential precincts, but should be externalised by locating them along more continuous movement routes (CSIR, 2000). This will ensure that the future of facilities is not entirely dependent upon the fortunes and resources of particular local communities (ibid.). It will also maximise the potential return on the investment in facilities, by making the facilities accessible to a wider range of people (ibid.). In addition, it will reinforce the private quality of the residential areas and will contribute to the establishment of symbiotic relationships between different activities and facilities (ibid.).

#### 4.5.5 Principle of Concentration along Movement Routes

While intensive activities and facilities should be externalised along continuous routes, it is important to recognise that development along them will not be even. The accessibility of different points along routes is not the same, as there are powerful tendencies for more intensive activities to concentrate at the most accessible points along movement routes (CSIR, 2000).

#### 4.5.6 Principle of Accommodating Sameness & Diversity

This principle relates to accommodating both homogeneity (sameness) and heterogeneity (diversity) in settlements. It is this principle that accommodates both cultural and economic diversity and expression within settlements. It recognises that in a democratic, multicultural, society all communities, individuals and cultures are to be accorded equivalent respect (CSIR, 2000).

This realisation has significant implications as far as the approach to structure and space in the settlement-making process is concerned. The connection between space and structure lies in the recognition that different activities, cultures, and lifestyles have their own requirements, which must be met in the settlement-making process. As a result, successful settlements are ones that reflect diversity in terms of areas of sameness, areas of diversity or mixed-use development, areas of cultural homogeneity and areas of cultural diversity.

At a fundamental level, the requirements of sameness and diversity relate to variations in the need for **privacy and exposure**. Certain institutions and public places are more “owned” by particular groups, communities, lifestyles and cultures and are thus more private, while others are more neutral or public in the sense that they serve broader, more diverse, communities. Thus, for example, commercial activities

and sport stadiums, when compared to religious activities, are heterogeneous. A mosque, or church, however, is "owned", by a smaller, more specific set of people.

In the sense that there is an order of homogeneity and heterogeneity in successful settlements, there exists a similar ordering of space, which reflects a transition from more public to more private living. At the heart of positive settlement-making lies the creation of systems of public spaces which order activities, events and facilities according to their need for exposure or secrecy, and the integration of this system of spaces with the movement system, which, in itself, forms part of the system of public spaces.

In terms of the minimalist approach to planning and design, it is inappropriate to make centralised decisions about everything. Greater freedom, and the more complex process of development which results from this, allow many actors to participate in and contribute to the settlement-making process. The result of this approach is settlement making and planning in the form of a process, a process enabling and involving a diverse range of delivery agents.

## 4.7 Legislative Context

This section aims to outline the various legislative and regulatory informants, which will need to be taken into consideration for the development proposals to be put forward for Stellenbosch.

### 4.7.1 Law

#### **CONSTITUTION**

The Constitution of the Republic of South Africa Act (No. 108 of 1996) is the supreme law of the Republic and any law or conduct, which conflicts with the Constitution, is invalid. The primary objectives of the Constitution are to ensure the human rights and dignity of all people whilst simultaneously advancing human equality.

From a planning perspective, all planning laws must be drafted by the sphere of government that has the constitutionally conferred power to do so, and each sphere of government must ensure that when dealing with planning matters, they give effect to the fundamental rights enshrined in the Bill of Rights section of the Constitution.

#### **SPATIAL PLANNING AND LAND USE MANAGEMENT ACT 16 of 2013 (SPLUMA)**

On the 5 August 2013, SPLUMA (No. 16 of 2013) was promulgated to replace the Development Facilitation Act (67 of 1995) as the national planning and land-use management act.

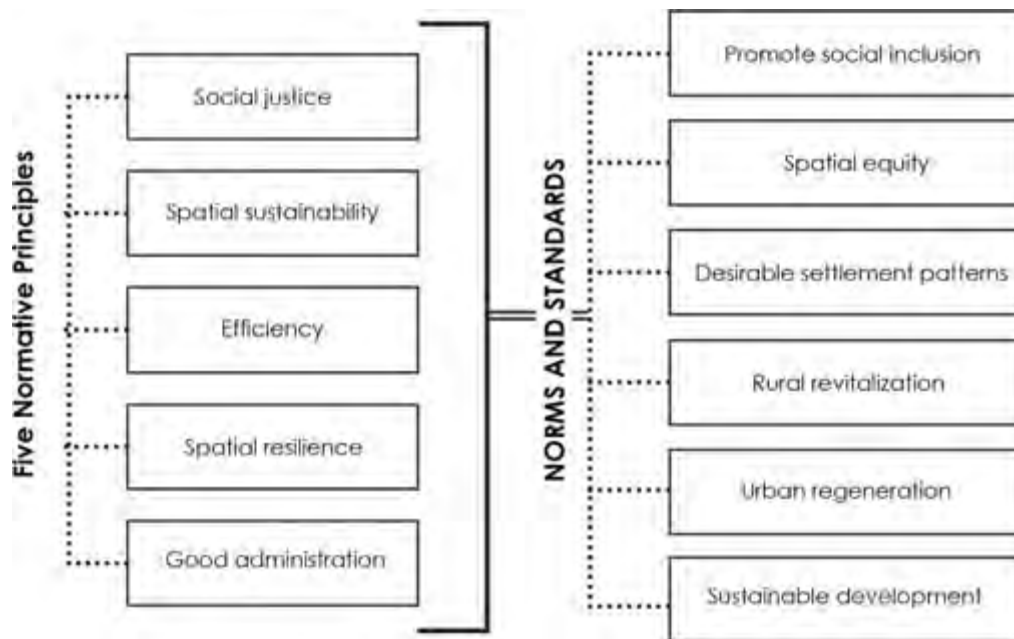


Figure 4.3: Normative Principles & Norms and Standards (source: Development Facilitation Act 67, 1995).

SPLUMA is a national act that applies to the entire area of the Republic of South Africa. It regulates all three spheres of government, namely, national, provincial and municipal planning, in providing uniform, effective and comprehensive systems of spatial planning and land-use management (Department of Rural Development and Land Reform, 2014).

The objectives of SPLUMA are:

- to ensure the system of spatial planning and land use management promotes social and economic inclusion;
- to provide for development principles and norms;
- sustainable and efficient use of land;
- co-operative government and intergovernmental relations;
- to redress the imbalances of the past in order to ensure equity in the application of spatial development planning and land use management systems.

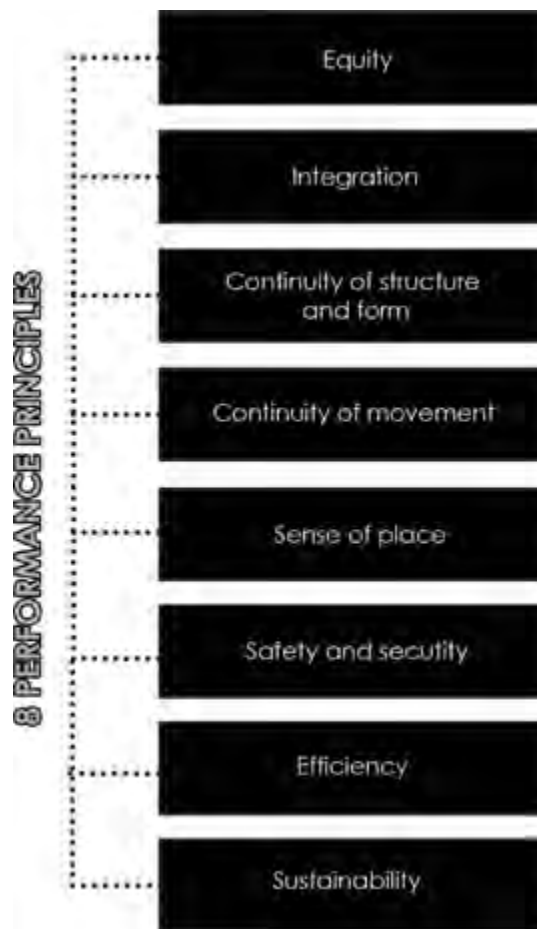


Figure 4.4: Performance Principles (source: Spatial Planning and Land Management Bill, 2011).

### **LAND-USE PLANNING ACT 3 of 2014 (LUPA)**

The Land-use Planning Act (3 of 2014) was promulgated on 7 April 2014. The Act seeks to clarify the functions of municipalities and provincial government in respect to land use planning, which include:

- Structure Plans
- Zoning Schemes
- Subdivision of land
- Planning Advisory
- General Provisions

### ***MUNICIPAL SYSTEMS ACT 32 of 2000 (MSA)***

The Municipal Systems Act (32 of 2000) was introduced on 20 November 2000 and contributes towards the realization of the rights contained in the Constitution. It must be read with Chapter 1 of the Development Facilitation Act (Act 67 of 1995), which describes the principles that must govern the development of land. To this extent, development means sustainable development and includes: integrated social; economic; environmental; spatial and infrastructural upliftment of a community with special reference to the poor and other disadvantaged sectors of the community in ensuring that development serves present and future generations. The MSA requires all municipalities to produce an Integrated Development Plan (IDP) for their area of jurisdiction every 5 years. A central purpose of the Act is to achieve a more integrated spatial planning system.

### ***INTEGRATED DEVELOPMENT PLAN (IDP)***

An IDP is a vision for the long-term development of the municipality with a special emphasis on the municipality's critical development and internal transformation needs. The plan involves a review of the existing level of development in the municipality, which must include: an identification of communities which do not have access to basic municipal services; an SDF which must consist of the basic guidelines for a land use management system for the municipality; applicable disaster management plans; and a financial plan which includes a budget projection for at least the next three years. The IDP effectively forms the policy framework and general basis on which the annual budget must be based and provides a framework for co-ordination.

### ***SPATIAL DEVELOPMENT FRAMEWORK (SDF)***

Each municipality is required to compile a spatial development framework for the area. The SDF builds on the IDP and must correspond to the spatial aspect of the IDP (Dewar et al, 2012). An SDF is a future spatial plan for the province or municipality which maps out the desired vision and growth trajectory. It considers the main public structure (green space, movement of all modes, public institutions, urban space, utility services and emergency services) in relationship to one another as well as in relation to the emerging capital infrastructure (ibid.). The municipal SDF must be reviewed every 5 years.

### ***NATIONAL ENVIRONMENTAL MANAGEMENT ACT 107 of 1998 (NEMA)***

The National Environmental and Management Act (107 of 1998) is the overarching environmental legislation in South Africa and is complemented by sectoral specific Acts, for example: The Biodiversity Act; the Protected Areas Act and the Integrated Coastal Management Act, amongst others.

The Act includes core principles of:

- Sustainable Development
- Integrated environmental management
- Environmental Justice ('the polluter pays')
- Equitable access to environmental resources
- Community empowerment

### ***NATIONAL HERITAGE RESOURCE ACT 25 of 1999 (NHRA)***

The National Heritage Resource Act identifies and regulates the declaration or designation of national and provincial heritage sites, protected areas and heritage areas (Van Wyk, 2012). The Act also makes special provision for burial grounds and graves as well as public monuments and memorials (ibid.).

#### 4.7.2 Policy Informants

A range of national, provincial and local policies shape the development of the planning frameworks. The most significant policies are mentioned below.

### ***NATIONAL DEVELOPMENT PLAN 2030***

The National Development Plan 2030 (NDP) is a strategy that aims to accelerate growth, eliminate poverty and reduce inequality in the country by 2030. Some of the targets of the plan include getting more people to live closer to economic opportunities, better quality public transport and more employment opportunities in proximity to human settlements. To achieve these targets, the NDP advocates measures to prevent housing development in marginal places, increase densities to support public transport and provide incentives for economic activities to locate adjacent to human settlements (Department of Rural Development and Land Reform, 2014).

### ***WESTERN CAPE PSDF 2013***

The PSDF seeks to protect environmental assets, address economic and social divisions in cities and towns in the Western Cape, manage urban growth and the effects that it has on natural resources and infrastructure, and improve living conditions and the quality of urban environments (City of Cape Town, 2012a).

### 4.7.3 Fragmented Spatial Planning and Land-use Management Systems

South Africa still operates with fragmented, unequal and incoherent spatial planning and land use management systems, which often constrain land and economic development and the transformation of apartheid settlement patterns (Ogle, 2014). Ogle (2014) presents three main critiques of the various planning legislation in South Africa:

*Multiple applications are required:* Developers need to make a separate application under each of the various Planning Acts and to different departments. As an example, land use applications must be made to the municipality and the removal of restrictions must be made to the provincial department. This duplication of processes and authorisations delay planning applications with a consequent impact on the delivery of housing stock to poorer areas. In addition, with market-related developments, the holding costs are built into the price or developers simply abandon the project. These multiple laws on planning render the entire planning system inefficient, costly and confusing (Ogle, 2014).

*Different decision-makers are involved:* Different aspects of planning are dealt with by different laws. Acts such as NEMA and the National Heritage Resources Act require applications in tandem with planning legislation such as SPLUMA and LUPA. This means that different authorities from different spheres of government and different line departments make decisions relating to the same development. Given their conflicting mandates it is highly likely that these decisions may conflict (Ogle, 2014).

*Different forms of participation are required:* Each Act has its own participation provisions. Sometimes the participation can be done simultaneously, other times not. For example, the Removal of Restrictions Act and Land Use application stipulate different lengths of advertising. Sometimes the environmental participation process precedes the land use planning participation process. This leads to confusion amongst targeted group and participation fatigue. It is also expensive and time-consuming for an applicant (Ogle, 2014).

## 4.8 INTERNATIONAL TENDENCIES

This section focuses on global trends that have an overarching impact on planning schemes around the world. The most prominent trends are discussed with the aim to gain better insight and knowledge of the current global issues related to planning which will influence place-making in the 21<sup>st</sup> century. The section deals with urbanisation and global population growth, climate change, food security, resource depletion and economic globalisation.

#### 4.8.1 Urbanisation and Global Population Growth

Today over half of the world's population live in cities (United Nations, Department of Economic and Social Affairs, 2014). It is expected that by 2050 an extra 2.5 billion people will be living in cities (ibid.). This means that by 2050, 66% of the world's population will be city dwellers (ibid.). It is expected that most of this population growth will happen in the cities of developing countries. Presently, many towns and cities in the developing world are experiencing rapid population growth due to a large amount of rural-urban in-migration as a result of agricultural transformation and rural unemployment as the urban poor are looking for a foothold in towns and cities where land is more easily available (Watson, 2009; UN Habitat, 2009).

The urban populations are stabilising in areas that are already urban, such as Europe and North America, while regions that have higher rural populations, such as Asia and Africa, are likely to experience exponential rates of urbanisation in the coming years (UN-Habitat, 2012). The types of cities that urban dwellers reside in are diverse; about half of urban residents live in small cities with less than 500 000 inhabitants and almost one-eighth live in the 28 mega cities of 10 million inhabitants or more. The number of megacities is expected to rise to 41 by 2030 (ibid.). Where in the past most of the largest cities were found in developed countries, they are now concentrated in developing countries in such as Asia, Africa and South America (United Nations, Department of Economic and Social Affairs, 2014).

This rapid and largely unplanned urban growth is unsustainable, especially when the necessary infrastructure is not developed and if policies are not implemented to ensure that the benefits of living in cities are equally shared amongst inhabitants (United Nations, Department of Economic and Social Affairs, 2014). According to the World Bank, urbanisation will result in a large loss of natural land as the built environments will expand into their surroundings. It is expected that cities in developing countries will triple their land area by 2030 (UN-Habitat, 2012).

In many cities, unplanned urban growth has led to rapid sprawl, pollution, environmental degradation and unsustainable production patterns (United Nations, Department of Economic and Social Affairs, 2014). Urban areas are also more unequal than rural areas as hundreds of millions of the urban poor live in city slums.

Despite these negative aspects of urbanisation, cities do have positive benefits for people living in them. As Jenks and Burgess (2000: 3) state, "Cities may have problems, but they are not necessarily a problem in themselves". They provide economic opportunities for millions of people who seek to escape restrictive rural lifestyles that may no longer be economically sustainable (Jenks & Burgess, 2000). Cities also provide inhabitants with greater access to social services such as health and education (United Nations, Department of Economic and Social Affairs, 2014).

The major problems associated with these rapid rates of urbanisation in the developing world, are the local economies in these cities, natural resources and governmental systems with limited capacity to

accommodate the rapid rates of urban population growth. This results in major outward expansion because of cheap and unregulated peripheral land which inevitably results in urban sprawl, structural unemployment and inequalities which are reflected in the growing differences between the wealthier and poor areas, environmental degradation and poverty (UN Habitat, 2009).

To this end, city planning should be directed towards interventions that focuses on the needs of low-income populations. It should also be concerned with implementing innovative planning solutions that deal with these poverty-related issues through effective land-use planning and mobilization of resources and capacity building. Thus, it is argued that urbanisation should not be perceived as a problem, but more of a positive and natural process: "Urbanization should be seen as a positive phenomenon and a pre-condition for improving access to services, economic and social opportunities, and a better quality of life for a country's population" UN Habitat (2013:11). It is essential that planners realise that spatial plans cannot be comprehensive but need to be flexible to allow for uncertainties such as the rapid urbanisation that is still expected to occur in developing countries.

#### 4.8.2 Climate Change

One of the most threatening environmental challenges that we face on a global scale is climate change. Climate change refers to the rise in the global average atmosphere temperatures, followed by an increased frequency of climatic abnormalities, intensified heat and cold waves, droughts, storms, floods, as well as rising ocean levels (Stellenbosch EMF, 2014). Accelerated climate change is believed to be a result of human activities that increase the concentration of greenhouse gasses (GHG) in the atmosphere – to which carbon dioxide (CO<sub>2</sub>) is the largest contributor (Solomon, 2007). CO<sub>2</sub> is naturally stored on Earth in 'carbon sinks' such as fossil fuels (oil, gas & coal) and green biomass. Human activities release this CO<sub>2</sub> through the burning of fossil fuels for energy and the reduction of forests, grassland and peatland. Key mechanisms to limit GHG emissions (and thus to slowdown climate change) include switching to low-carbon energies, reducing energy demands and preventing deforestation; these measures are known as mitigation. However, adaptation measures to the already inevitable adverse impacts of climate change are also needed (Stellenbosch EMF, 2014).

Climate change poses a huge future risk for humans and the natural environment. The fact that many cities are located in low lying and coastal areas presents major implications regarding sea level rise and increasing flooding. Food and water insecurity are also major threats which will affect cities across the globe and requires urgent attention in planning decisions. Others have emphasized the extent to which threats of climate change has begun to assert itself in the form of intensive weather conditions, such as, flooding, droughts and storms which has resulted in devastation worldwide (Satterthwaite et al, 2010, IPCC, 2014).

The IPCC (2014) has identified five key risks of climate change across sectors. Firstly, some unique and threatened systems (these include ecosystems and cultures) are already at risk from climate change. The number of these systems that are at risk is related to increases in temperature, particularly systems with limited adaptive capacity. Secondly, climate change-related risks from extreme weather events such as droughts, floods and cyclones will increase in severity as temperatures rise. Thirdly, climate change risks are not evenly distributed and will be most significantly felt by disadvantaged communities. This can already be seen in the decrease in regional crop yield and water availability, especially in developing countries. Fourthly, global aggregate impacts will be felt from extensive biodiversity loss and loss of ecosystem services. A rise in temperature will therefore result in aggregate economic damages. Lastly, some physical systems and ecosystems will be at risk of irreversible changes. Warm water coral reefs and Arctic ecosystems are already experiencing irreversible shifts. With additional temperature increases, large and irreversible sea level rises are expected from the melting of the Greenland ice sheet which could increase sea levels by 7m (IPCC, 2014).

*Since the Industrial Revolution human influences on the climate have increased significantly. Cities only occupy 3 per cent of the earth's surface but account for over 70 per cent of natural resource consumption and carbon emissions (UN Habitat, 2012).*

The promotion of compact cities, the regulation of urban sprawl through densification strategies, land market regulations, reduction in the cost of infrastructure, a decrease in the demand for transport and limits to the footprint of urban areas are all strategies which can effectively address the challenges of climate change (UN Habitat, 2015). Furthermore, improving energy efficiency and using renewable energy are important ways to address this complex knot of environmental and social problems. It is widely acknowledged that the cost of investing in energy efficiency is commonly smaller than the gains achieved over a medium-term period from resultant energy savings. Energy savings also mean avoided energy and CO<sub>2</sub> generation. This also makes the residential sector one of the most cost-effective (in fact, profitable) mechanisms for the reduction of CO<sub>2</sub> emissions (Stellenbosch EMF, 2014)

### 4.8.3 Water Security

There is a growing scarcity of freshwater resources in many parts of the world. According to Vörösmarty et al (2013), the increased pressure on the global water supply due to climate change is leading to a large portion of the global population to experience "water stress". Some areas have also been experiencing an increasing number of droughts while others are witnessing the occurrence of frequent floods. These hazardous pressures impact on global water security and make future management of the

global water supply crucial. Finding a way to satisfy humanity's water demand while at the same time protecting the ecological support functions of freshwater systems will be one of the most important challenges of the 21st century (Postel, 2000).

Water has two fundamental functions: its role as a necessity for human life and its use as an economic resource, such as, for the production of food and industrial processes. These two roles are increasingly in conflict. Human activities have already reached renewable water limits in many regions. Only 2.5 % of the world's water is fresh water and of this 2.5 % approximately 70 % is frozen. The biggest user of water is agriculture which uses approximately 70% of available fresh water, followed by industries that use around 20%. Only 10% of freshwater is used for human consumption. The depletion of water resources is more serious than the oil crisis as oil can be substituted but water is irreplaceable (The world counts, 2015).

Currently water management is focused on the construction of large engineered dams that pump water over large distances in order to reach drought prone areas. This approach is extremely costly and in some cases, worsens the problem as these dams are losing millions of litres because of surface evaporation and pipe leakages (Stellenbosch EMF, 2014). Many aquifers and rivers are already being overstressed in meeting current water demands. The stress on freshwater systems will worsen as the global population and consumption levels increase. The major dimensions of the water scarcity challenge will be to maintain food security, with water constraints on agriculture contributing to decreased health of the aquatic environment, and avoiding political instability in international river basins. The biggest indicator of unsustainable use is the over-pumping of groundwater that is widespread in many food-producing regions and urban areas. Another sign of unsustainable water use is rivers that are now running dry when irrigation is most needed.

The issue of water depletion is prominent in South Africa as the country is already faced with water scarcity. Provision should therefore be made through effective water demand management strategies which aim to protect existing water sources against pollution and thus ensure sustainable future water security. The most effective way to combat water depletion in cities is to protect existing water resources such as rivers and aquifers and to promote grey water recycling and local water capture. Rainwater can be harvested from roofs of buildings and from surface runoff. The harvested water can then be used either for drinking, domestic use, watering gardens or for irrigation.

#### 4.8.4 Food Security

Climate change will adversely affect all aspects of food security, including food availability, access to food, stability of food suppliers and food utilisation. Food security will be affected in many different ways, including through changes in temperature and rainfall patterns, loss of water sources and rainfall as well as the continued emission of greenhouse gasses which will affect land suitability and crop yields. Climate

change is also expected to increase the frequency and extremity of extreme weather events such as floods, droughts and cyclones which will cause greater fluctuations in crop yields, possibly affecting the stability of food supplies and thus food security (Gregory et al, 2005). The issue of climate change has also lead to more extreme seasonal conditions, which has a detrimental effect on agricultural processes as hotter and drier season impact on crop production. A further issue that relates to food security in many global south countries involves agricultural subsidies. Many farmers in global north countries receive agricultural subsidies, which allow for relatively cheap and efficient food production and exports. This, in turn, hinders local food production in the global south, as farmers cannot compete on an even level. This has implications for food shortages and the need for food imports. These imports are usually expensive and undermine the poor from accessing these food supplies. The increased scarcity of produce leads to price inflation, which bring about a number of social issues. As the urban poor are unquestionably the most vulnerable due to restricted coping mechanisms (Ibid.). Climate change can also affect the ability of people to use food effectively by changing the conditions for food safety. Changing climatic conditions can cause cycles where infectious diseases compound hunger. An example is an increase in flooding which can increase risks of an outbreak of water-borne diseases such as cholera. This can lower people's capacity to use food effectively.

Gregory et al (2005: 2139) refers to the food system, which underpins food security, as "all of the dynamic interactions that take place in the biophysical and human environments which inevitably lead to production, processing, distribution, preparation and consumption of food". External forces, which include climate change, urbanization and global population growth, places stress upon these various food systems, diminishing global food security. Gregory et al (2005) states that the food systems encompass a variety of factors, such as, food availability (production, distribution and exchange), food accessibility (affordability, allocation and preference) and food utilization (nutritional and societal values and safety). These factors make it as much an urban issue as it is a rural issue, as it emphasizes the importance of the above-mentioned factors in inducing food insecurity. The issues of food security and its relationship to agricultural produce are further impacted by the on-going conversion of agricultural land into urban development on the peripheries of cities in an attempt to accommodate rapid urban growth.

"Food access" is a fundamental aspect in terms of the global food security debate. There are sufficient net global food supplies, and some regions will experience an increase in productivity as a result of global warming (Gregory et. al, 2005). It is, however, the accessibility to these supplies, especially by areas that experience greater negative pressure from climate change, that are causing many Global South countries to experience situations of famine and food shortages. The best ways to ensure food security in cities is to increase access to produce through the promotion of local food production through urban agriculture, and to protect valuable agricultural land through urban containment. Local food production can also encourage local economic development and provide employment opportunities.

#### 4.8.5 Fossil Fuel Depletion

The world's oil reserves are a non-renewable resource and account for 40 % of the total use of energy worldwide. The liquid fuels obtained from oils have a number of uses, including manufacturing, transportation, building, mining and harvesting. Predictions have indicated that there is only enough oil to last for 25 years (The world counts, 2015). High demand for oil will result in peak oil within the next ten years which will lead to dramatic increases in the cost of fuel, mobility and food prices (UN-Habitat, 2012). There are, however, means to overcome the global oil crises as efforts are underway to develop cheaper and more sustainable energy such as wind power, solar power, and other forms of renewable energy that can replace oil (The world counts, 2015).

The global use of oil as an energy source has promoted and contributed to the emergence of low-density and sprawling urban forms as well as dependency on private cars. An oil based economy and climate change are interrelated as vehicle emissions contribute significantly to greenhouse gas emissions and inevitably global warming. Cities that exhibit low density sprawl contribute to green-house gas emissions and resource depletion through the prioritization of private vehicular transport as the main mode of movement, and because people are required to travel large distances to reach places of employment. A key solution to reducing green-house gas emissions is therefore to reduce the aggregate amount of movement which occurs within cities. As many urban residents worldwide rely on motor cars, there is a need to return to NMT. This will be especially difficult in South African cities as motor cars are the primary mode of transport and current public transport systems are inefficient. Decreasing the demand for fossil fuels and the adoption of alternative sources of energy is thus not only necessary to decrease green-house gas emissions, but is also important to ensure that the urban poor are not further excluded from opportunities and services due the rising unaffordability of transportation costs and utilities.

#### 4.8.6 Economic Globalisation

Globalisation and economic restructuring have affected both countries in the developed and developing countries in various ways, however the extent of this is also determined by local factors and governance (Shatkin, 2007; UN Habitat, 2009). This point is reiterated by Beall (2002) who states that macro-economic policies which accompany globalisation, such as, neo-liberalisation and privatisation can reduce the government's power to ensure social well-being and equality. Views from major institutions such as the World Bank promote the idea that globalisation empowers private sector interests, which reduces the role of government intervention. Economic globalisation is not a new occurrence, but what is new are the speed, scale, scope and complexity at which it is occurring. Soja and Kanai (2007) state that the increasing competition between global cities has been a pre-occupation with attracting

investment and tourism, which diverts attention from the fulfilment of social services and the needs of disadvantaged communities.

One of the most significant effects of globalization and economic restructuring has been the change in urban labour markets. The neoliberal agenda of globalization has led to new industries which rely on less regulated labour markets (ibid.) and increased access to a cheap labour force. The outcome has been restrictions being placed on the labour force to increase profitability and involves short-term contractual labour, restrictions on the working age and gender and the reduction in the power of trade unions, which serves to disempower the working class and increase precarious labour. This has resulted in service sector growth and a decline in manufacturing which has contributed to the increasing socio-economic polarisation prevalent in many cities across the globe (UN Habitat, 2009).

The biggest challenge that we are facing with regards to globalisation is how to share the benefits more equally and how globalisation can function as an agent for economic growth as well as an agent for social justice (UN-Habitat, 2001). The best way to achieve this in cities, especially in developing countries like South Africa, is to promote local economic development (LED) which encourages local urban residents to work together to achieve economic growth and development, thereby bringing economic benefits and better quality of life to all residents. The result of this, especially in the context of developing countries, has been the emergence of informal economies which is said to be a "distinctive feature of both the urbanization of the world and the globalization of the urban" (Shatkin, 2007; UN Habitat, 2009; Soja & Kanai, 2007:65). This extends to informal housing which is related to the flow of labour, the demand for urban space and the inflexibility of private development and the formal housing market.

There are many benefits to globalisation such as medical advancements which have reduced mortality rates and agricultural technologies which have increased food production. It is clear, though, that the benefits of globalisation have not been spread evenly. While the conditions of many people have improved, there are many people whose conditions have deteriorated. In many countries, the costs of living have increased as well as the number of poor households, particularly in cities. Inequality in many regions has been worsened as smaller shares of income reach poorer households.

## CHAPTER 5: STELLENBOSCH AND ENVIRONS

Stellenbosch Municipality is located in the heart of the Cape Winelands. The Cape Winelands is dominated by agricultural land of historic and aesthetic value, and globally-important natural habitats. It is the second oldest European town (after Cape Town) in South Africa and its well-preserved buildings are fine examples of the impact of many architectural styles. The Municipality is bounded to the east and south by the Drakenstein, Wemmershoek and Limietberg mountain ranges. The Hottentots Holland range, (i.e. Stellenbosch, Jonkershoek and Simonsberg Mountains) and the Bottelary Hills are in the immediate vicinity of the town of Stellenbosch.

The Municipality's area of jurisdiction covers approximately 900 km<sup>2</sup>, and includes the town of Stellenbosch and Franschhoek as well as a number of rural hamlets such as Wemmershoek, La Motte, De Novo, Kylemore, Pniel, Johannesdal, Languedoc, Groot Drakenstein, Muldersvlei, Klapmuts, Elsenburg, Raithby, Jamestown, Koelenhof and Vlotenburg (most with a population of less than 5 000 people) (BER, 2013). Apart from formal settlement areas, the municipal area also includes a number of informal settlements.

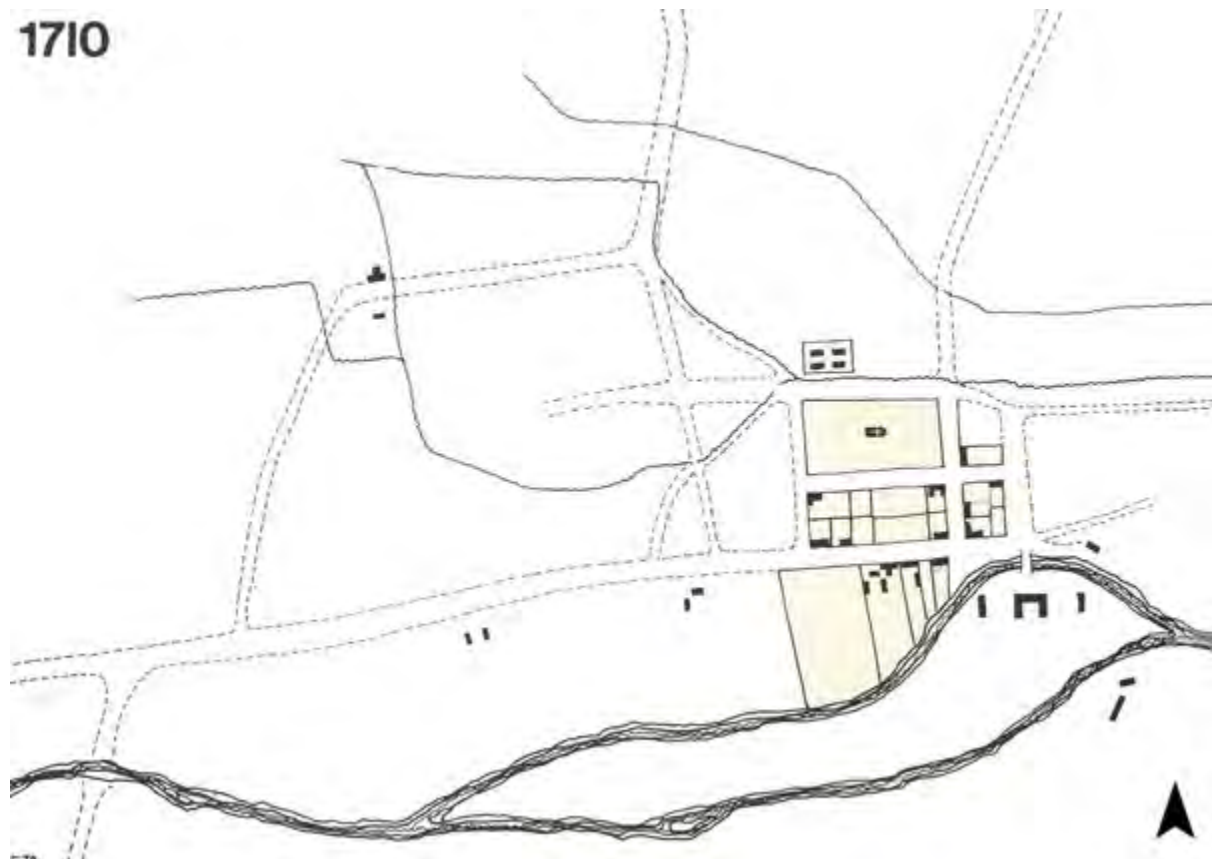
Stellenbosch as a whole still has a relatively tightly structured settlement pattern located at strategic nodes on the transport and river systems and is relatively well linked to the surrounding agricultural, conservation and scenic hinterland. The reason for this relatively tightly structured settlement is the topographical setting it is situated in. This pattern has developed over the past 300 years and has proven to be sustainable up until the later years when a number of trends began. Rapid population growth led to urban sprawl bulldozing over valuable agricultural land. Furthermore, climate change and global urbanisation has resulted in additional pressures on the Cape Winelands Region.

### 5.1 The Structural Evolution of Stellenbosch

Historical studies are a good point of departure when planning, designing and rehabilitating new places and existing areas (Kelbaugh, 1997). It is imperative that the local history, traditions and values be thoroughly studied as part of any planning process and that the planning and design of both the cultural and the natural environment reflect these dimensions. Developments should reflect an appreciation for the history, culture and traditions of the local people and build on the historical precedents presented by existing high quality settlements (ibid.). Any architectural type that has stood the test of time must be doing something right in terms of responding to climate, social and cultural needs, tradition, and economy, should therefore, be worth duplicating (ibid.).

### ***The Agriculture Colony becomes a Town***

The first farmers settled around the Eerste River in 1683 and the area was classified as an agriculture colony without any town centre at the time. After the arrival of the farmers, a group of French colonists arrived in Stellenbosch bringing with them an advanced knowledge of viticulture. Over the years, wine production in the area grew significantly and ultimately ensured that Stellenbosch became the centre of the South African Wine industry and significantly contributed to the local economy.



*Figure 5.1: Stellenbosch's growth pattern since its origin up to 1710 (source: adapted from Stellenbosch Drie Eeue, 1979: 86).*

In 1685 the town, Stellenbosch, was established as the first European settlement in the hinterlands of South Africa. The Drostdy was the first building completed, and was situated on the island formed by the double course of the Eerste River (refer to Figure 5.1). Houses and a church were built along the Eerste River and a building that served as a Court and a Town Hall was erected in 1687. The houses are now situated along the current Dorp Street. The second row of houses that were built was between the Drostdy (then situated on the island formed by the Eerste River) and the first church in Ryneveld Street. The church and

the Drostdy served as two points or poles and in time grew towards each other with the infill of institutional buildings such as a school and the Town Hall.

During the 1680's the grid pattern was a common pattern in the layout of cities. Similarly, Stellenbosch originated from a central point (the Drostdy) and developed a grid pattern. Later it took on a more organic structure as it developed outwards, while taking into account the surrounding topography, shaping it into the star pattern seen today. Bird Street was the main access in 1783, leading to Paarl, and development clustered adjacent to the route, creating the first corridor in Stellenbosch. It is observable in Figure 5.2 that the location of the Braak (the area in the middle of the map) did not grow out of itself, but was arguably formed by the rivers surrounding it and the intersection of a number of movement routes.

In 1701, Oak tree saplings were imported to Stellenbosch and were planted along public streets. The numerous Oak trees in town is a defining physical feature that the town is known for today. Accordingly, Stellenbosch is also called "Eikestad" which translates to Oak City.

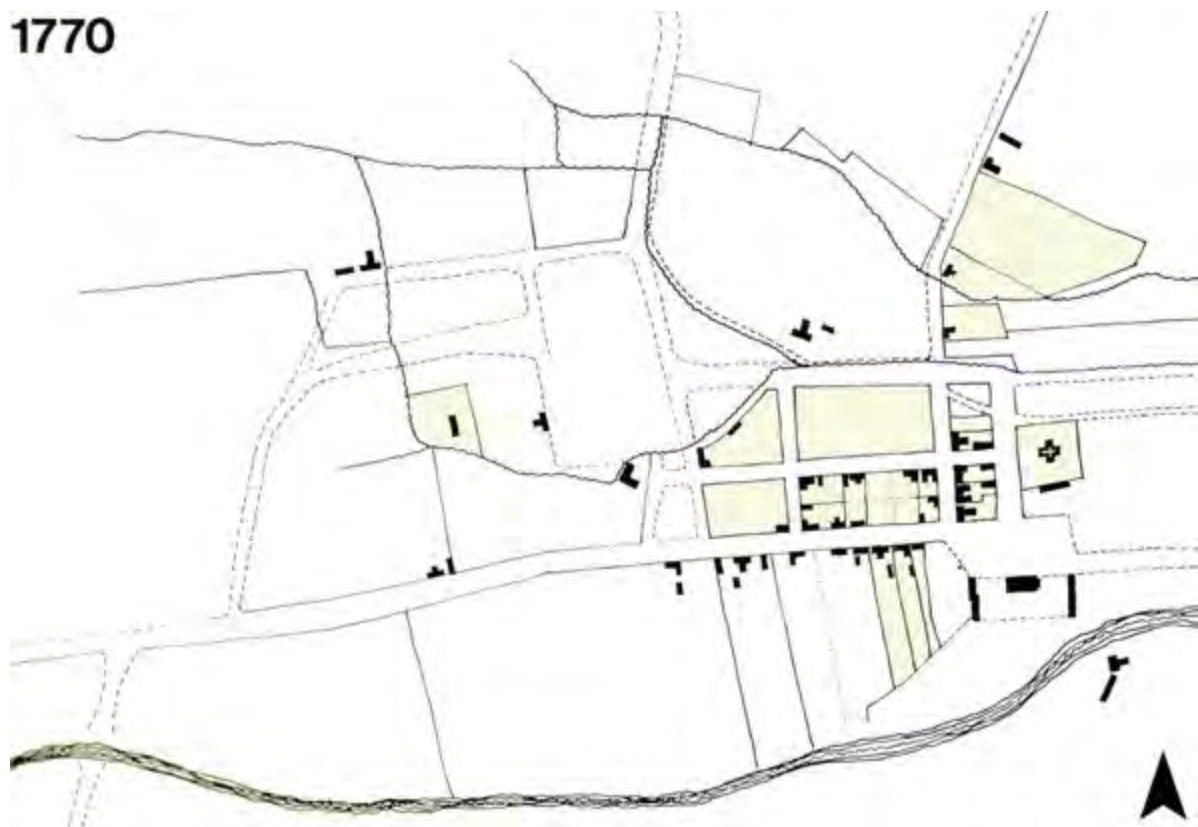


Figure 5.2: Stellenbosch growth pattern in 1770 (source: adapted from Stellenbosch Drie Eeue, 1979: 87).

When slavery was abolished in South Africa during 1834, land was purchased where the town Pniel is situated, and a mission station was founded in 1843. The village of Pniel lies on the banks of the Dwars River in the Drakenstein Valley. The valley is located between the the Simonsberg Mountains in the west and the Hottentots Holland Mountains in the east. Today, the United Congregation Church still stands at the centre of daily life of the town.

Since its origin, the town was structured and organised according to European examples and acted as an administrative, religious, and militarian centre to the region. Because of its isolation it grew independently with a co-operative spirit. In 1859, further institutional buildings started clustering around Ryneveld Street which already hosted the church, Town Hall and Drostdy building. This included a theology education building and university education building.

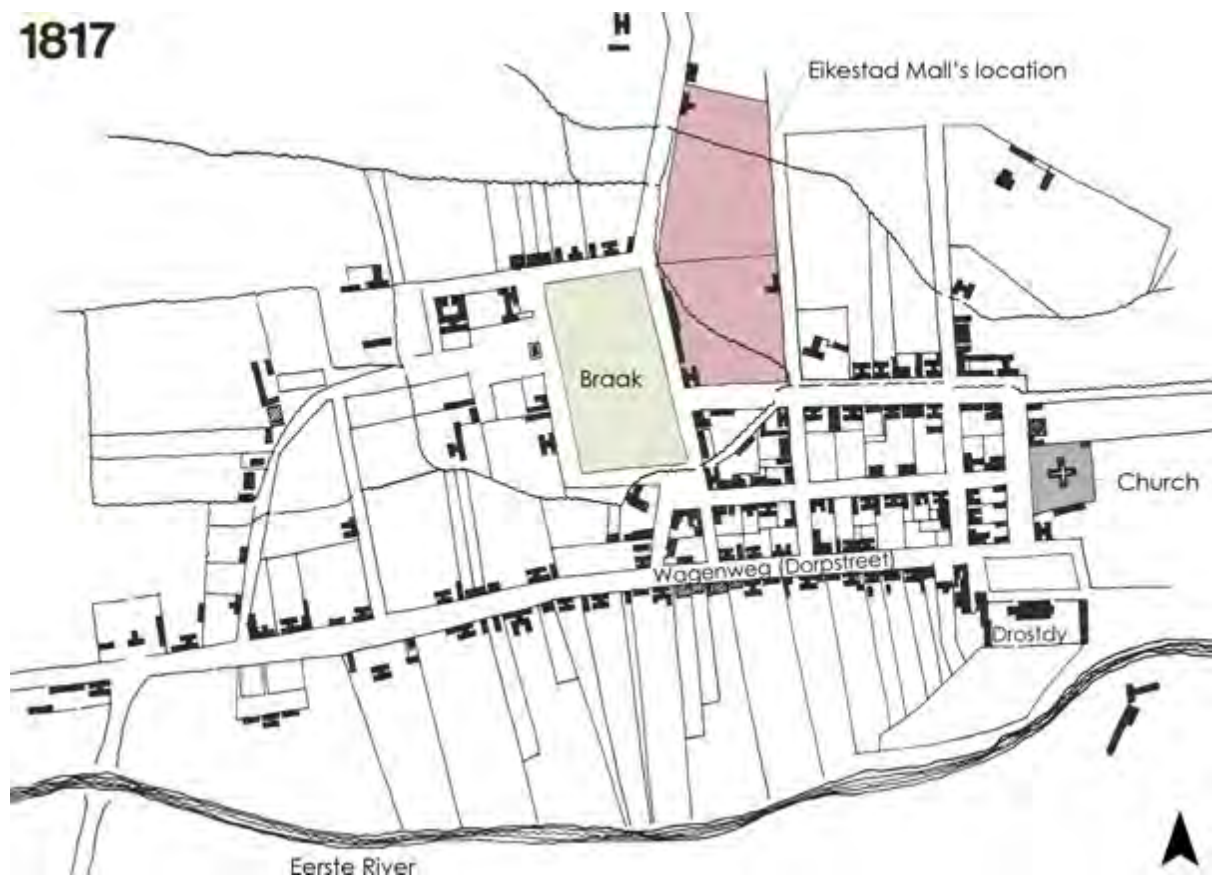


Figure 5.3: Stellenbosch in 1817 (source: adapted from Stellenbosch Drie Eeue, 1979:89).

In 1859, the Town Council had a new plan of Stellenbosch drawn up with the object of selling off more building sites. The intention of the Town Council was to encourage settlement to develop away from the long stretch of fertile land along the banks of the Eerste River, and instead grow out of the dry northern

“plain” in the region of the present Du Toit Train Station. For over a century Stellenbosch remained the seat of this frontier magistracy. Missionaries and rural settlements, such as Simondium, Raithby, Pniel, Lanquedoc, Jamestown, Johannesdal, Kylemore, and Klapmuts developed around Stellenbosch.

The Franschhoek of today has its origins in 1688, when the Huguenots (French Protestants) fled from their homeland because of religious persecution by the Catholic monarch, Louis XIV. Facing an uncertain future as refugees in Europe, about 200 Huguenots arrived at the Cape. The French settlers brought with them a sound knowledge of viniculture and settled down to make wine in the fine French tradition. These French at the Cape soon lost their national identity, although the French farm names are still with us to this day. Franschhoek, is also a town decorated with restored Cape Dutch and Victorian houses, wine stores, grand wine estates and still retains an underlying French ambiance. The French Huguenot Memorial was constructed in 1938 to commemorate the arrival and importance of the French culture to South Africa.

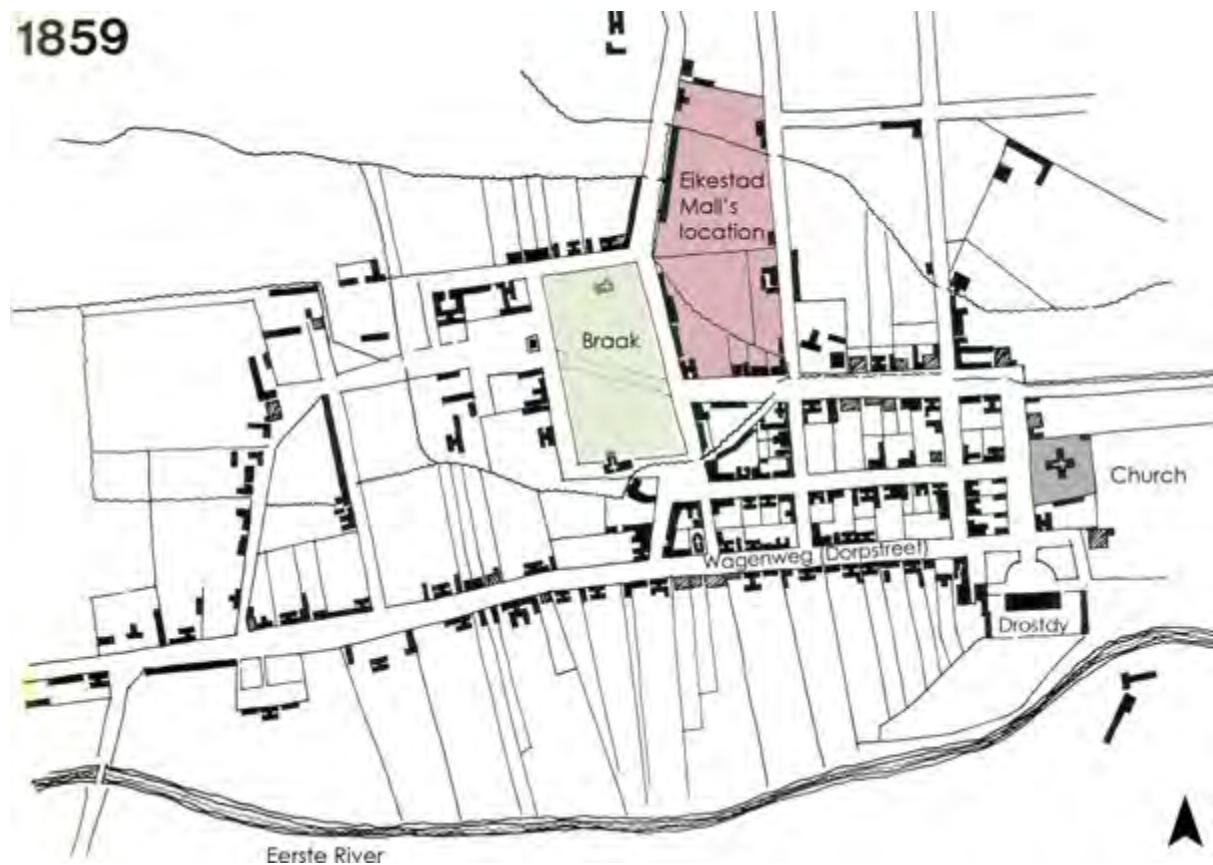


Figure 5.4: Stellenbosch in 1859, illustrating the growth pattern i.e. space (source: adapted from Stellenbosch Drie Eeue, 1979: 93).

### ***The Locality for Stellenbosch's Origin***

Central place theory is a spatial theory in urban geography that attempts to explain the reasons behind distribution patterns and size. It also attempts to provide a framework by which those areas can be studied both for historic reasons and for the locational patterns of areas today. Jefferson (1931: 453) wrote that: "Cities do not grow up of themselves. Country sides set them up to do tasks that must be performed in central places". This simply means that a city does not originate in a random location, but that its origin is directly linked to a purpose that is determined by the location it is situated in. Nel & Van Zyl (1962) furthers this statement by arguing that the speed of growth of a city is embedded in its economic aspects, rather than in religion, social or political aspects.

Central place theory was first proposed in the 1930s by a German geographer, Walter Christaller. The theory was developed to explain the size and spacing of cities that specialise in selling goods and services. According to the central place theory, a central place is a market centre for the exchange of goods and services by people who are attracted from the surrounding area. The central place, as the name implies, is centrally located to maximise accessibility for people from the surrounding region. Central places compete with each other to serve as a market for the provision of goods and services. This competition creates a regular pattern of settlement. Arguably the Braak in Stellenbosch was 'this' central place where market activity took form, because of its nodal position (refer to Figure 5.3 & 5.4).

Slow development took place during the 19<sup>th</sup> century after the development of towns such as Tulbagh and Worcester, caused Stellenbosch to be bypassed on the route from Cape Town to the hinterland towns. Low density development on the periphery relaxed the core not to grow intense. The Hager Map of 1859 shows growth in the town's religious institutions built; in 1823 the Rhenish Church, in 1852 St. Mary's Church, and in 1853 the Lutheran Church (Stellenbosch Drie Eeue, 1979).

Davis (1957) argues that all major cities in the world are situated on one of the following locations: where rivers merge; where a river mouths into the ocean; where important sea transport routes cross next to the coast (suitable harbour); where important rail lines intersect; or where the earth's morphological forces the use of a certain route. Analysing Stellenbosch according to Davis's (1957) theory on the location of a city's origin; poses the question: how is a city born? Stellenbosch is in fact situated where two rivers merge and where the earth's morphology (topography) forces the ease of access in a specific route. Although Stellenbosch did not originate due to the intersecting of major rail lines, nonetheless, it acted as a halfway station between the east and west coast and is situated where major routes intersect (the route connecting Paarl, Somerset-West and Franschoek).

Physical configuration, powerfully effecting route patterns, naturally plays a big part in granting situations with potential nodality. Such natural nodality predisposes these situations to be scenes of traffic concentration and urban development. Thus, the stage is set for urban activity where valleys converge in

country of strong relief or at the junction of highlands and lowlands where channels of movement, concentrated along the valley lanes in the highlands, deploy more freely as the valleys pen out into plains.

(Smailes, 1953: 55)

This statement of Smailes (1953) support the natural setting Stellenbosch was originally established in, situated in the valley between Bottelaryberg (now known as Pappegaaiberg), Simonsberg, Jonkershoekberg, Stellenboschberg and Helderberg. It can be argued that both Smailes' (ibid.) and Davis' (1957) theories are applicable in the physical morphology of Stellenbosch. Certain physical features, for one reason or another, have been favoured for the location of towns (Stellenbosch) and provide a basis for their classification according to site types (Smailes, 1953).

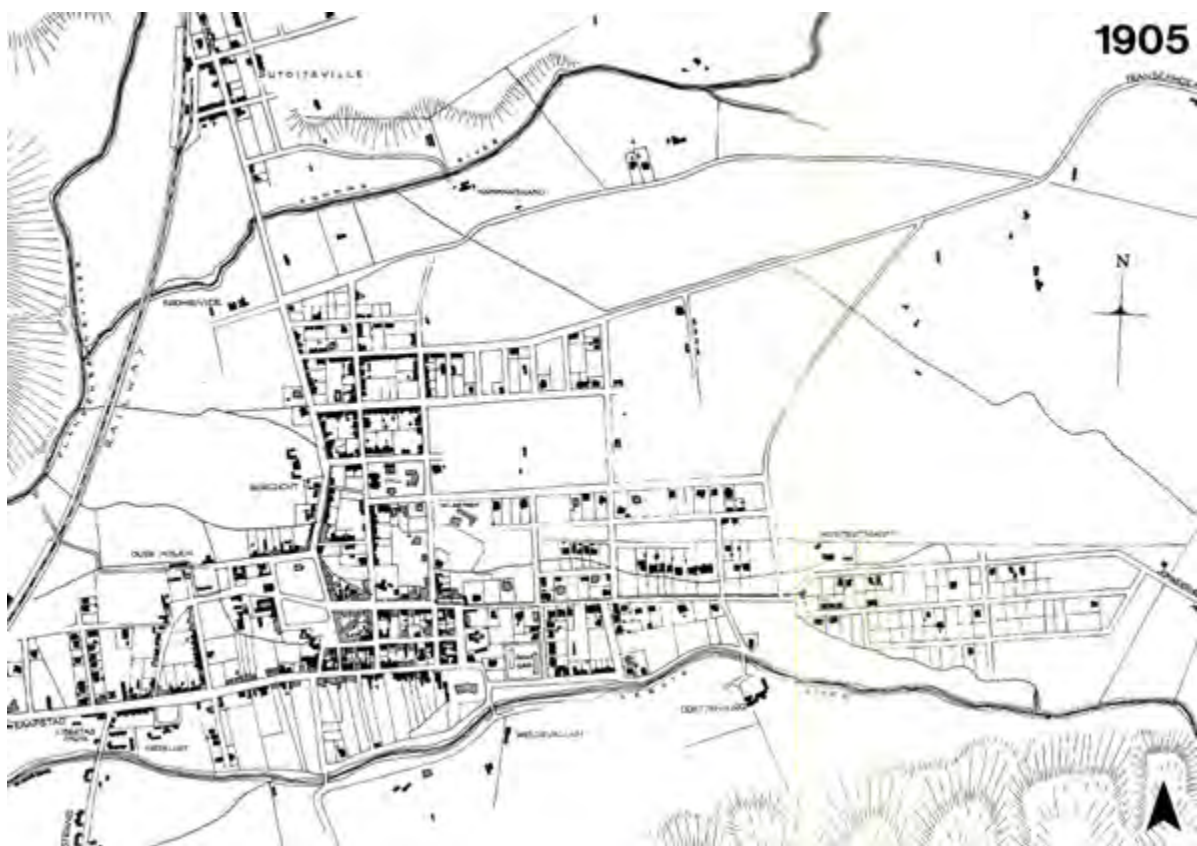


Figure 5.5: Stellenbosch in 1905 (see railway on west boundary (source: Stellenbosch Drie Eeue, 1979).

## 5.2 Bio-Physical Analysis

### 5.2.1 GEOLOGY

A variety of geological formations occurs in the Municipality and pose moderate to high engineering constraints to development. Figure 5.6 illustrates the main geological formation zones. The geology can be described as quaternary alluvium derived mostly from Table Mountain sandstones and the Malmesbury Group clays (with some Cape Granite) (Stellenbosch EMF, 2014). Along the R44 route, the sections to the north of the Blaauwklippen River are largely underlain by Malmesbury Group shales, while to the south of the river, the Cape Granites of the Stellenbosch-Kuilsriver and Helderberg Plutons occur.

### 5.2.2 TOPOGRAPHY

Stellenbosch Municipality is characterised by a diversity of topographical features from gently rolling hills to wide open plains, high impressive mountains and secluded valleys. The most defining feature of the Municipality is its mountain ranges which give shape and a magnificent backdrop to its fertile agricultural valleys. These mountain ranges, which form part of the Cape Fold Belt, comprise the Klein Drakenstein and Limietberg Mountains, which run in a north-south direction forming the eastern, and north-eastern boundary of the Municipality, and the Hottentots Holland mountain range which, together with the Helderberg Mountains, form the southern boundary (Stellenbosch EMF, 2014).

The central part of the Municipality is characterised by steep valleys and high peaks, i.e. Simonsberg, Jonkershoek Mountains and Groot Drakenstein Mountains (refer to Figure 5.7). These mountains create the secluded Ida's Valley and are a natural divider between the two main towns of Stellenbosch and Franschhoek. The Franschhoek valley characterises the eastern part of the municipality. The enclosed valley formed by the Drakenstein and Hottentots Holland mountain ranges flattens into gently undulating plains to the north up to Paarl Mountain (Stellenbosch Municipality, 2014).

### 5.2.3 SOILS

The greater part of the Municipality comprises fertile soils capable of efficient agricultural production (refer to Figure 5.8) (Stellenbosch EMF, 2014). Since agriculture is one of the main four contributors to the GDP of the Municipality (BER, 2013), soil conservation is of great economic importance.

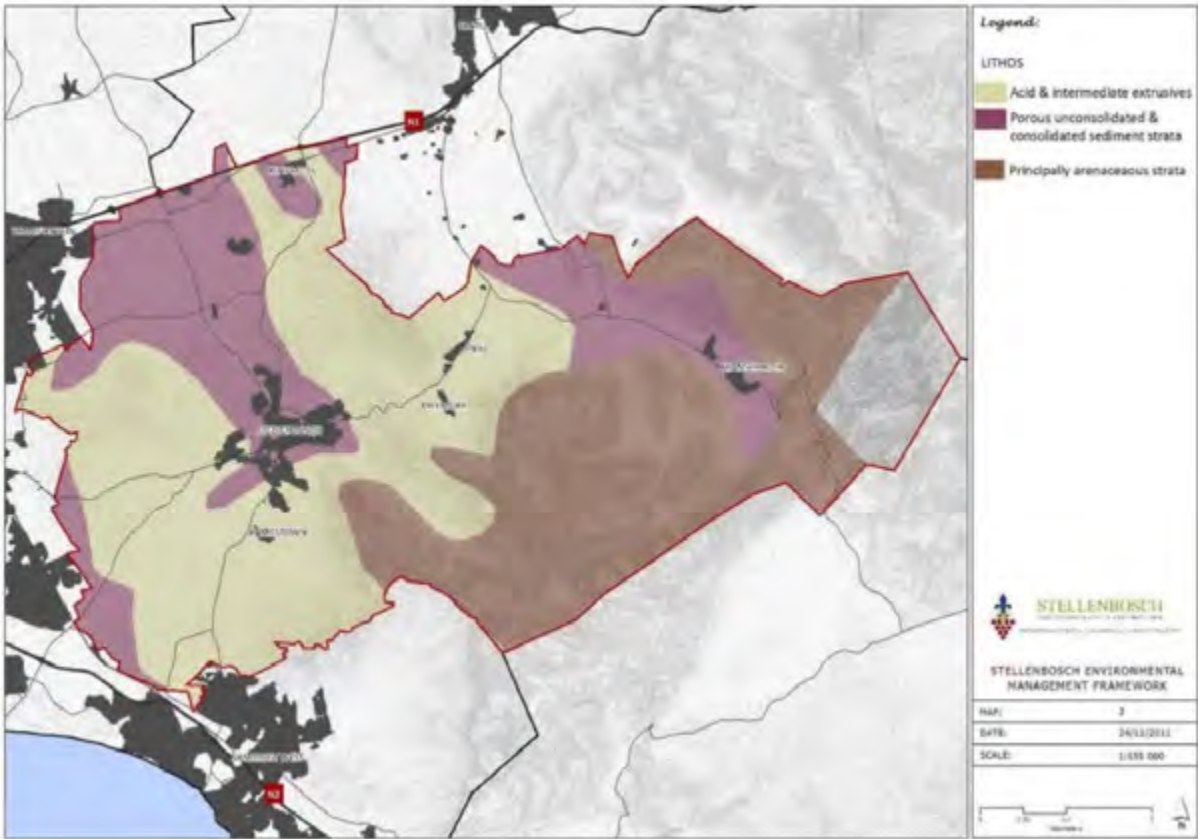


Figure 5.6: Geology of Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

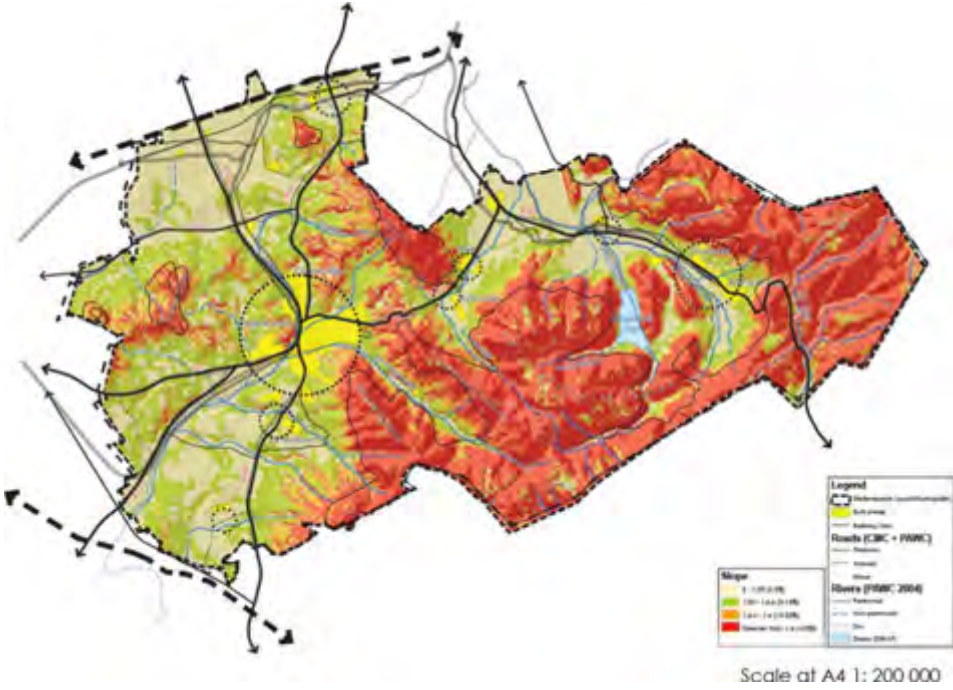


Figure 5.7: Slope Analysis (source: CNdV Africa, 2009).

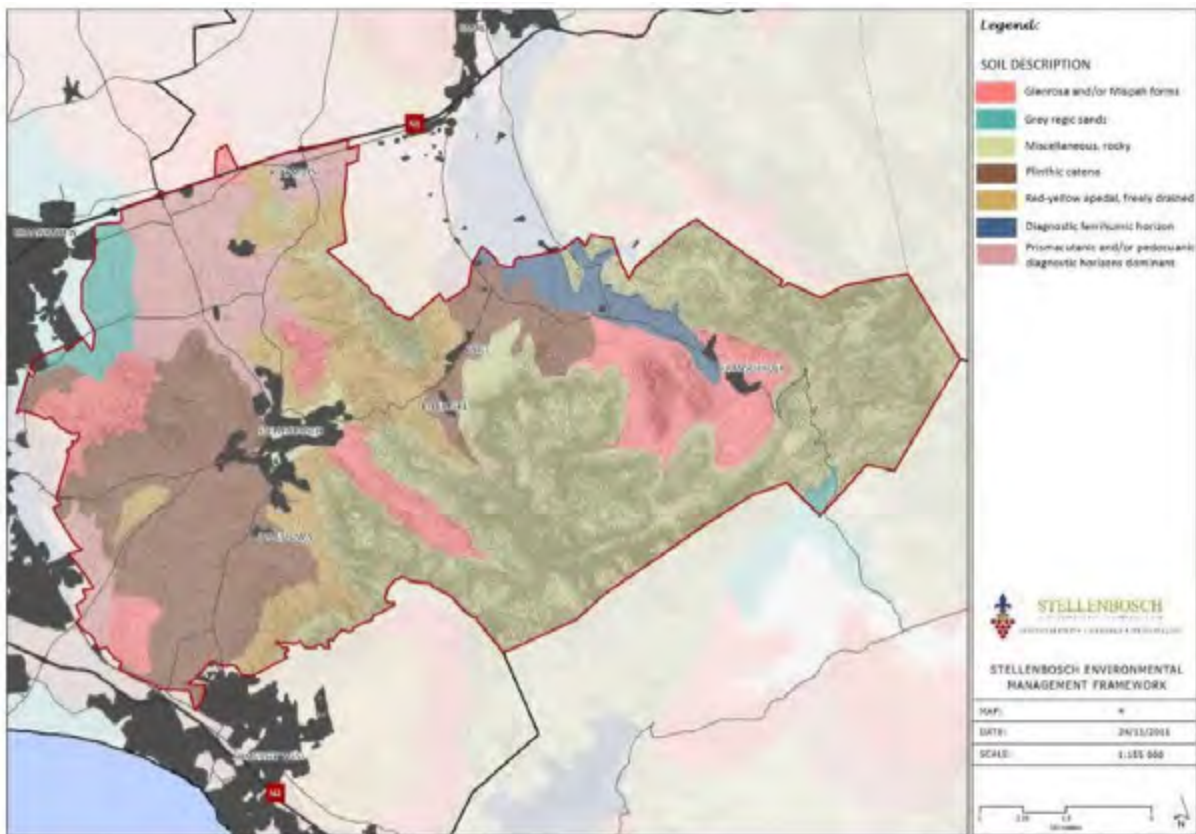


Figure 5.8: Soils of Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

## 5.2.4 CLIMATE

The Municipality has a Mediterranean climate characterised by warm, dry summers and cold, wet winters (Stellenbosch EMF, 2014). Summers are generally hot with temperatures averaging between 25°C and 30°C (DEA&DP, 2005). Heat waves lasting a few days occur reasonably frequently in summer. The southern part of the Municipality is on average 0.5°C cooler than the northern part (ibid.). Winter temperatures are usually mild, varying from about 5-6°C in the Stellenbosch and Franschhoek areas (ibid.). Occasional cold snaps accompanied by snowfalls on the higher mountain peaks are an annual winter occurrence. The Status Quo Report on the climate change in the Western Cape (2005) states that the future climate of the Western Cape is likely to be warmer and drier than at present, according to a number of current model projections. In support of these projections, recent temperatures trends reveal appreciable warming in the Western Cape over the past three decades. Rainfall trends are not as clearly identifiable. A future that is warmer, and possibly drier, will encompass a range of consequences that will affect the economy, the livelihoods of people and the ecological integrity of the Western Cape region (DEA&DP, 2005).

## **AIR QUALITY**

The air quality is gradually deteriorating and regulation and monitoring of air quality is fragmented and inconsistent (Stellenbosch EMF, 2014). There is a general trend towards increased industrial emissions (including those from brickworks), an increase in the application of agrochemicals including pesticides (including occasional aerial spraying due to rapid expansion of agricultural development) and increased greenhouse gas and particulate emissions from the increasing incidence of veld fires and the burning of crop residues (ibid.). In addition, potentially hazardous chemicals are emitted from the burning of materials such as tyres in vineyards. Many households are still dependent on wood and paraffin for heating and cooking and these fuels emit volatile organic compounds, nitrogen oxide and particulate matter (ibid.). Some of these conditions may be exacerbated by climate change, due to an increase in the number of days on which temperature inversions occur and the resulting entrapment of air pollution at low levels in the atmosphere with risks to health and the environment. An increased incidence of berg wind conditions could also result in more frequent wild fires.

## **RAINFALL**

Stellenbosch Municipality is located within the winter rainfall area. The Municipality receives approximately 80% of its annual rainfall in the winter months, typically as cyclonic rain from cold fronts, and 20% during its summer months (Elsenburg, 1990). Most areas of the Municipality have moderate to low rainfall, except for the mountain areas, which have been known to receive some of the highest rainfalls in the country. These high rainfall areas, however, constitute only a very small part of the Municipality. Rainfall across the Municipality varies from 200 mm to 3 000 mm per year, in the higher peaks of the Groot Drakenstein mountain range, decreasing to the west, away from the influence of the mountains (refer to Figure 5.9) (Stellenbosch EMF, 2014).

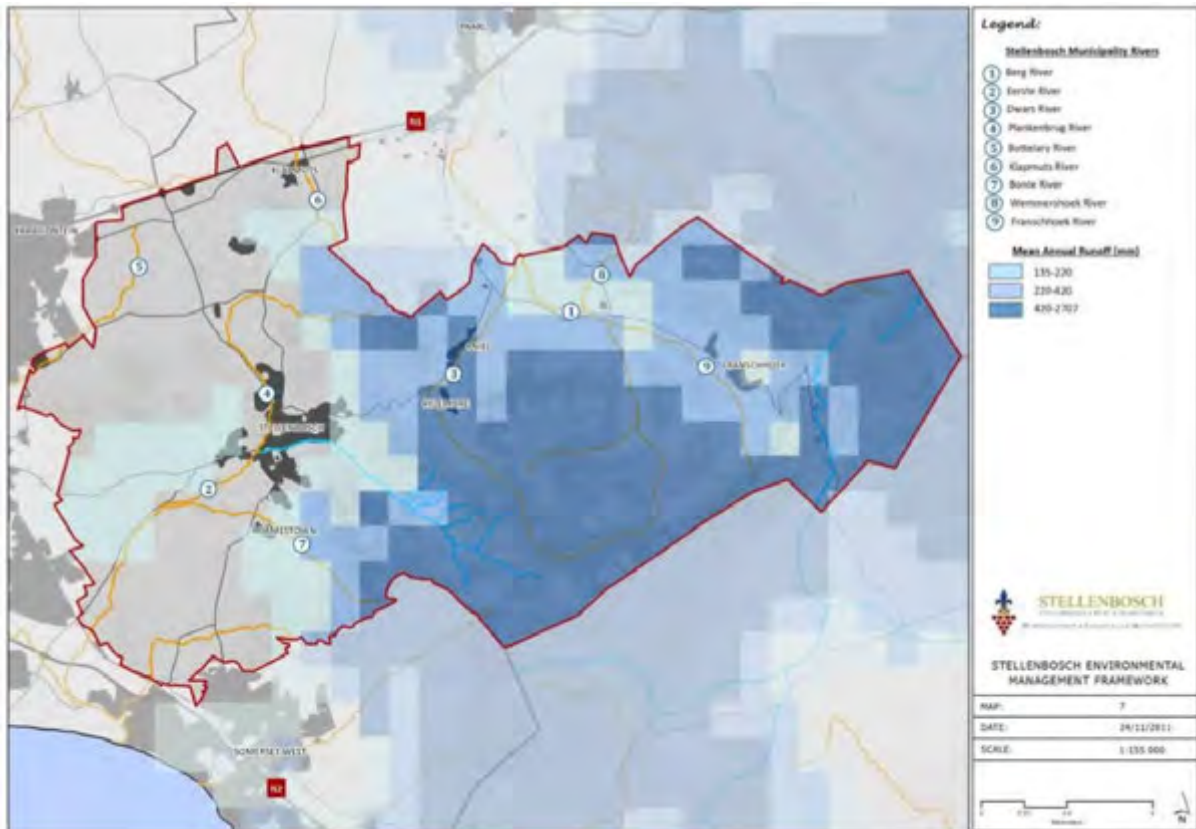


Figure 5.9: Mean annual runoff in Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

## 5.2.5 HYDROLOGY

Water is the most critical natural resource in the municipality. All sectors and communities are dependent on a sustainable supply of water. The importance of water resources must also be considered within the context of South Africa's dominantly semi-arid climate. Projected surface water demand estimates indicate that the country faces water scarcity by the end of the century (Bosch et al, 1984).

In addition to its ecological functions, the study area has an immensely important socio-economic function as water catchment area. Catchment is defined as the entire land area from which water flows into a river. Catchments can be divided into smaller 'sub-catchments' which are usually the area which drains a tributary to the main river or a part of the main river. The Municipality forms part of eleven quarternary catchments as shown in Figure 10. These catchments feed a number of large dams such as the Theewaterskloof, Brandvlei, Voëlvei, and Wemmershoek, as well as numerous smaller farm dams. These dams provide water to the Cape Metropolitan Area and various rural towns and agricultural areas, including Stellenbosch, Villiersdorp, and large areas of the Winelands, Overberg and Swartland. The



water to 640 000 people (ibid.). The water supports agricultural irrigation and urban uses in the Greater Cape Town Metropolitan Area (ibid.).

The two major river systems in the Municipality are the the Eerste River System and Franschhoek River, which flows into the Upper Berg River System (refer to Figure 5.11). Besides being important sources of water, these river systems are prominent place-making features of the landscape and valuable tourist and recreational assets. Furthermore, the Eerste and Franschhoek River Systems are also important recipients of storm water. The Eerste River system, which flows through the town of Stellenbosch, rises in the Dwarsberg at the head of the Jonkershoek Valley and stretches for approximately 40 km (Stellenbosch EMF, 2014). The river flows through the Jonkershoek Nature Reserve, pine plantations and farmland containing vineyards. The Kleinplaas Dam has been constructed on the river before entering Stellenbosch. During summer months, the Municipality diverts much of the water in the Eerste River, upstream of the Kleinplaas Dam, to the Idas Valley Dam at the Jonkershoek diversion. The role of the Eerste River is diverse. Although it has an important engineering role in handling storm water and has been substantially altered, it is still a habitat for indigenous fauna and flora.

A large portion of Stellenbosch Municipality is defined as Strategic Water Source Areas (SWSA) (refer to Figure 5.9) (Stellenbosch EMF, 2014). SWSAs are water areas that supply a disproportionate amount of mean annual runoff to a geographical region of interest. These areas are important because they have the potential to contribute significantly to overall water quality and supply, supporting growth and development needs that are often a far distance away.

SWSA areas make up 8% of the land area across South Africa, Lesotho and Swaziland but provide 50% of the water in these countries. At a national level, SWSA's form the foundational ecological infrastructure on which a great deal of built infrastructure for water services depends. Investing in SWSA's is also an important mechanism for long-term adaptation to the effects of climate change on water provision growth and development. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. The importance of managing this small fraction of land that contributes so vitally to our water security should be acknowledged at the highest level across all sectors. Appropriate management includes: maintaining healthy functioning riparian zones and wetlands; ensuring good agricultural management leads to soil conservation that supports the water cycle; avoiding activities that reduce stream flow (e.g. irrigated agriculture and forestry plantations) and where it is not possible, ensuring careful regulation of these activities; minimizing ground water abstraction; clearing invasive alien plants and restoring the hydrological functioning of degraded landscapes (Stellenbosch EMF, 2014).

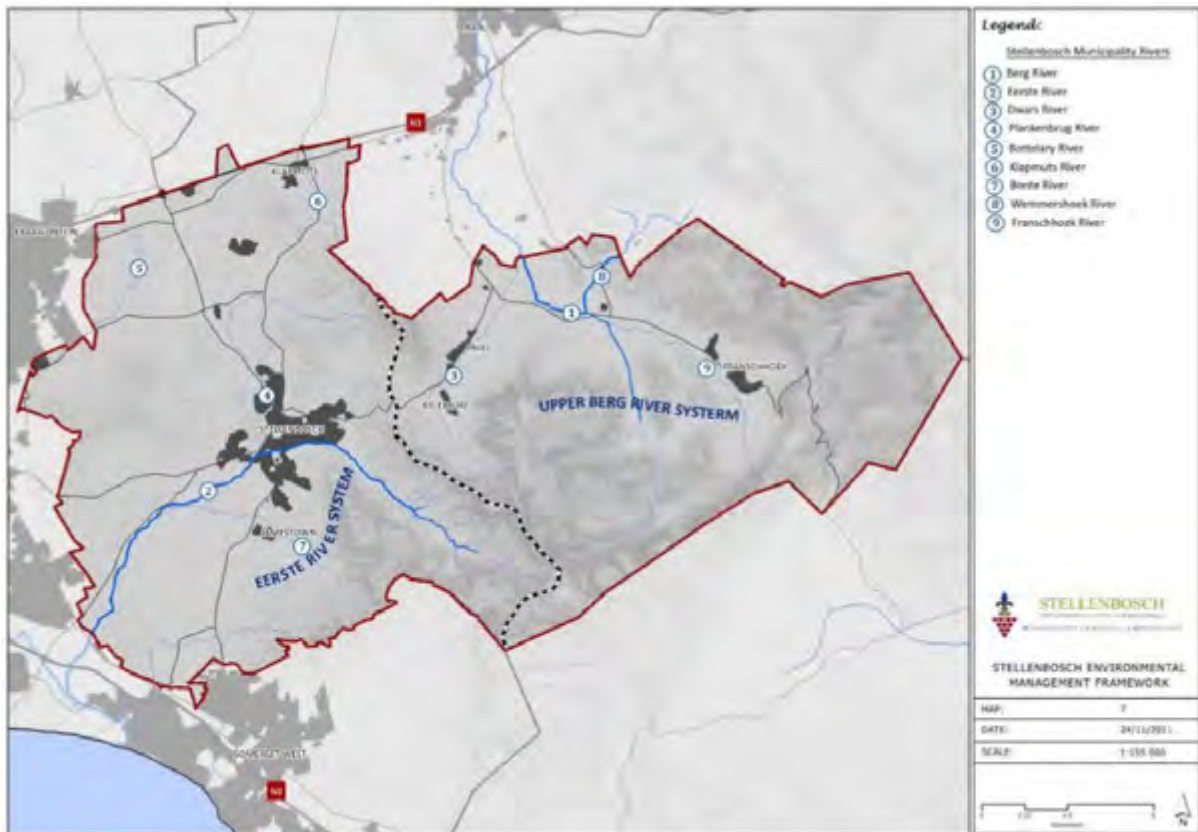


Figure 5.11: The two major river systems in the Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

In terms of the Freshwater Ecosystem Priority Areas (FEPAs) classification, most of the rivers located in the intensively cultivated and built-up areas of Stellenbosch, Franschoek, Pniel and Klapmuts, are largely modified and degraded (refer to Figure 5.12). The upper reaches of the Eerste and the Berg rivers are, however, relatively pristine and able to contribute towards river ecosystem targets (SRK Consulting, 2011). Figure 5.12, indicates the state of the rivers in the Municipality.

In general, there is a relatively close relationship between the condition of river buffer areas (the amount of natural vegetation remaining), the condition of the river itself and the presence of agriculture and/or towns along the river. More degraded rivers generally have less natural vegetation remaining in their river buffers, and rivers that are largely natural in their upper reaches become noticeably degraded once they enter agricultural areas or downstream of urban areas (SRK Consulting, 2011).

The rivers in the region are of immense conservation importance. This is largely due to their function as ecological corridors that link the various core conservation areas and provide for the migration species between habitats. Most of the rivers in the Municipality are under pressure from pollution and can present a serious health threat to the surrounding settlements. There is a rapid expansion of inappropriate agricultural development in spite of the problems associated with manifesting climate change (e.g.

crops with high water needs such fruit); demands for increased urban water supply by the Cape Metropolitan Area; water quality and quantity in the Cape Winelands is being negatively affected by agricultural activities along certain rivers (e.g. Plankenbrug River), by increasing abstraction of surface and groundwater resources, infestation by alien vegetation that consumes high volumes of water, a general increase in the pollution of rivers (e.g. the Berg River and Plankenbrug River) due to factors such as storm water and wastewater discharges, and by the effects of climate change that are reducing river flow in the area. This has a significant ecological effect and the delivery of goods and services by the rivers in the area is decreased.

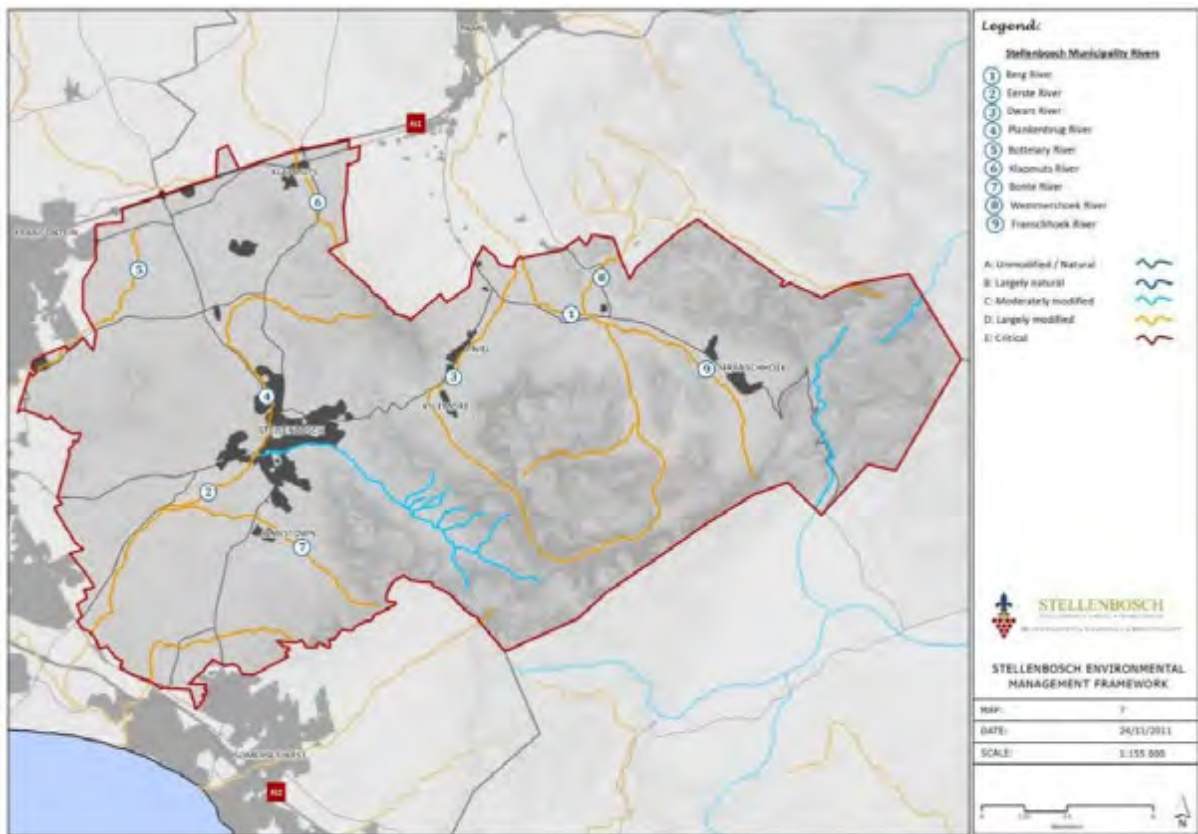


Figure 5.12: State of the rivers in Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

## 5.2.6 BIODIVERSITY

### **FLORA**

A primary reason for the conservation of the natural environment of the Greater Stellenbosch Municipality is that it forms an integral part of the world-renowned Cape Floral Kingdom. The Cape Floral

Kingdom is internationally recognised as one of the six Floral Kingdoms of the world (Stellenbosch EMF, 2014). The Cape Floral Kingdom (0, 06% of the earth's surface) is the only kingdom that is entirely contained, within a single country. It is characterised by its exceptional richness in plant species and its endemism. More than 8 700 species are known to occur, with more than 68% of these species being confined and compares with some of the richest floras worldwide, surpassing many tropical forest regions in its floral diversity (ibid.).

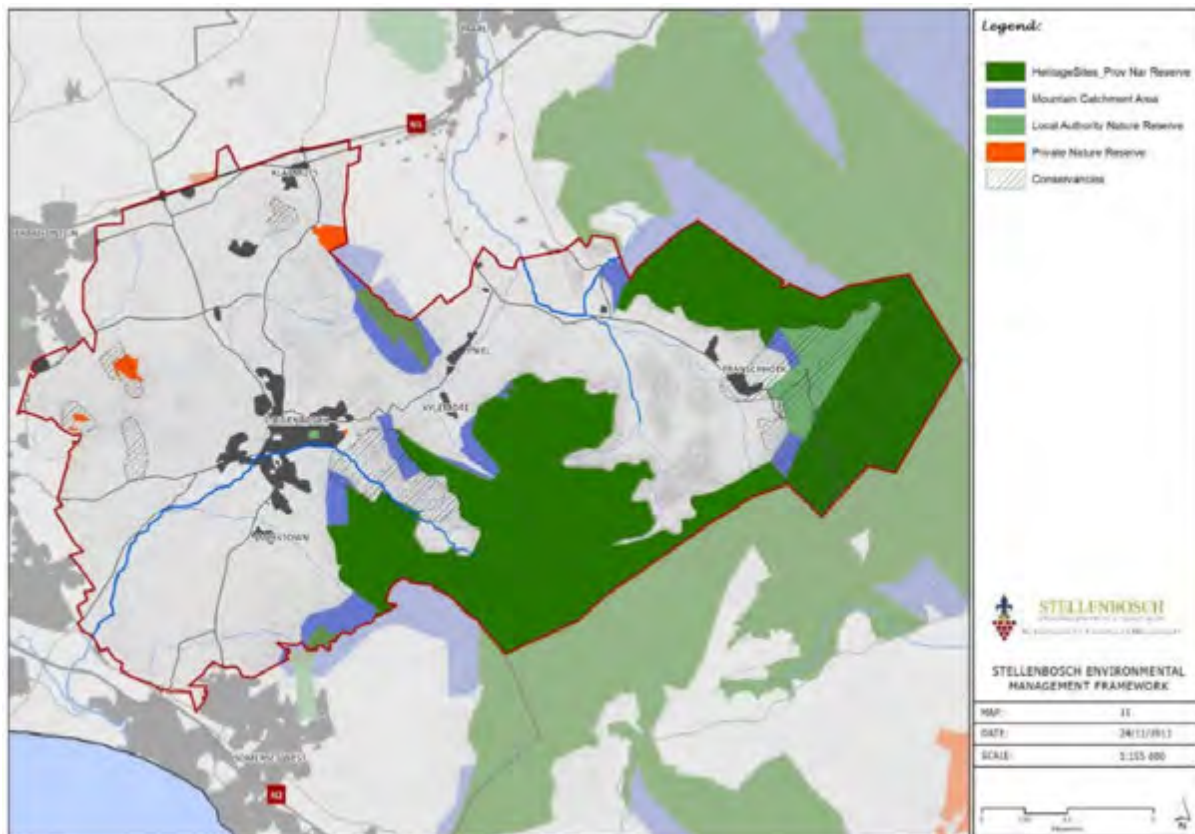


Figure 5.13: Conservation areas in the Greater Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

The enormous diversity found in the Cape Floral Kingdom is attributed to the age of this kingdom. The last Ice Age had far less of an influence on this area than it did on the Northern Hemisphere. Plant life in the Northern Hemisphere was almost wiped out while conditions in the Western Cape were altered very little. The diversity can also be attributed to the harsh conditions and infertile soil of the area which has forced plants to adapt to ensure their survival.

The Cape Floral Kingdom is of immense scientific importance, both nationally and internationally. It covers only 4% of South Africa, but contains 45% of all plant species of Southern Africa (Stellenbosch EMF,

2014). About 75% of all plants in the South African Red Data Book are found in the Cape Floral Kingdom and of these species, 1 700 are threatened (ibid.). Many Fynbos species are extremely localised in their distribution, with sets of such localised species organised into 'centres of endemism' (Low and Robelo, 1996).

In the mountainous areas of the Municipality, more than 1 300 plant species are known to occur, of which a number are rare or endemic to the area (refer to Figure 5.13). Some of these distinctive species are *Protea repens*, *P. neriifolia*, mountain cypress, as well as various ericas and restios. Several relic forest communities occur in narrow, moist kloofs where they are relatively sheltered from fire. Dense riparian vegetation grows along the banks of the Eerste River and adjoining streams.

The natural vegetation of the Municipality is illustrated in Figure 5.14, and is discussed below:

#### a) West Coast Renosterveld

The information provided by the South African National Biodiversity Institute (SANBI) and the Cape Action for People and the Environment (C.A.P.E.) with regard to the irreplaceability of habitats, indicates that the natural environment of the Stellenbosch Municipality is of immense conservation importance (refer to Figure 5.13). This is mainly due to the fact that the area is, or used to be, the habitat of the now almost extinct West Coast Renosterveld. The objective is to rehabilitate and conserve as much as possible of this area.

West Coast Renosterveld occurs on Western Cape forelands from just north of Piketberg, to Somerset West, mainly on lowlands and low hills. It is confined largely to Malmesbury Group shales, Cape Granite Suite and Klipheuwel Formation shales, which weather to form heavy clays and loamy soils. Occurring on more fertile soils, most of this vegetation type has been ploughed up for wheat, or vineyards in wetter areas. Less than 3% of the original area remains, with less than 1% of the original area being found in nature reserves.

This vegetation type is characterised by mid-dense to closed cupressoid and small-leaved, midhigh evergreen shrubs, with regular clumps of broad-leaved, tall shrubs as emergents (especially on heuweltjies). The overstorey is dominated by Renosterbos *Elytropappus rhinocerotis*, with subdominants of Wild Rosemary *Eriocephalus africanus*, Dune Teabush *Leysera gnaphalodes*, Jakkalsstert *Anthospermum aethiopicum*, *Athanasia trifurcata*, *Felicia filifolia*, *Metalasia muricata* and *Stoebe spiralis*. The understorey is mainly annual and herbaceous with perennial grasses.

The Mediterranean annual grasses, Oats *Avena*, Quaking Grass *Briza* and Ryegrass *Lolium*, have become widespread and common and their effect on the indigenous grasses and geophytes is unknown. Bush

clumps are dominated by typical Thicket Biome species, such as Wild Olive (*Olea europaea* subsp. *africana*), Dune Taaibos (*Rhus laevigata*) and Bush Guarri (*Euclea racemosa*) (Low & Robelo, 1998).

#### b) Mountain Fynbos

Mountain Fynbos is the most widespread vegetation type of the Fynbos Biome, occurring mainly along the Cape Fold Belt from north of Nieuwoudtville to near Port Elizabeth. It is largely confined to soils derived from sandstones of the Cape Supergroup, except where the rainfall is sufficiently high, when it occurs on leached soils derived from granites (more than 300 mm to 400 mm per year) and even shales (more than 600 mm to 800 mm per year).

In general, mountain fynbos vegetation is well conserved, as the land is generally not suitable for agriculture, forestry or other forms of development. It is, however, threatened by encroachment of invasive alien species. Woody alien plants are the major threat in this vegetation type, with Pines (*Pinus* spp.), Needlebushes (*Hakea* spp.), and Wattles (*Acacia* spp.) being the most notable that impacts on the flora, fauna and water yield (Low and Robelo, 1998). The wetter valleys, lower slopes and riverine areas are under slightly more pressure due to agriculture, forestry operations and water resource development.

#### c) Sand Plain Fynbos

Sand Plain Fynbos is typically Asteraceous (species representing the Daisy family) and Proteoid (tall Protea shrubs with large leaves) and does not differ structurally from equivalent Mountain Fynbos types, although very few species are shared. Heaths (*Ericaceae*) are seldom dominant, but ericoidleaved shrubs tend to dominate with the Reeds (*Restionaceae*) and Sugarbushes (*Proteaceae*).

Sand Plain Fynbos is characterised by the presence of *Ninepin Heath Erica mammosa*, *Starface Phyllica cephalanta*, *Baboonface P. stipularis*, and the *restioids* *Thamnochortus obtusus* and *Sandveld Thatching Reed T. punctatus*. Three centres of endemism occur within this vegetation type, each characterised by their own suite of *proteoid overstorey*.

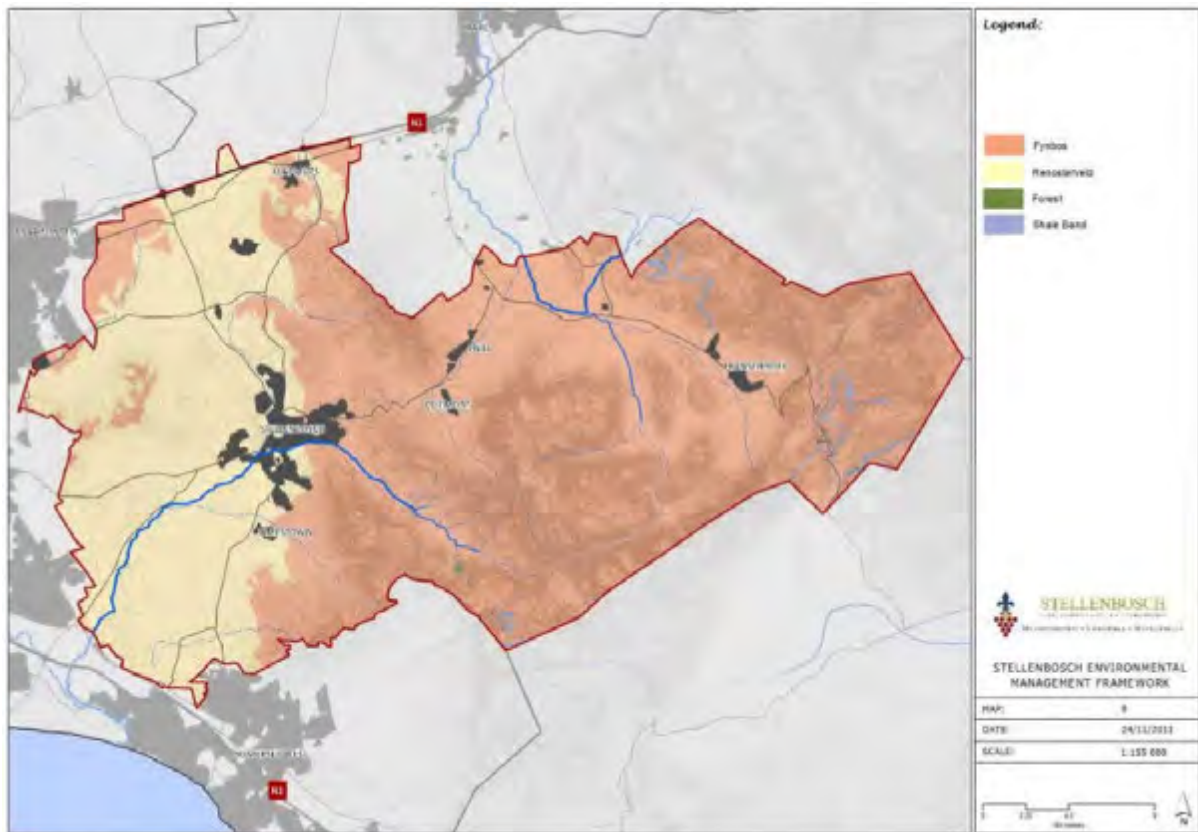


Figure 5.14: Broad vegetation types and their distribution in Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

## FAUNA

The Cape Fold Mountains is a centre of endemic mammal richness. Most of the wildlife of the Greater Stellenbosch Municipality is confined to the nature areas, with the fauna including the following (Stellenbosch EMF, 2014):

- a) Invertebrates: There is a high diversity amongst insects and mollusc groups. This diversity provides a wealth of resources and biological processes low in the food chain that supports a more conspicuous fauna.
- b) Fish: Indigenous fish recorded from the Berg River, upstream of the Berg River Dam, include *Barbus andrewii* (witvis) which is critically endangered in the Berg River and *Pseudobarbus burgii* (Berg River redfin) which is critically endangered and restricted to tributaries of the Berg River (Skelton, 1993). *Sandelia capensis* (Cape kurper) is commonly found in the rivers within the municipality, while *Galaxius zebratus* (Cape galaxias) is near threatened.

- c) Amphibians and Reptiles: Relatively high levels of species richness occur in the *herpetofauna*. On warm days, rock agamas are often encountered on the rocky outcrops where they display typical head-bobbing antics to defend their territories. Berg adder, puff adder, boomslang and Cape cobra are fairly common throughout the municipality.
- d) Birds: The area has a high species diversity, with more than 140 species occurring. This is a consequence of the wide variety of terrestrial and wetland habitats in the region and is typical of that of the Cape Mountains. Two endemic birds namely, the Cape sugarbird (*Promerops carer*) and the Protea Canary are found in the Limietberg Mountains near Franschhoek. Other large raptors that are found in the municipality include the black eagle, occasional fish eagle and spotted eagle owl, while kingfishers and typical Fynbos birds such as the sugarbird, orange-breasted sunbird and protea seed-eater are more abundant.
- e) Mammals: The mammals within the municipality represent a relatively small biomass. This fauna ranges from the smallest groups such as rodents and shrews, to larger species such as Honey Badgers, Baboons, Klipspringers, Grey Rhebuck and the Common Duiker. The Leopard (*Panthera pardus*) is the largest carnivore occurring in the mountains of Stellenbosch Municipality.

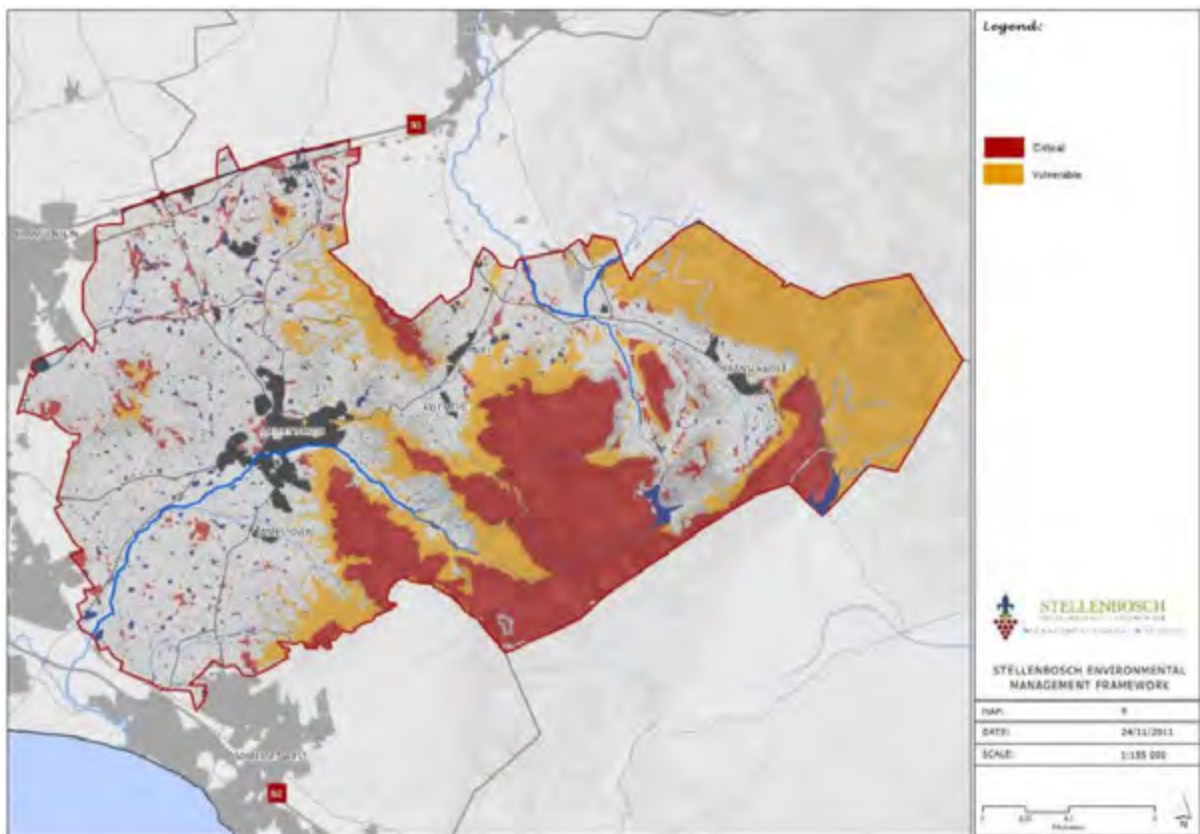


Figure 5.15: Irreplaceability of habitats in Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

Figure 5.15, indicates the critical and vulnerable conservation areas in the Municipality.

## PROTECTED AREAS IN THE STELLENBOSCH MUNICIPALITY

Significant portions of the Municipality fall within both public and private conservation areas that have been designated for conservation purpose. It is vital to identify and to protect these for future development.

CONSERVATION AREA		
Town/Vicinity	Property Name	Area (ha)
Stellenbosch	Koopmanskloof Private Nature Reserve	2 901
Stellenbosch	Karindal Private Nature Reserve	3.35
Klapmuts	Wiesenhof Wildpark Private Nature Reserve	175

Table 5.1: Public conservation areas in Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

NAME	CATEGORY	SIZE
Assegaaibosch Nature Reserve	Provincial Nature Reserve	197.8ha (0.24% of municipality)
Hawequas Mountain Catchment Area	Mountain Catchment Area	346.1ha (0.42% of municipality)
Haweqwa Nature Reserve	State Forest Nature Reserve	3997.8ha (4.81% of municipality)
Helderberg Nature Reserve	State Forest Nature Reserve	115.7ha (0.14% of municipality)
Hottentots-Holland Mountain Catchment Area	Mountain Catchment Area	2430.9ha (2.93% of municipality)
Hottentots-Holland Nature Reserve	State Forest Nature Reserve	1298.3ha (1.56% of municipality)
Jan Marais Local Nature Reserve	Local Authority Nature Reserve	24.2ha (0.03% of municipality)
Jonkershoek Nature Reserve	State Forest Nature Reserve	13848.3ha (16.66% of municipality)
Mont Rochelle	Local Authority Nature Reserve	1681.6ha (2.02% of municipality)
Papegaaiberg Nature Reserve	Section 23 Nature Reserve in terms of the National Environmental Management: Protected Areas Act	140.5ha (1.69% of municipality)
Simonsberg Nature Reserve	State Forest Nature Reserve	460.3ha (0.55% of municipality)
Theewaters Nature Reserve	State Forest Nature Reserve	4200ha (5.05% of municipality)
<b>Total of 11 reserves in Stellenbosch Municipality covering 28 741 ha (34.6% of municipality)</b>		

Table 5.2: Private conservation areas in the Municipality (source: Stellenbosch EMF, 2014).

## 5.2.7 COMPOSITE BIO-PHYSICAL CONSTRAINTS AND INFORMANTS MAP

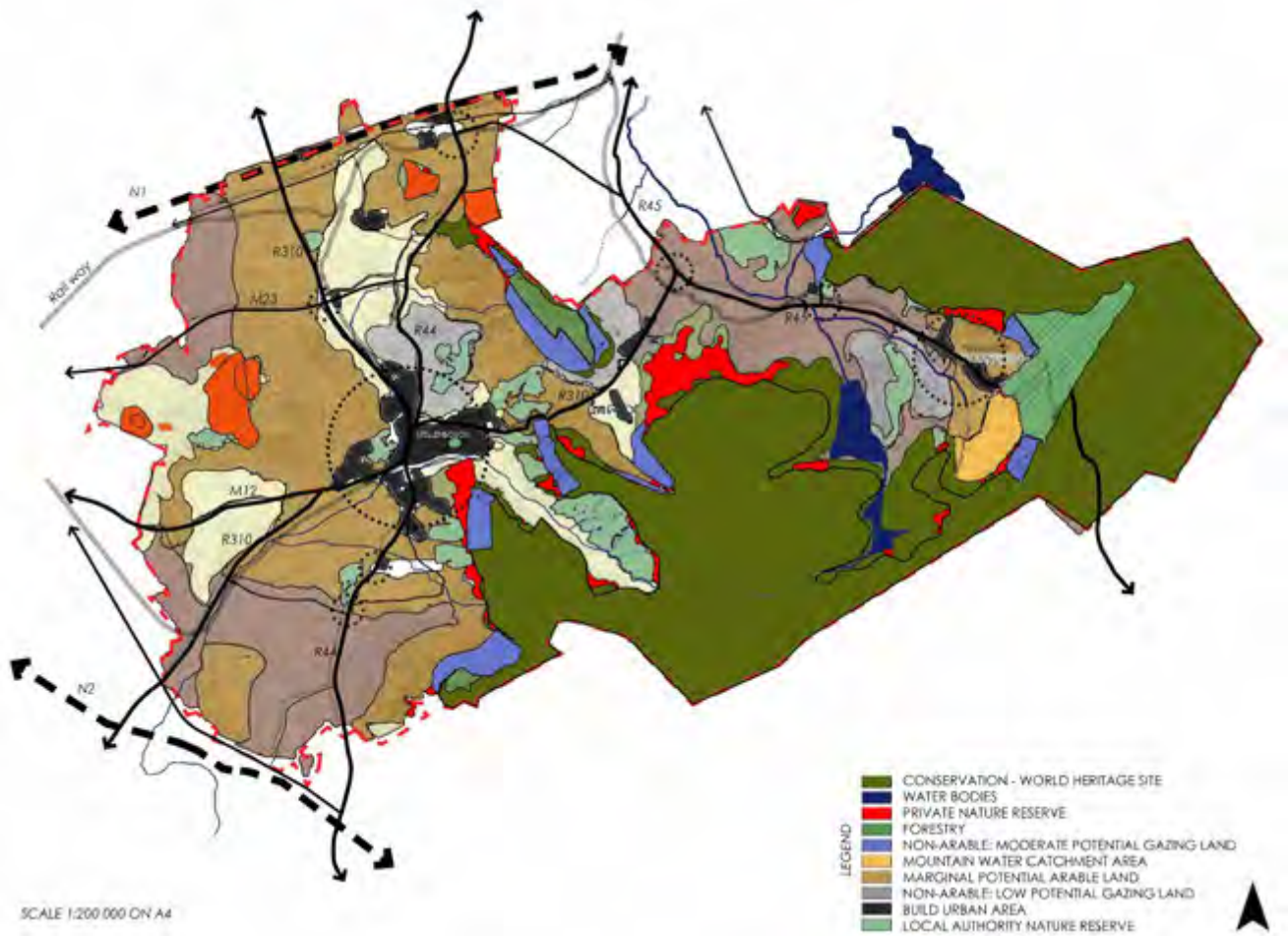


Figure 5.16: Composite Constraints and Informants (source: Author: 2016).

Figure 5.16 is a composite constraints and informants map. This map aims to direct development, with regards to 'where' development is constraints by bio-physical features, which should be protected for the ecological performance and well-being of the Municipality. Figure 5.16, indicates conservation, water bodies, private nature reserves, forestry, local authority nature reserves, mountain water catchment area, and then move beyond this point of protection and inform the process of non-arable moderate potential gazing land and non-arable low potential gazing land (possible development parcels).

### 5.3 MOVEMENT ANALYSIS

The R44 is in a critical state of reaching its capacity. The road network was calculated at a traffic demand increase of 15% over the 2014 traffic volumes (CITP, 2016). This indicates that a 15% increase in vehicle movement will bring the road to its capacity (ibid.). The projected time for the 15% increase in movement to happen was estimated at five years (ibid.). This issue raises a movement network challenge and shows that accessibility grid of the Municipality is not sustainable. Figure 5.17, illustrates the current movement grid. The scenario causing traffic congestions is visible in the diagram (Figure 5.17), indicating almost no by-pass roads. This causes Stellenbosch to act as a pivot point, which draws large amount of movement through its core, instead of allowing mobility to by-pass the core. The issue of mobility versus accessibility is critical for future development.

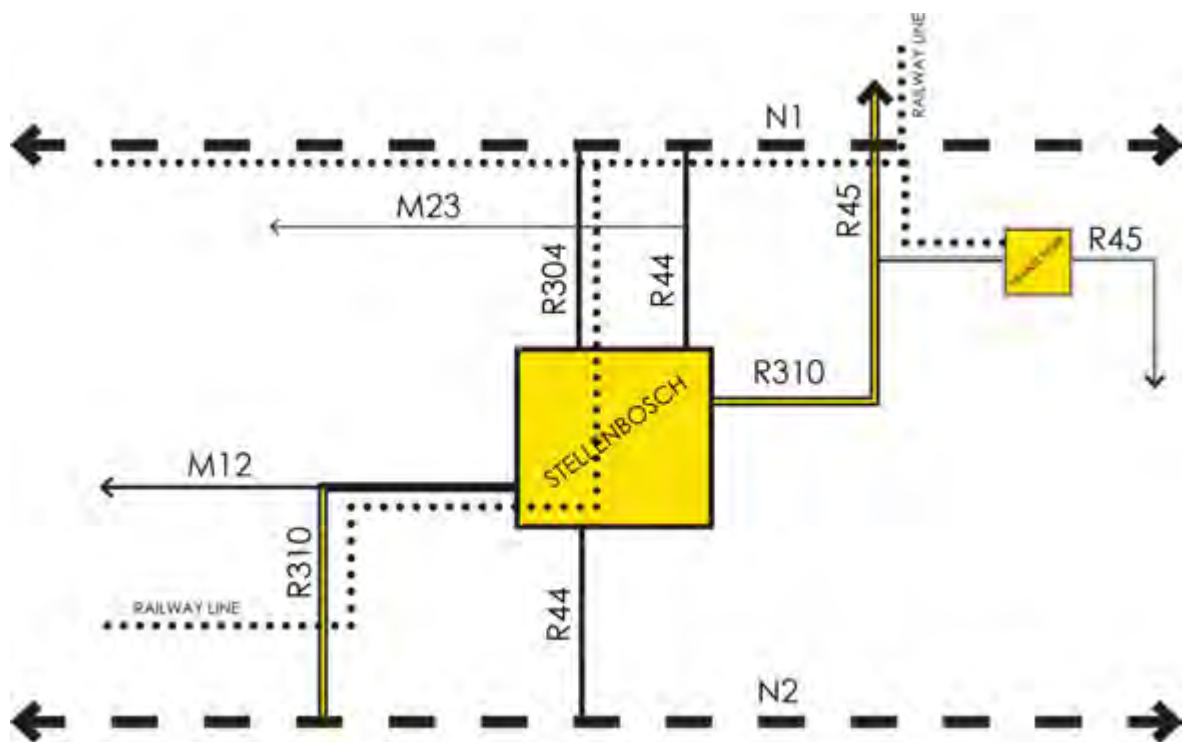


Figure 5.17: Conceptual diagram of existing movement routes (source: Author, 2016).

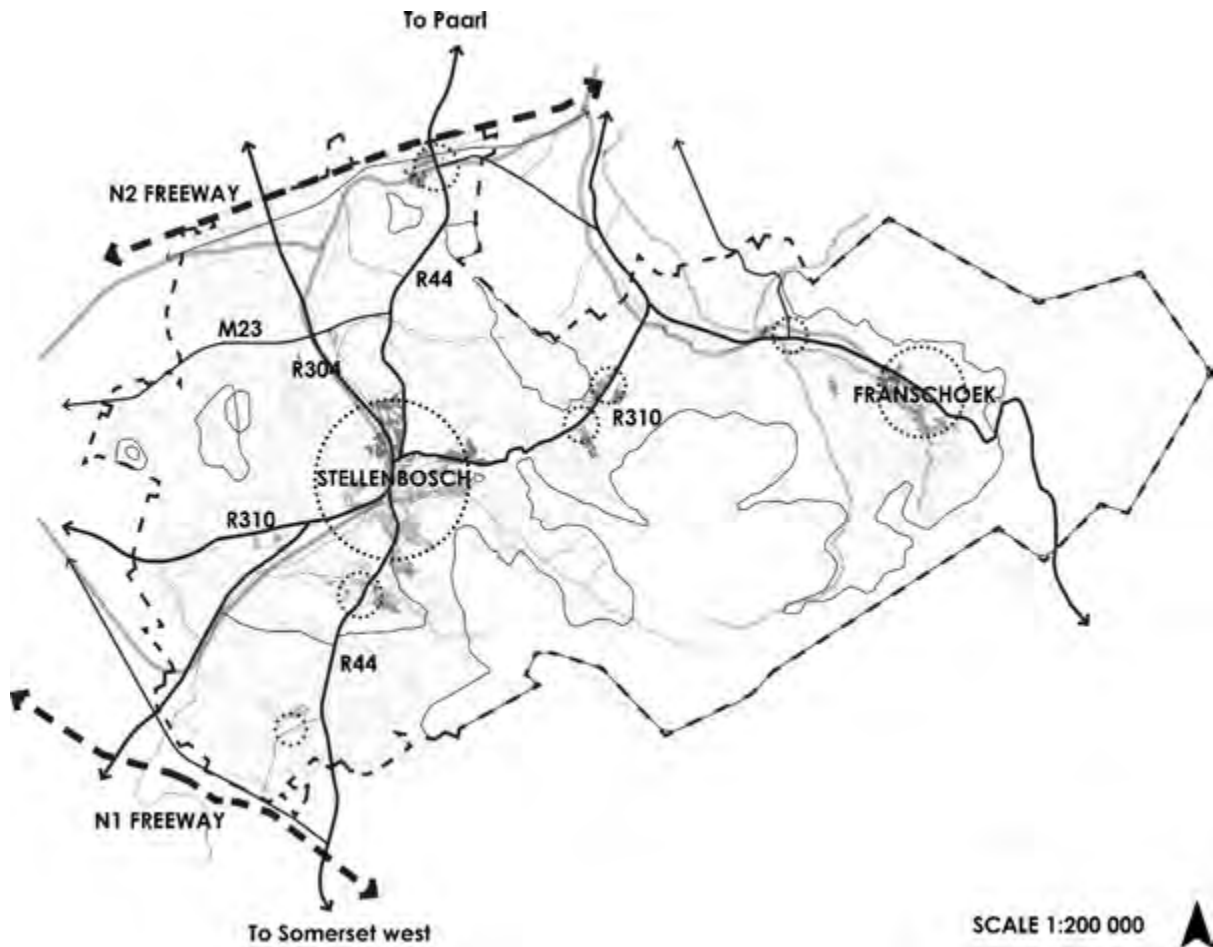


Figure 5.18: Sub-regional Road Network (source: Author: 2016).

## 5.4 CULTURAL LANDSCAPE

Stellenbosch Municipality has a deep history and a rich and varied heritage (Todeschini & Jansen, 2016). Our identity as individuals (who we are) and as part of a community (where we belong) is based on our relationship to the environment around us, often called a 'sense of place' (ibid.). Human activities have been imprinted on the natural landscapes over a very long time, and in many different ways. There are many physical and social contexts and developmental histories that produced these 'cultural' landscapes.

Stellenbosch itself is a renowned tourist destination (Todeschini & Jansen, 2016). Tourism is a critical economic driver that depends on the protection of authentic scenic landscape and townscape qualities. It could be said that heritage characterizes most of the Stellenbosch Municipal area (ibid.). It is important to acknowledge the strong link between conservation and development and the implications for managing heritage resources (ibid.). Todeschini & Jansen (2016) argue that an approach to planning

in terms of heritage, is to understand how places became as they are today, which elements are important and why, and how to protect and manage them.

Todeschini & Jansen (2016) argue that there are two dimensions in their approach: on the one hand a series of spatial overviews of heritage resources, and on the other hand a range of social values, narratives and voices. The results are graphics and data for understanding both the large scale, place-defined, area-based landscapes (top down), and very individual or site-specific features (bottom-up).

The river valleys, from the largest (Eerste River Valley) to the smallest (Ida's Valley) are typical 'cultural landscapes' (ibid.). They are significant because they are economically productive as well as being scenic and tourist resources of great national and international status. For example, Ida's Valley was declared a National Heritage Site in 2004, some Municipal areas are part of the proposed Cape Winelands Cultural Landscapes inscribed on the World Heritage Sites tentative list by UNESCO (Todeschini & Jansen, 2016).

Table 5.3 lists the Natural and Rural Heritage Sites in the Municipality listed by the South African Heritage Association (refer to Figure 5.13)

HERITAGE SITE		
Town/Vicinity	Property Name	Area (ha)
Muldersvlei	Muldersvlei Salvation Army Site	3
Stellenbosch	Duthie Reserve, Stellenbosch	2.2
Franschhoek	Purgatory Outspan	127

Table 5.3: Natural and Rural Heritage Sites in the Municipality (source: Stellenbosch EMF, 2014).

## 5.5 DEMOGRAPHICS & SOCIO-ECONOMICS

The modern state and society is an extremely complex outcome of the various economic, societal, geographic and political forces at play at any time. As such, the ability to direct development is not only very complex but also often only of limited success (BER, 2013).

Economics are superficially two sided affairs. On the one hand, you have consumption and on the other, production. In a closed system, the two are required to be in balance and that which is produced may be consumed. This ideal simplistic state, does not exist practically, outside of theory. Rationale consumers will live where their opportunity for maximising their income is greatest so that they may consume the

most. Similarly, from the production side, location will be chosen where the most can be produced with the least cost - be-it locally, nationally or internationally (BER, 2013).

The economy of Stellenbosch Municipality tracks those of South Africa, Western Cape, Cape Winelands District Municipality and City of Cape Town (refer to Figure 5.19). All these economies, including that of Stellenbosch, contracted at the height of the global financial crisis in 2009 (BER, 2013). However, the economies have since rebounded, with Stellenbosch leading in terms of the growth pace, registering growth of 5.4% in 2011 (BER, 2013). The Stellenbosch Municipality economy is the biggest in the Cape Winelands, and outpaced the Drakenstein Municipality's economy in 2009 (ibid.). Furthermore, the contribution of the

Stellenbosch economy to the District's economy is on a gradual increase, with the share of the local municipality to the Cape Winelands District Municipality rising from 25.5% in 1996 to 33.6% in 2011 (ibid.).

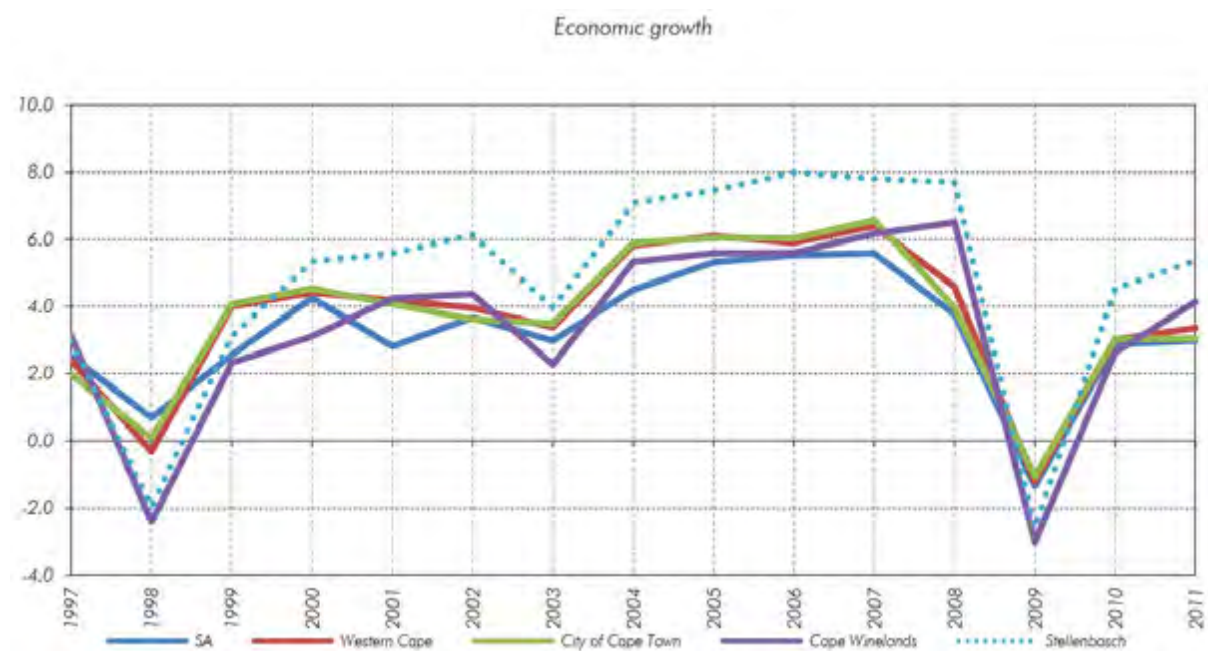


Figure 5.19: An overview of the Stellenbosch Economy (source: BER, 2013).

In 2011, four sectors dominated economic activity in Stellenbosch, namely manufacturing, trade (including wholesale and retail trade, catering and accommodation), finance (including insurance, real estate and business services), and government services (BER, 2013). At 23%, the financial services sector was the largest contributor to economic activity, followed by manufacturing, which accounted for 22.3% of economic activity and trade (18.2%) and government services (12.0%) (ibid.).

While Stellenbosch was historically associated with the wine industry and Stellenbosch University, the town has in recent years become increasingly relevant in terms of tourism, high technology firms and other service sector activities such as banking (BER, 2013). It must however be noted, that while still important

to the economy of Stellenbosch, the contribution of the manufacturing sector has been on a gradual decline and has fallen from 30% in 1996 to 22% in 2011 (BER, 2013). Conversely, the trade and financial services sector's contribution to the local economy has been gradually rising (ibid.). The share of the trade sector has risen from 10% in 1996 to 18% in 2011, indicating an increasing importance to the Stellenbosch economy and future development. The share of the financial services sector has climbed from 19% in 1996 to 23.6% in 2011 (ibid.). Of particular concern is the agricultural sector. The contribution of the sector to Stellenbosch has fallen from 13% in 1996 to 5% in 2011 (ibid.).

The growth rates for Gross Value Added in post 1994 South Africa indicate that apart from two brief periods (1998 and 2009) Stellenbosch grew faster than both the Western Cape and the National economy. Stellenbosch added approximately 2% annually on top of the provincial growth rates. During this time and in absolute terms, Stellenbosch became a more prominent contributor to the broad economy as is clear in Figure 5.20.



Figure 5.20: Gross Value Added Growth (source: Quantec, 2013).

Tourism and university related activities typically fall within the tertiary sector. One would therefore expect the region to be dominated by the tertiary sector. The national accounts point to the fact that Stellenbosch has a significantly larger contribution from the secondary sector (manufacturing) at 31% of the total versus the provincial and national levels of 23% (refer to Figure 31)(BER, 2013). The primary sector in Stellenbosch is small at only 5% but is still above the provincial level of 4% (ibid.). The national average is 8% (ibid.). The largest component growth in the secondary sector was registered by construction but

there are several large food manufacturing concerns in the town and region and their contribution is meaningful (ibid.).

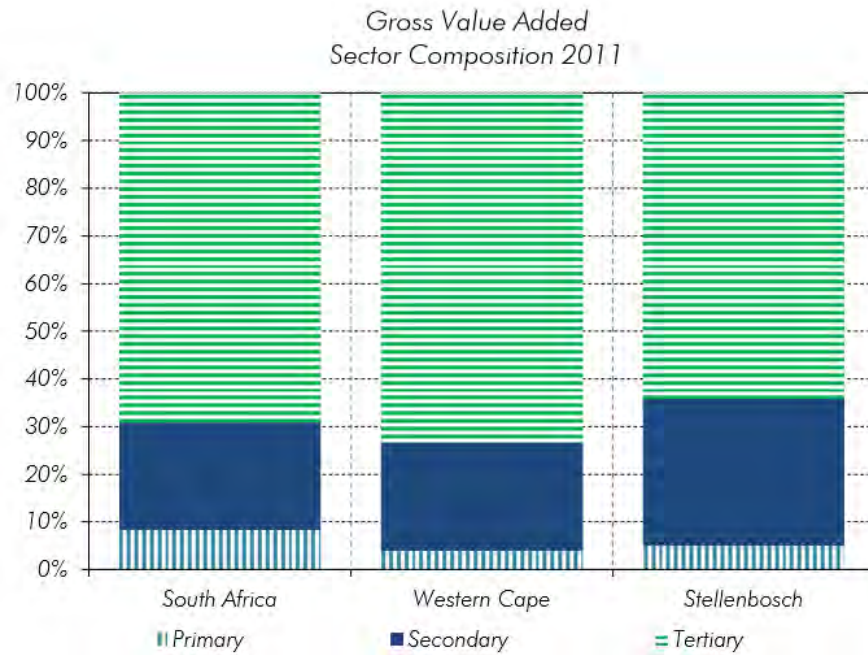


Figure 5.21: Gross Value Added, Sector Composition 2011 (source: Quantec, 2013).

Consistent employment and economic growth are arguably the most important goals from an economic point of view given South Africa's dire employment situation. Stellenbosch again performs better than either the province or the country as can be seen in Figure 5.22.

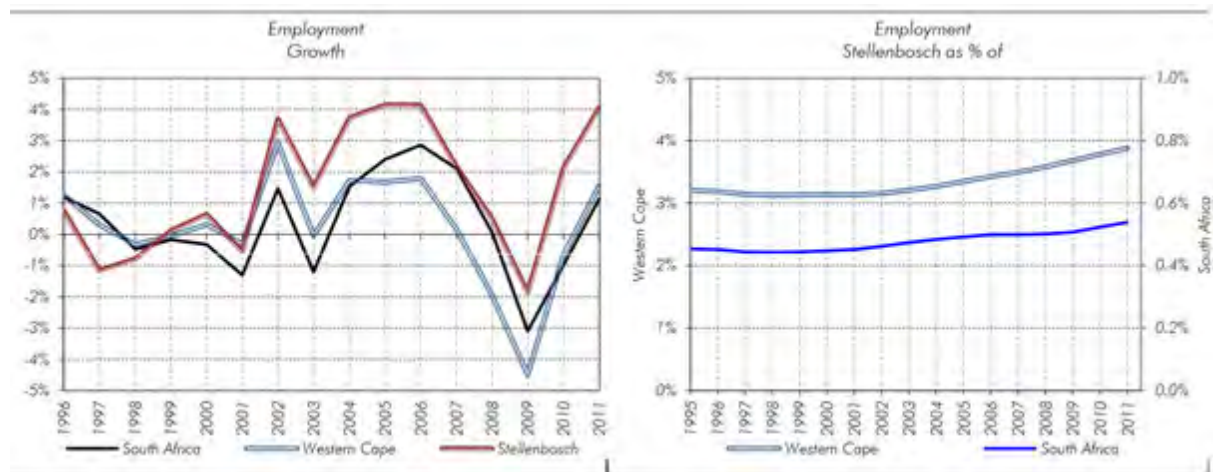


Figure 5.22: Employment trends (source: BER, 2013).

As a sector, manufacturing in the region was the area most seriously affected during the recent recession. As can be seen from Figure 5.23, manufacturing was hard hit in 2009 and has still not recovered from pre-crisis levels.

In the tertiary sector of Stellenbosch all major components performed well in the period after 1994. Unfortunately, even though the primary and secondary sector in the area managed to grow moderately after 1994, the sectoral composition of employment in the region changed dramatically.

From the bottom two graphs in Figure 5.23, the dramatic deterioration in formal employment in the primary and secondary sector is clearly visible. However, in absolute terms, by far the greatest impact occurred in the agricultural sector with a near three-quarter contraction in absolute employment over the period. This may be argued as a shift in labour to technology orientated agricultural practices grew. In contrast employment in the tertiary sector increased across all sectors. It is noteworthy that during the major contraction in agricultural employment, that Stellenbosch was able to grow employment in manufacturing and construction.

On the whole, the tertiary/services sector, which comprises of trade, transport, finance, community and government services, accounted for the bulk 65% of economic activity in Stellenbosch, while the secondary (29.4%) and primary (5.1%) trail behind (BER, 2013).

Although, in 2011, Stellenbosch's unemployment rate was high at an estimated 20%, the local municipality's unemployment rate was lower than that of South Africa (24.7%), the Western Cape (21.2%) and the Cape Winelands (20.3%). In terms of employment (both formal and informal), the community/government services sector employed the majority (30%) of the employed population in Stellenbosch in 2011 (ibid.). The agricultural and manufacturing sectors respectively employed 13.1% and 13.4% of the employed population. Despite its declining importance to Stellenbosch Municipality, the agriculture sector managed to be the fourth highest employer in 2011 (ibid.). The financial services sector was the fifth largest employer in the region, despite being the biggest sector by contribution (ibid.).

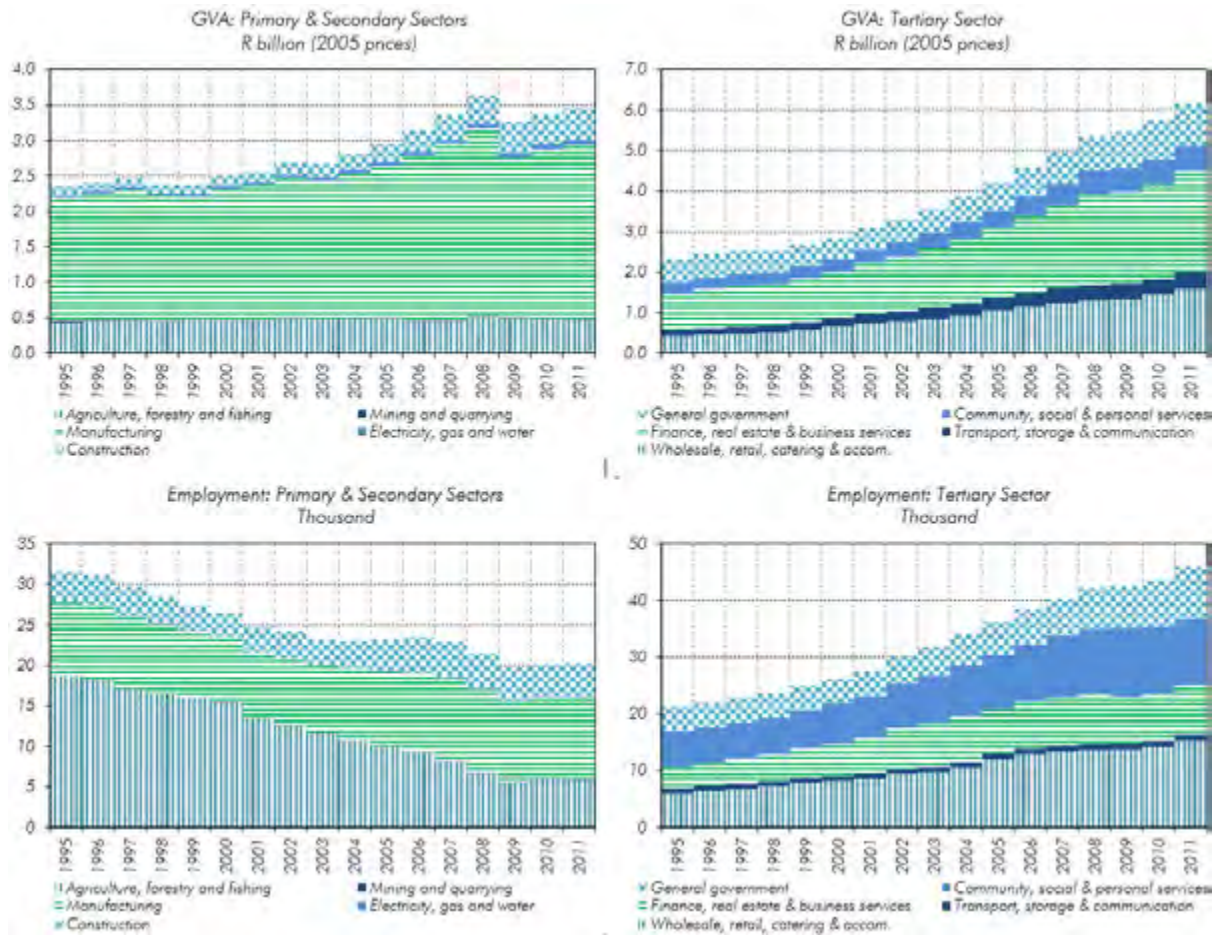


Figure 5.23: Sectoral economic growth and employment composition (source: Quantec, 2013).

Figures 5.24 to 5.28 illustrate Secondary and Tertiary sector employment trends.

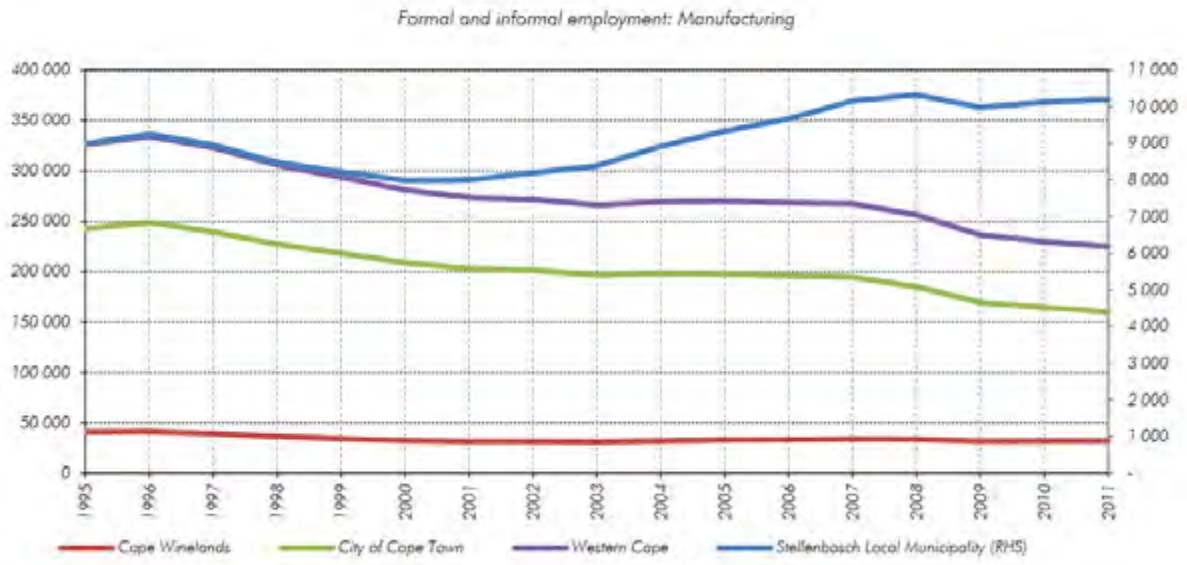


Figure 5.24: Formal and informal employment: Manufacturing (source: Quantec, 2013; BER, 2013).

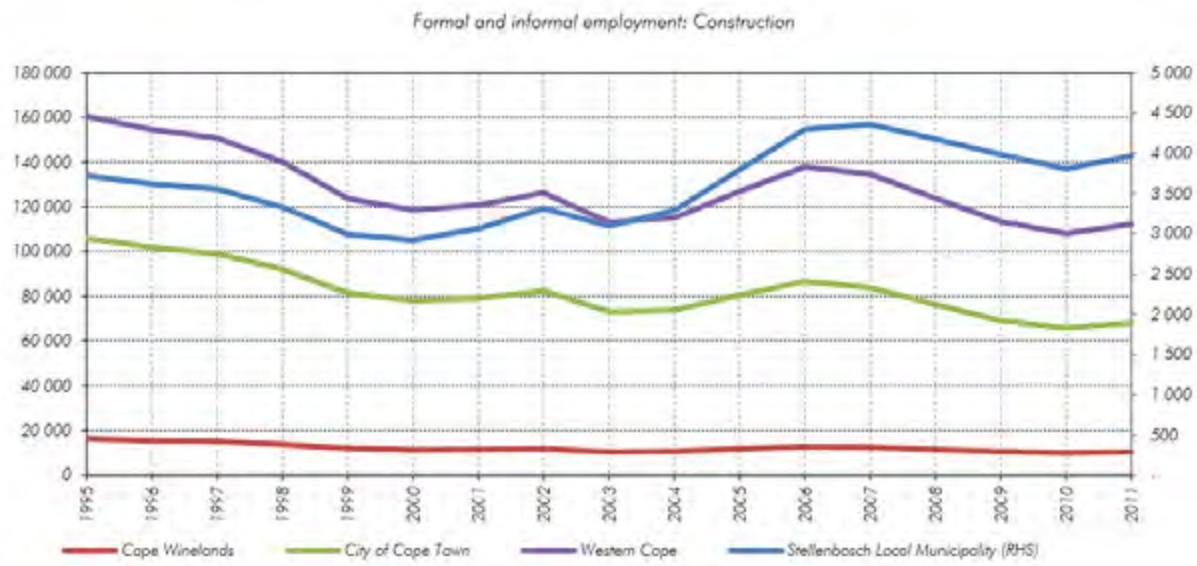


Figure 5.25: Formal and informal employment: Construction (source: Quantec, 2013; BER, 2013).

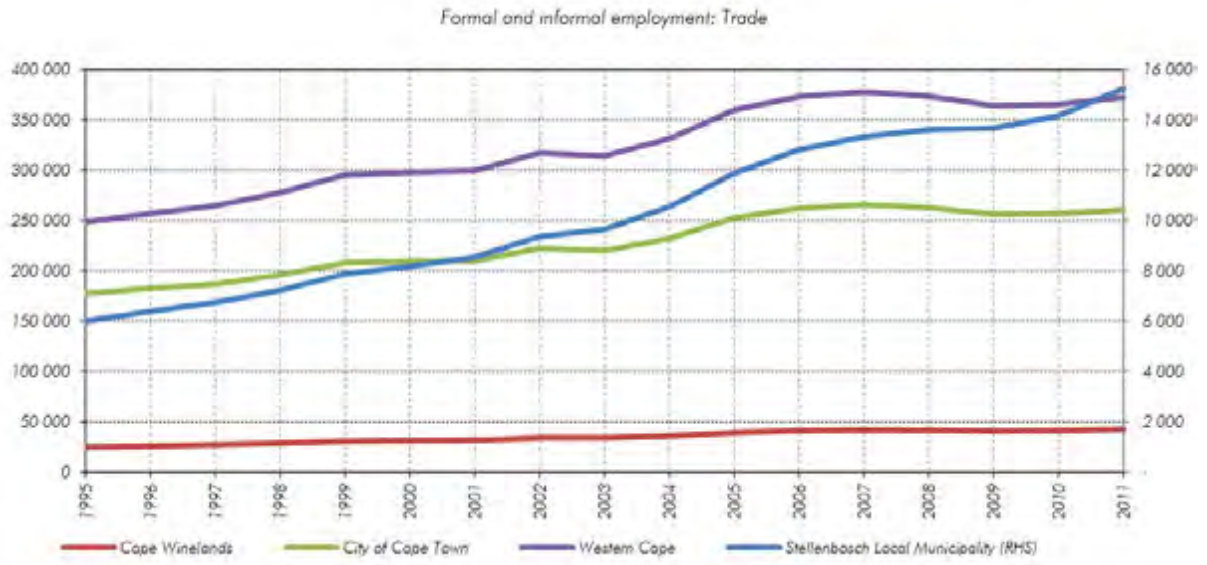


Figure 5.26: Formal and informal employment: Trade (source: Quantec, 2013; BER, 2013).

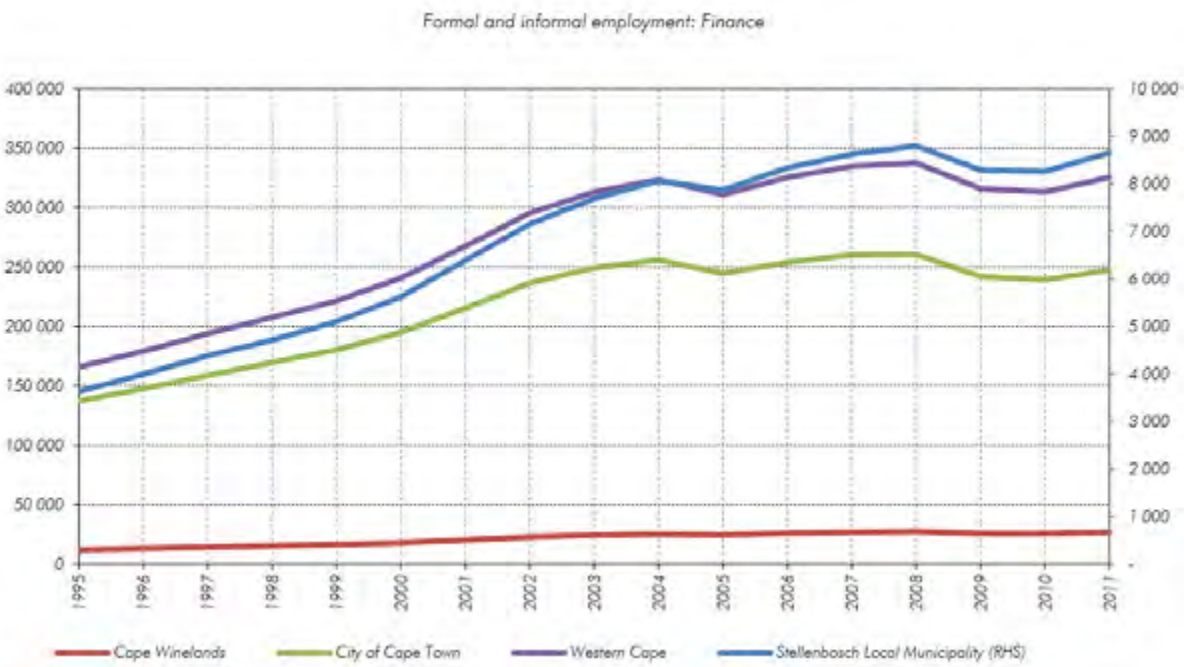


Figure 5.27: Formal and informal employment: Finance (source: Quantec, 2013; BER, 2013).

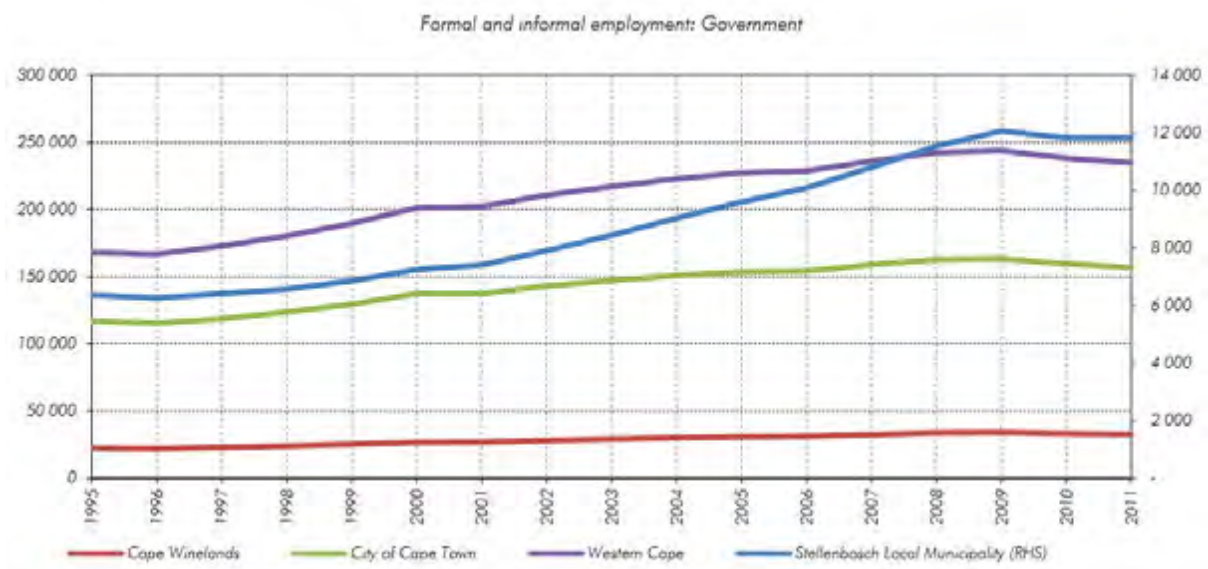


Figure 5.28: Formal and informal employment: Government (source: Quantec, 2013; BER, 2013).

While employment deteriorated badly in agriculture, this was the general trend also experienced by other parts of the country (BER, 2013). Manufacturing employment contracted across the South African spectrum but Stellenbosch significantly deviated from trend and has had growing employment in manufacturing (ibid.). It is therefore rational to deduce that Stellenbosch now enjoys a significant relative competitive service and agricultural region. While employment trends in Trade and Finance are also picking up, they are in line with the relative outperformance of the region in addition to the worrying trend in agricultural employment, the strong rise in government employment in the regions needs to be monitored as it is conceivable that most of this employment stems from the local government layer and as such carry both cost and benefits (ibid.).

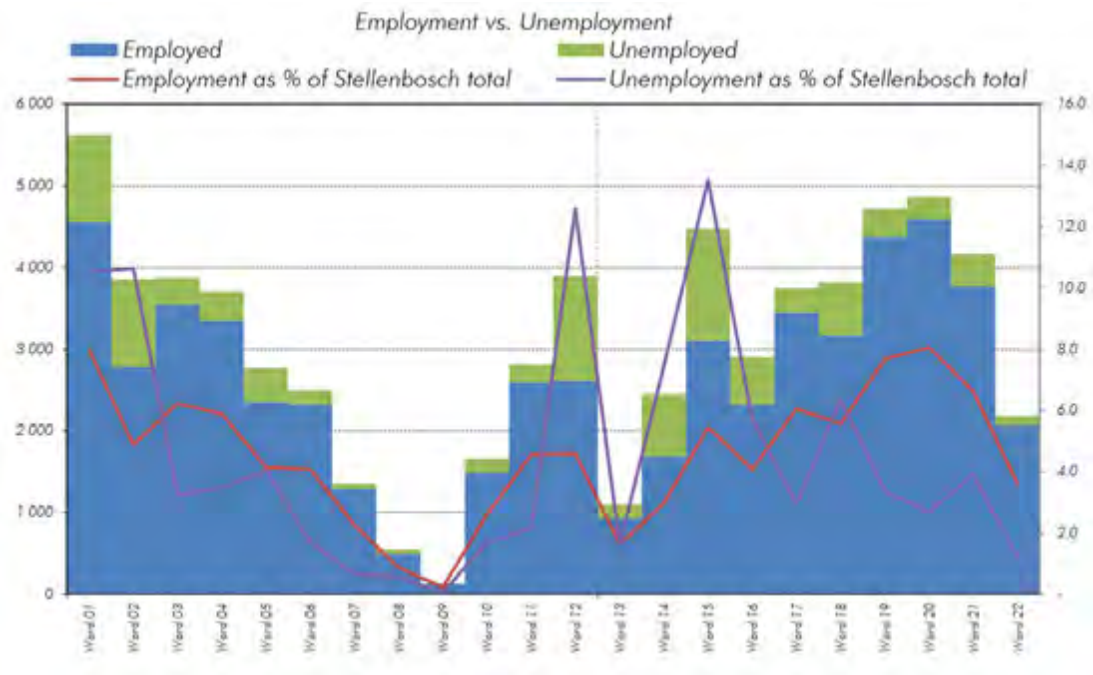


Figure 5.29: Employment trends by wards (source: Quantec, 2013; BER, 2013).

While the average employment trends are visible in Figures 5.24 to 5.28, when viewing Figure 5.29, it becomes clear that there is a very clear sub-regional variation in employment levels. It would be prudent to keep this in mind when determining future development for the towns in question and aim to facilitate development in these areas if feasible.

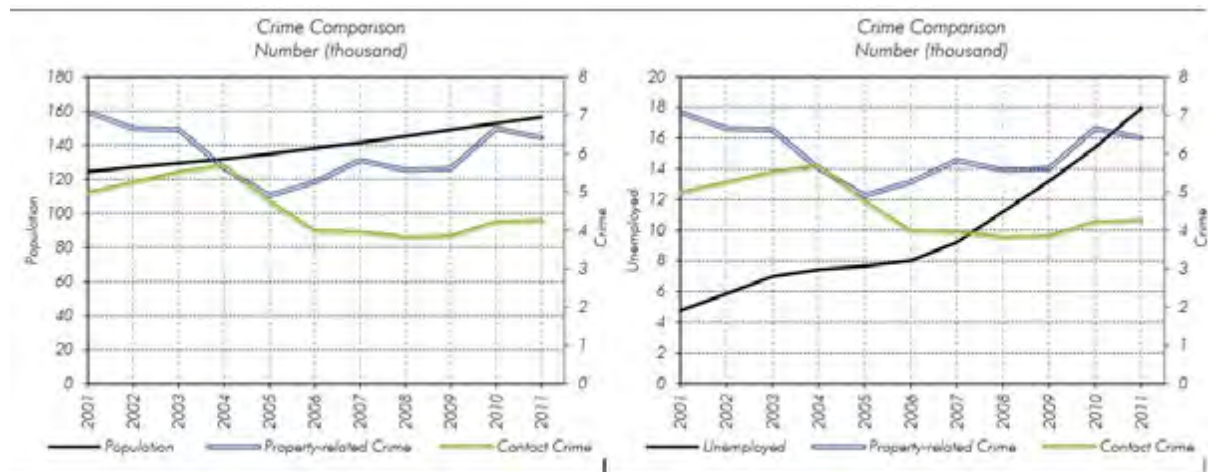


Figure 5.30: Crime levels in the Stellenbosch Municipality (source: Quantec, 2013).

The dramatic increase in absolute levels of unemployment and the seeming correlation to property related crime (refer to Figure 5.30), raises the possibility that crime levels are set to increase further unless the situation is handled properly.

Figure 5.31, compare the dwelling type (shack) to the unemployment percentage in each ward. It is clear that there is a correlation between unemployment and the dwelling type.



Figure 5.31: illustrates the correlation between informal dwelling type housing and unemployment in each ward of the Municipality (source: Quantec, 2013; BER, 2013).

Figure 5.32, indicates the household income by neighbourhood. The diverse income is clearly visible in the different neighbourhoods of Stellenbosch, and arguably an indication measure of inequality.



Figure 5.32: Average Income per Household Per year (source: Quantec, 2013; BER, 2013).

Figure 5.33, indicates the educational attainment by ward. Comparing Figure 5.31, which illustrates the dwelling type and unemployment percentages in each ward, the level of unemployment is correlating with the level of educational attainment.

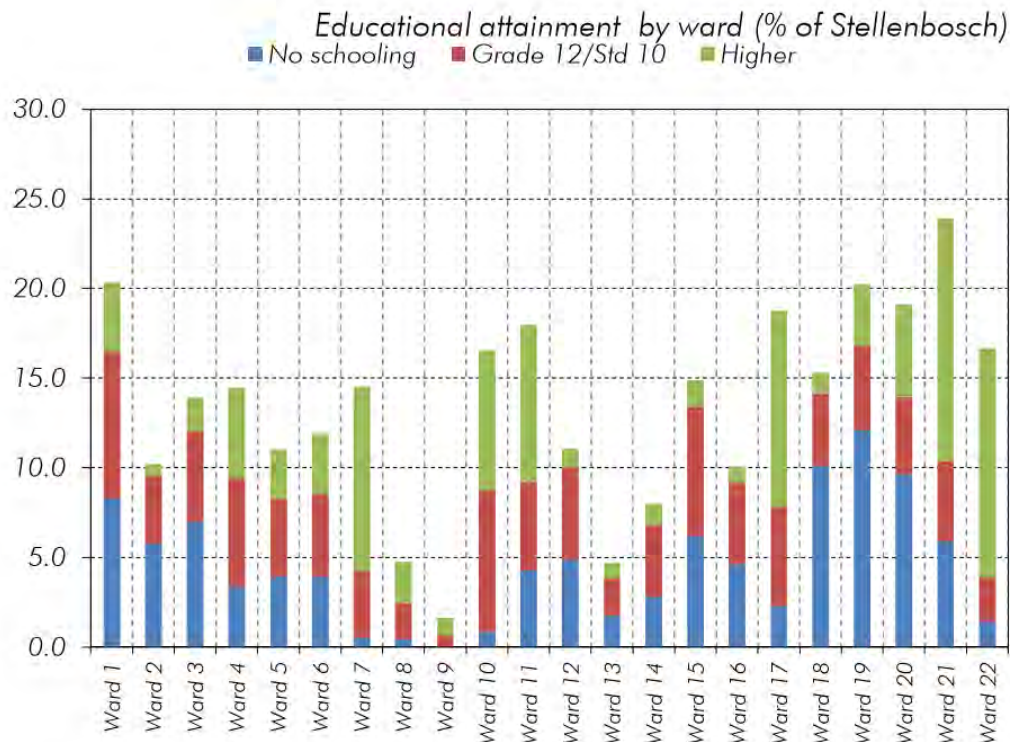


Figure 5.33: Educational attainment by ward (% of Stellenbosch) (source: Quantec, 2013; BER, 2013).

The question is, however, what the local authority can do to improve educational attainment levels, and how to create faster and better local economic development despite limited resources, and many institutional constraints. It is in the area of enabling development that Stellenbosch is most able to influence the local economy. By setting the appropriate framework in terms of safety, service levels and infrastructure, the local authority can enable the private sector to aid development by allowing investment to flow in those directions which are appropriate. With this in mind, the importance of a proper long term SDF that is coherently implemented cannot be overemphasised.

## 5.6 Agricultural Land Potential & No-Go Areas for Development

Figure 5.34 illustrates the various forms of land-use and land coverage that currently constitute the natural and cultural components of the Municipality. Figure 5.34 should be read together with Figure 5.35 which

provides broad indices as it relates to land-use potential and suitability. The agricultural potential of the lower slopes of the Stellenbosch, Jonkershoek and Simonsberg Mountain is classified as 'medium'. The area of medium potential agricultural land is most extensive in the region west of Simonsberg, and forms a broad belt that extends along the Krom and Eerste Rivers towards Lynedoch. Other areas of medium potential agricultural land occur north of the Helderberg Mountain and on the western boundary of the municipality. The collective influences of topography, temperature, rainfall, and good soils mean that few areas of low agricultural potential exist in the Municipality. These areas should be considered first when future development occurs within the municipality.

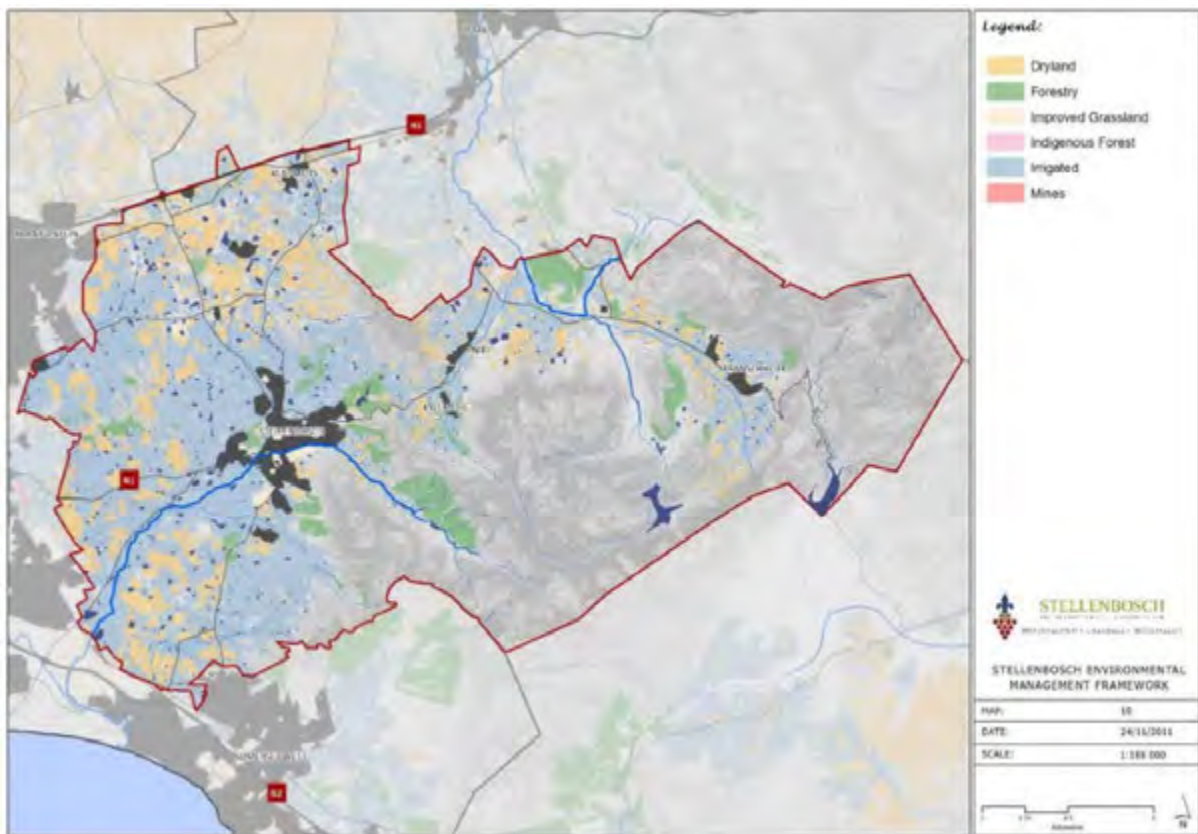


Figure 5.34: Land-use and land coverage in Stellenbosch Municipality (source: Stellenbosch EMF, 2014).

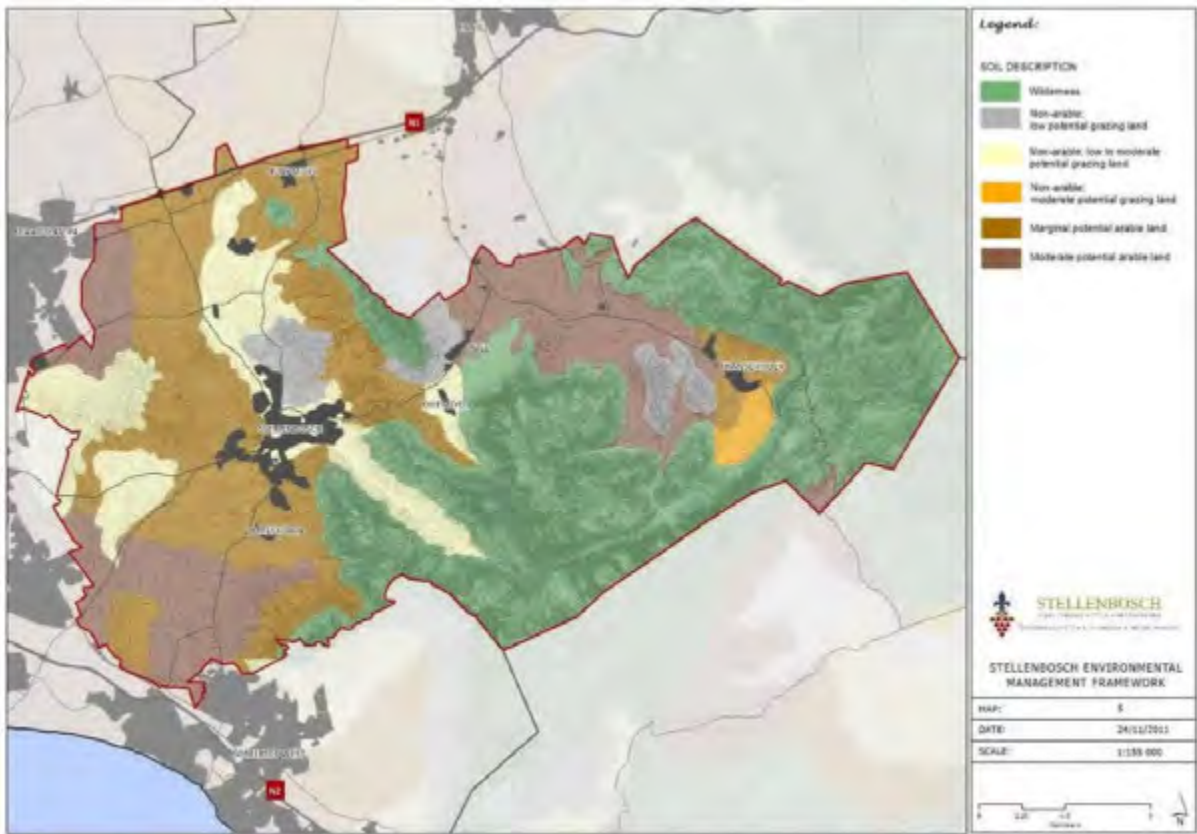


Figure 5.35: Land-use potential and suitability assessment (source: Stellenbosch EMF, 2014).

## CHAPTER 6. CONCEPTUAL FRAMEWORK

The preparation of the conceptual framework involves the formulation of a conceptual spatial ordering system for settlement-making. It articulates the main concepts, principles and ideas informing the framework. These concepts is centrally engaging with the issues of the role of Stellenbosch, and integration with its context and challenges. It is an abstract device, and has the following purposes: it ensures clarity by enabling the idea to be questioned and taking plan-making out of the realm of simple intuition; it enables continuity by ensuring that the relationships between ideas are addressed; it serves as a management tool by providing the framework to which plan-makers can refer in searching for solutions to particular problems and in the making of the formal plan itself, and it provides the basis for discussion and incorporation of stakeholders views and inputs (Dewar et al, 2012).

Stellenbosch has a significant clear space transition pattern – moving from wilderness to urban (refer to Figure 6.1). The SDF will enhance this pattern, as it promote a sustainable environment.

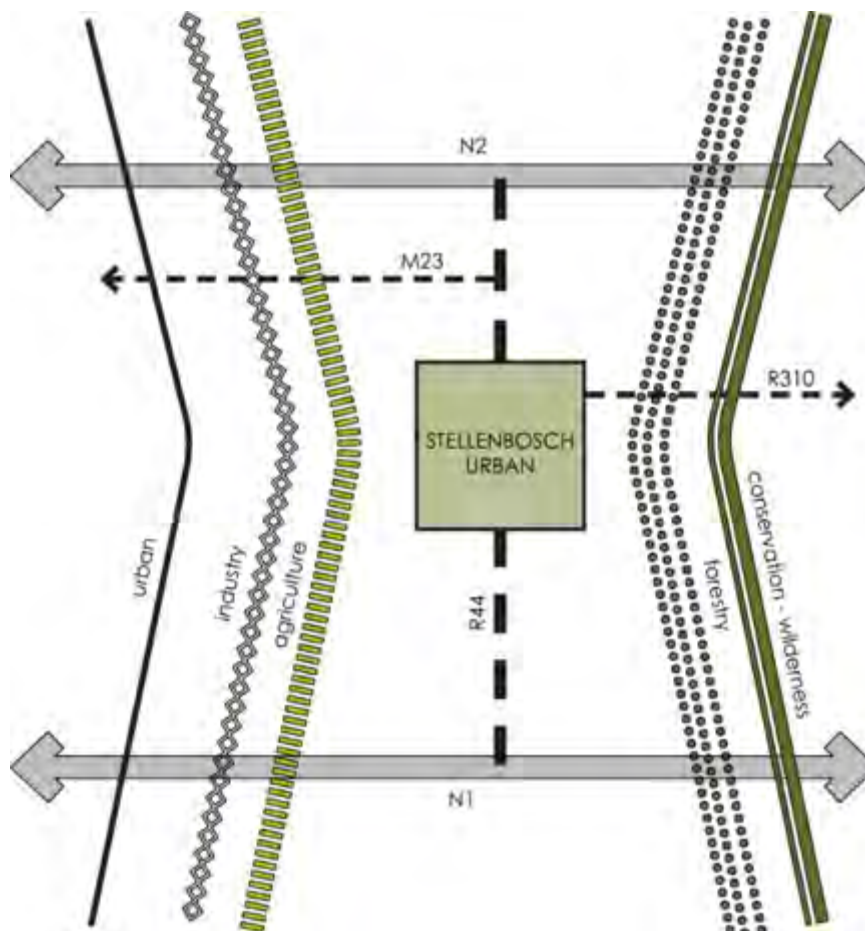


Figure 6.1: Concept for Stellenbosch's space transition (source: Author, 2016).

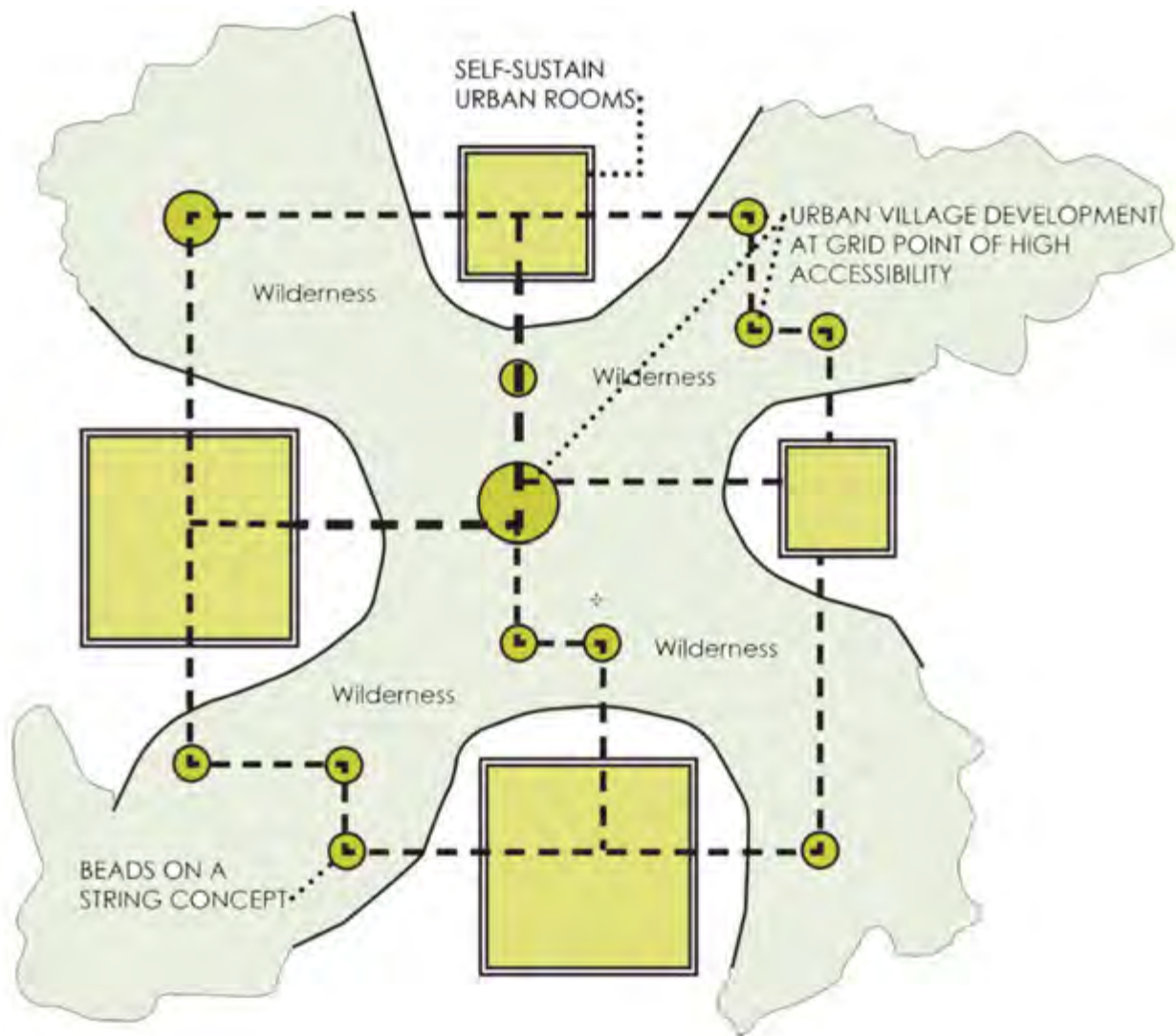


Figure 6.2: Sub-regional Concept – Self Sustain Urban Rooms (source: Author, 2016).

The sub-regional concept diagram illustrates self-sustained urban rooms that are situated in wilderness. It is important to observe that the wilderness is not disconnected from the urban rooms, but that the rooms are situated within the wilderness (refer to Figure 6.2). The urban rooms thus take secondary hierarchy, while wilderness takes first. These self-sustaining rooms are situated on the highest order accessibility grid, and are linked by the secondary accessibility grid. This secondary grid uses the 'beads on a string' concept, and urban and agricultural villages consequently develop. This concept suggests – a 100m building setback line from provincial roads, to protect scenic beauty in the Winelands, and therefore promoting the region as a tourist attraction.

## Beads on a String Concept

The intention is to order the existing settlement along a corridor with settlement taking the form of villages that is strategically linking to the string that ties them together (refer to Figure 6.3). The string is thus the corridor and the villages the beads forming the 'beads' on a string. The concept is maintaining the regional dominance of agriculture and the existing sense of place in the Cape Winelands region. This concept is also interrogating the existing urban edge of Stellenbosch. It is emphasising the idea that the urban edge should not be a perimeter on the edge of existing settlements, but should rather move the focus to where development should not go, and work along the edge of these areas.



Figure 6.3: Beads on a String Concept, illustrating urban villages along the R44 (source: Author, 2016).

In addition to the two concepts discussed above, it is important to recognise two other corridor concepts, namely: ecological corridors, and urban corridors. Both support the key concept, and should be used where appropriate.

## ECOLOGICAL CORRIDOR

An ecological corridor system consists of core areas, corridors and buffer zones. The ecological corridors create connections between the core areas. The core area and various connecting ecological corridors

should have a buffer zone that will protect the areas from disruptive development while allowing low impact activities to take place. There are three types of corridors. Linear corridors are long uninterrupted strips of vegetation, stepping stone corridors consist of a series of small non-connected habitats and landscape corridors consist of diverse and uninterrupted landscape elements (refer to Figure 6.4) (Sicirec, 2015). The corridors also deliver a range of other social and environmental benefits that includes the enhancement of the local landscape, better opportunities for public access and recreational use. They cover natural landscapes such as rivers, floodplains and mountains, as well as "corridors" of unsealed land. Ecological corridors should be created to support natural systems where all areas of natural value is included into a biodiversity network to ensure the conservation of biodiversity (Nilsson et al, 2013).

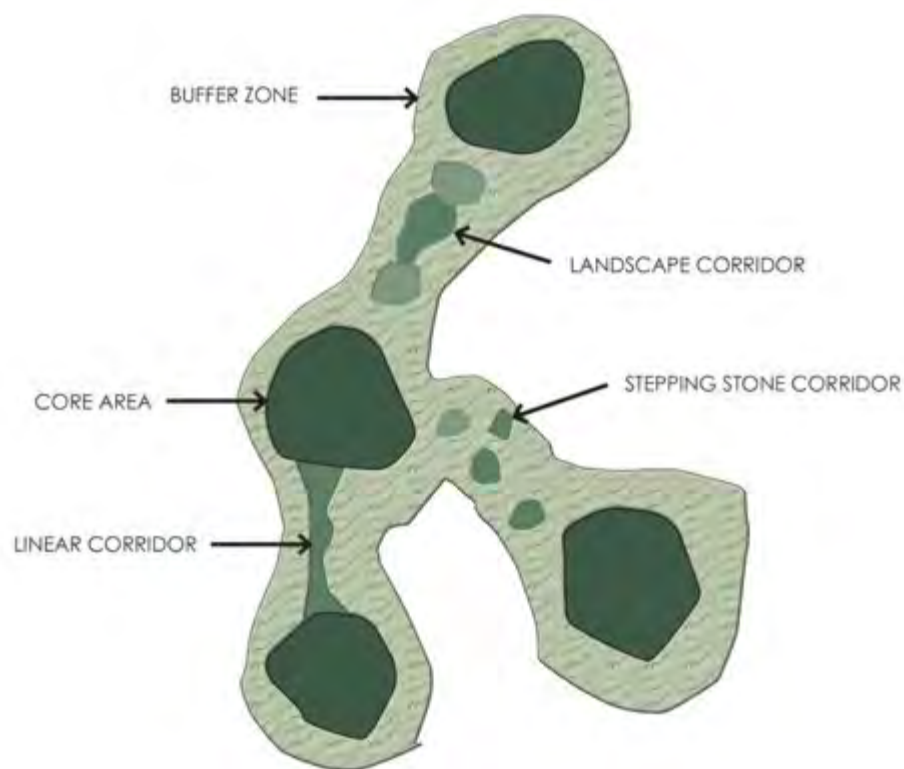


Figure 6.4: Ecological Corridor Concept (source: Adapted from Sicirec, 2015).

## URBAN CORRIDOR

“Corridor planning is an approach which seeks to promote intensity, to encourage non-motorized and public transport, to stimulate a mix of activity, to promote small business, to pursue urban integration vigorously and to improve equity and convenience” (Dewar, 2011: 815).

The result of modernist planning created a formation of space bridges in the urban fabric. Dewar (2011) argues that this formation essentially divide a city into 'boxes'. The concept of a corridor is therefore, an incredible mechanism to overcome previous planning approaches that lead to fragmentation of urban form. Warnich and Verster (2005: 344) state that, "corridors seemingly present a particularly powerful and effective planning strategy for the purpose of restructuring the spatial inequity of the city, as well as initiating economic growth points in close proximity to low income communities".

Corridors are not solely concerned with transport, although public transport is an important aspect, they are concerned with urban challenges (Dewar, 2011). The nature of the corridor – a broad band of mixed use activity that intensifies around a hierarchy of interlinked movement routes. Continuous movement routes, tend to have higher energy flows. This energy is the reason why intensive activities cluster together along the energy flows. The flow of people and finances are markets for goods and services. The higher the amount of movement, the greater the potential for markets (Dewar, 2011).

There are a number of advantages that stem from making corridors a focus of planning. Firstly, the approach promotes economic decentralisation since accessibility is co-ordinated and movement tends to be higher at these points. This provides a range of land prices that occur along the corridor which ensures that all activities can afford to find a place in the system (Dewar, 2011). Secondly, the linear nature of corridors enables large and small enterprises to establish a relationship with one another. Larger enterprises generate more movement that is appropriate for highly accessible locations while smaller enterprises that do not create as much movement can locate themselves in the flow that is generated by the larger enterprises and feed off of the energy (ibid.). Thirdly, the spine of the corridor is a continuous route, which is the where public transport logically moves, equity and accessibility is promoted (ibid.). Fourthly, corridors are able to break down urban fragmentation and increase integration as they are able to tie local areas into an integrated systems (ibid.). Finally, corridor initiatives involve a range of different projects, they are able to co-ordinate the different spheres of government as well as different departments (ibid.).

## Decrease Traffic Congestions – Conceptual Diagram

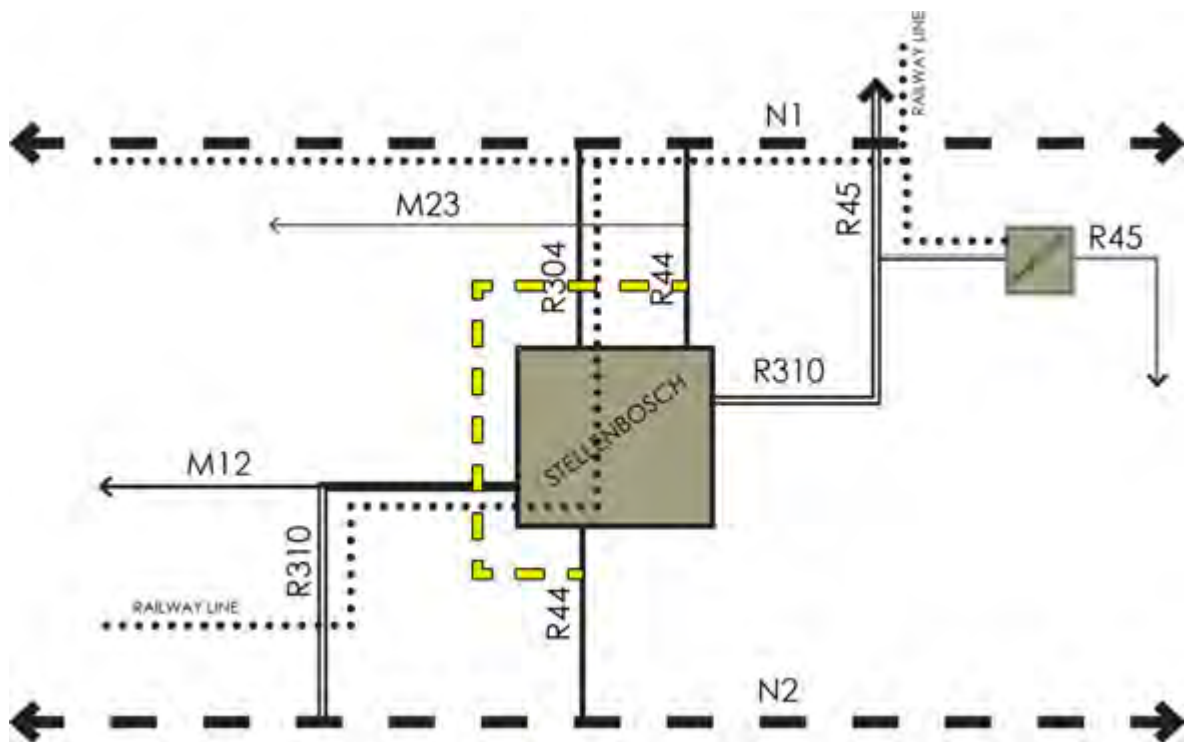


Figure 6.5: Conceptual diagram of proposed connector route- indicated in yellow (source: Author, 2016).

Figure 6.5, is a conceptual diagram proposing a by-pass connector route, to reduce traffic congestions. The purpose of this route is to enable a decrease in the number of vehicles, and ultimately movement through the town core.

## CHAPTER 7: SPATIAL DEVELOPMENT FRAMEWORK

The SDF for Stellenbosch is made by refining the conceptual framework, and constitutes the desired future spatial plan for the municipality, and ultimately defining the emerging 'capital web' (Crane, 1960). The focus is particularly on the five main elements of public structure (green space, movement of all modes, public institutions, urban space and utility services), and the integration and relationship to each other (Dewar et al, 2012).

The significance of this SDF is to protect wilderness and valuable agricultural land. It argues (spatially) for mixed-use densification, integration, better access to community facilities by promoting public transport, which is linking, existing and proposed residential and economic areas to improve the municipality's sustainability in the long run.



Figure 7.1: Spatial Development Framework for Stellenbosch – scale 1:50 000 on A3 (source: Author, 2016).

LEGEND

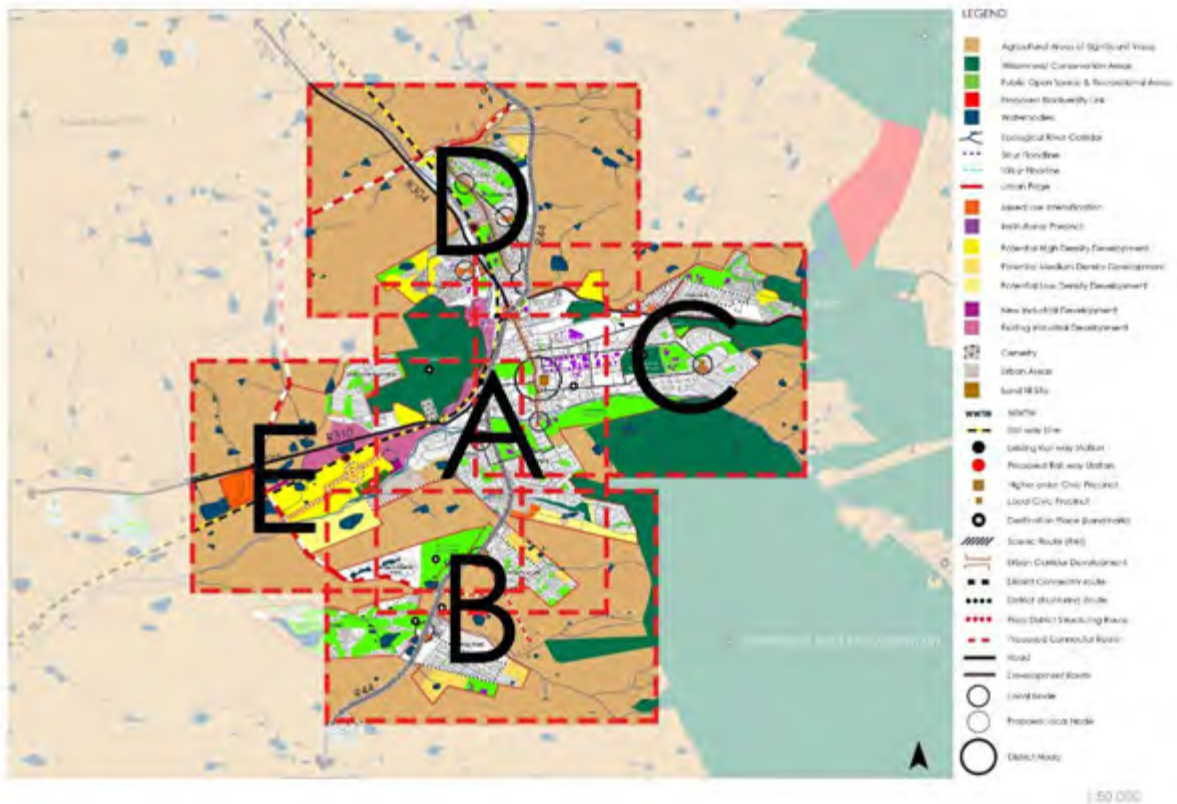


Figure 7.2: Identification of Precinct Areas for Detail Design (source: Author, 2016).

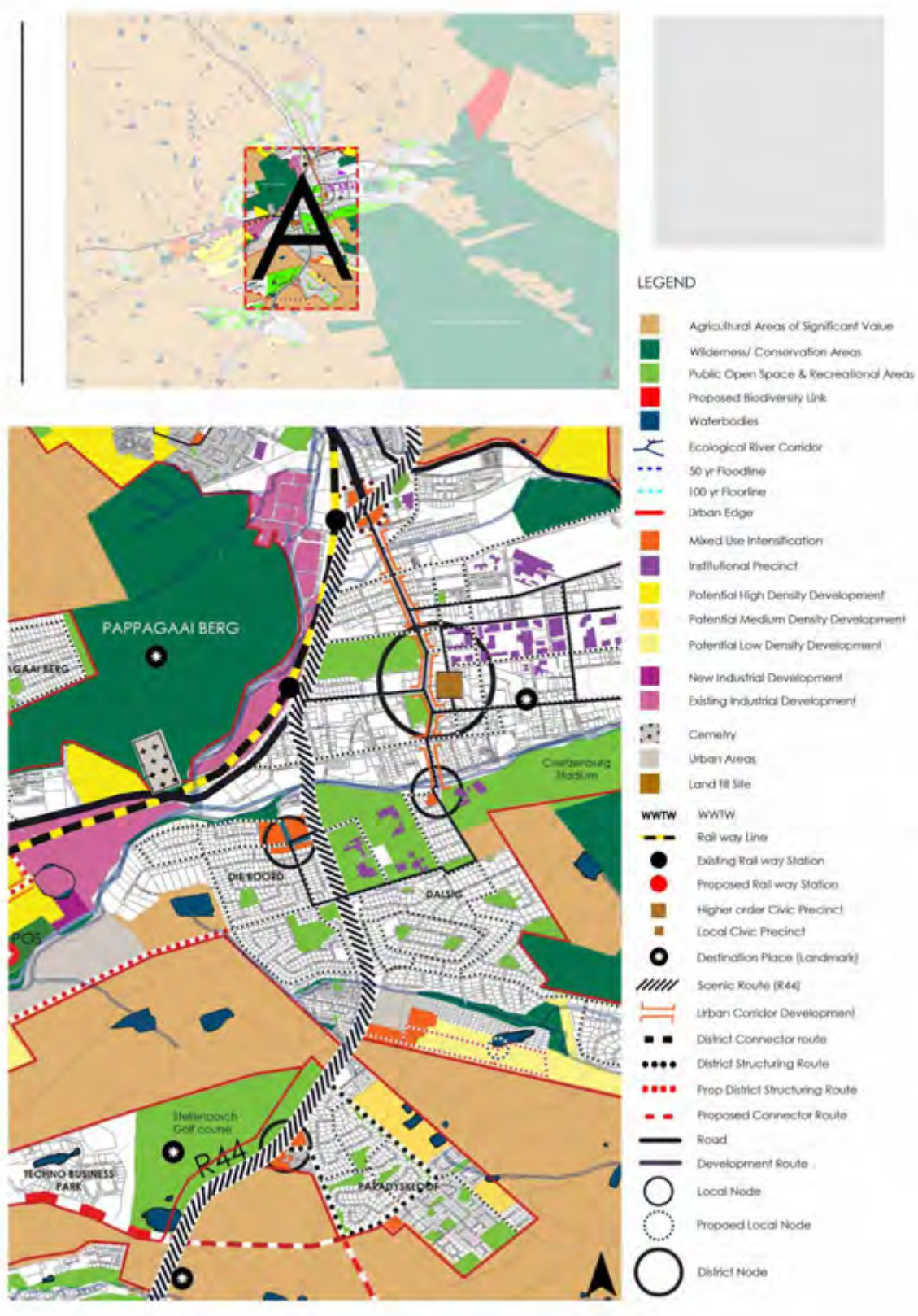
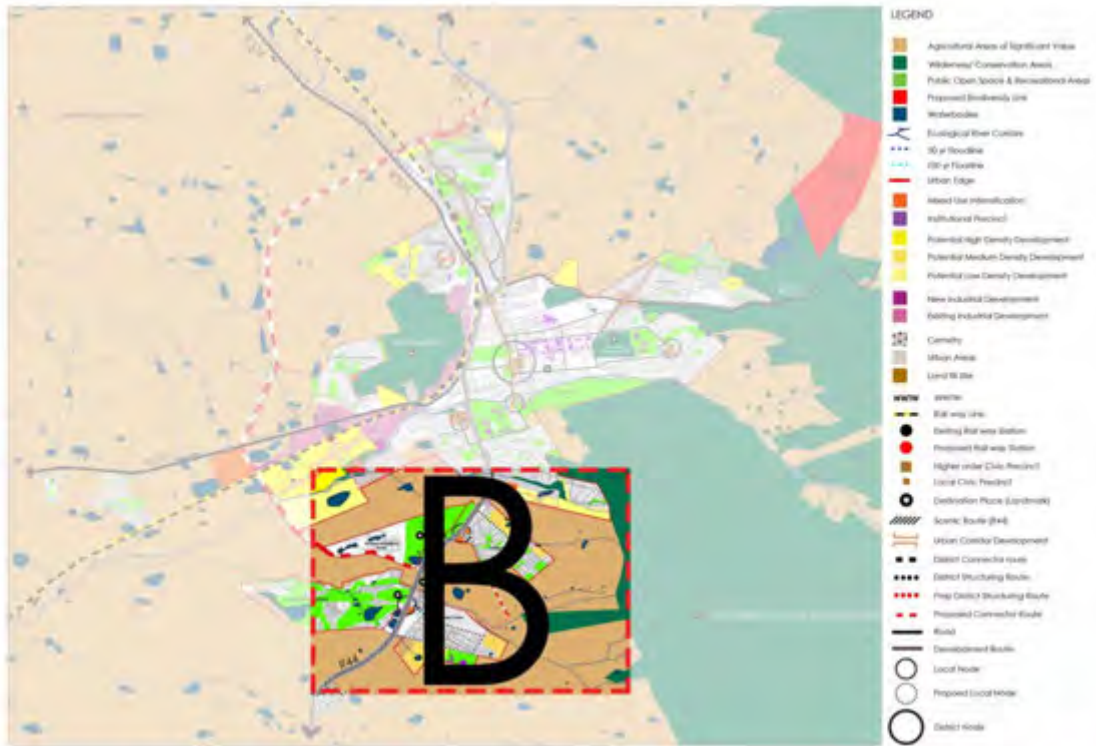


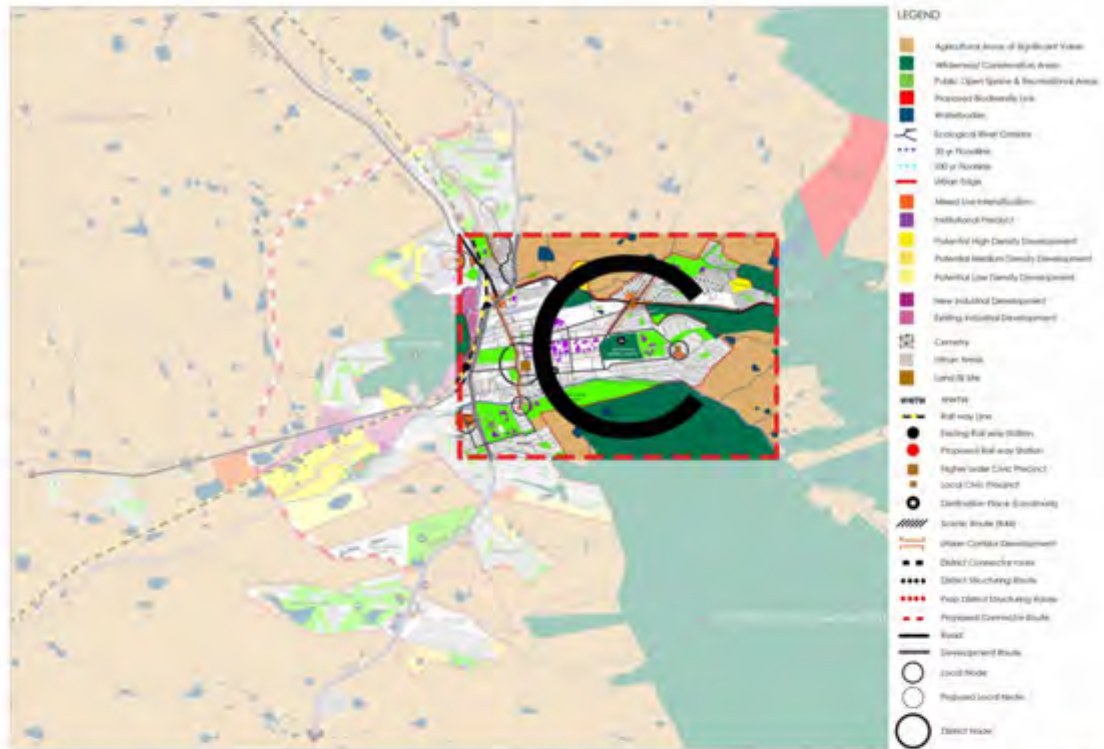
Figure 7.3: Precinct A - detail Spatial Plan (source: Author, 2016).



1:50,000



Figure 7.4: Precinct B – detail Spatial Plan (source: Author, 2016).



1:80 000



Figure 7.5.1: Precinct C - detail Spatial Plan (source: Author, 2016).



IDASVALEI PRECINCT LOCATION

NOT TO SCALE



IDASVALEI PRECINCT PLAN

SCALE 1:2000 ON A3

Figure 7.5.2: Detail Design - Precinct C (mixed-use intensification and restructuring) (source: Author, 2016).

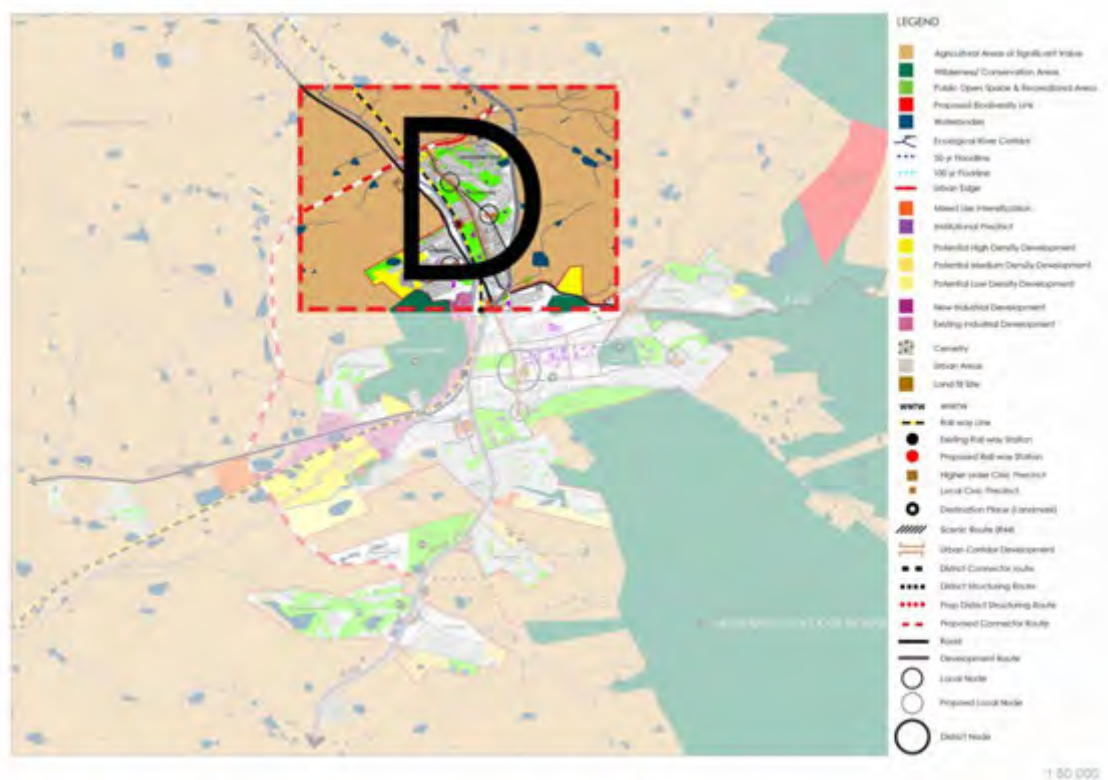
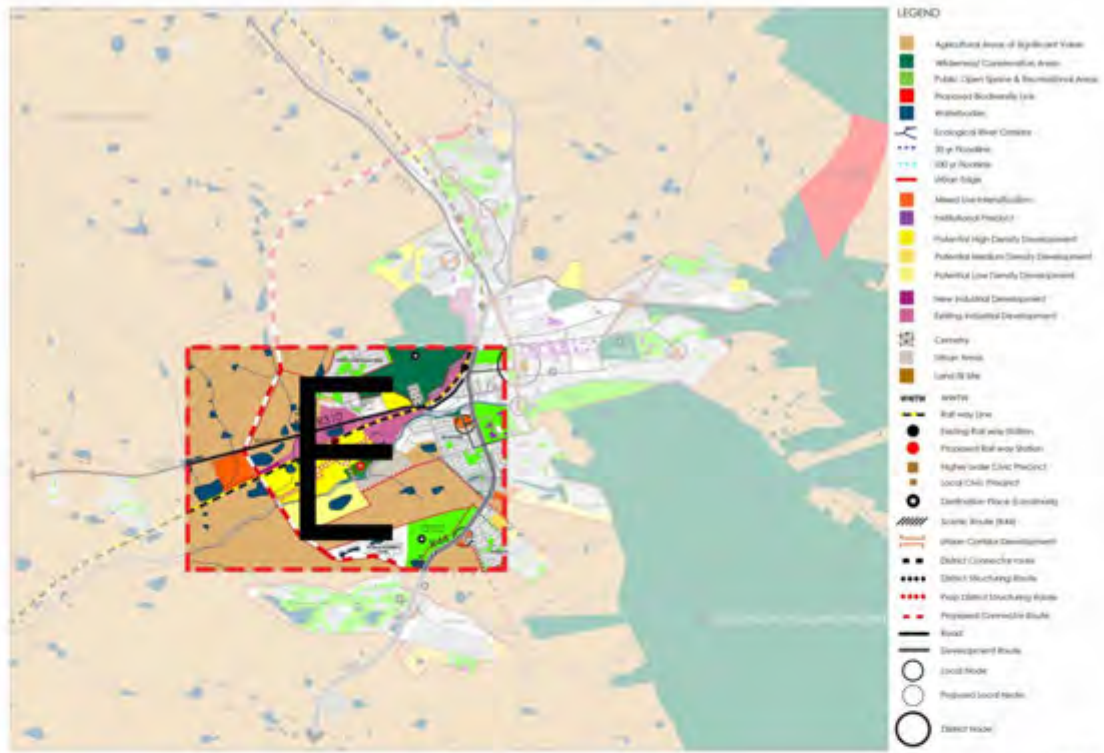


Figure 7.6: Precinct D – detail Spatial Plan (source: Author, 2016).



1:50 000



Figure 7.7: Precinct E - detail Spatial Plan (source: Author, 2016).

### Agriculture Areas of Significant Value:

High potential and unique agricultural land include areas that have been ploughed for orchards, vineyards, forestry plantations, annual crops, pastures and irrigations lands (CCT, 2012). Intensive agricultural land shall be protected against conversion to other land uses, particularly urban development.

- Preserve and utilise high potential agricultural land, particularly high potential arable land (refer to Figure 5.16 and 5.35).
- Adhere to identified urban edges around the periphery of high-value agricultural areas to prevent urban intrusion.
- Development outside the urban edge into areas of high agricultural value and high agricultural significance should not be authorised.
- Encourage activities that reinforce primary agricultural use of these areas (refer to Figure 5.35).
- Limit non-agricultural uses to ancillary rural activities that do not detract from the primary agricultural use and character of the area, but contribute to local character and associated recreational and tourism potential.
- Development outside the urban edge into "other agricultural areas" or small holding areas should only be considered under exceptional circumstances and subject to compelling motivation.
- Rural development outside of the urban edge should not exceed densities of 1 dwelling unit per 10 ha (PSDF, 2005) and sub-division should be discouraged. In some areas, a lower density may be appropriate.
- Discourage further sub-division of agricultural land.
- Encourage urban agricultural activities where feasible.

### Wilderness/ Conservation Areas:

- Wilderness and Conservation Areas are areas of high conservation importance and should be protected in terms of their underlying high level of biodiversity.
- Activities in these areas should focus on conservation use with conservation management activities (e.g. alien clearing, research) encouraged.
- In general, low impact activities such as passive recreation (e.g. walkways and trails), environmental education and tourism may be appropriate, but should be subject to stringent controls (e.g. limits to development footprint, management plans).
- Where possible, all new utility infrastructure, services and structures should be located outside of these areas.

- Formalised reserves and sites (e.g. Jan Marias Park Reserve) should be regarded as 'no-go' areas and no further development of any kind should be allowed in these areas without a detailed assessment of the impacts.
- Areas of high biodiversity importance outside the urban edge should be regarded as "no-go" areas for development.
- Environmentally sensitive areas that are under severe development pressure (e.g. precinct B, refer to Figure 7.4) require a broad planning framework to guide the future development of these areas and ensure the long-term environmental protection of these areas.
- Further subdivision of these areas should generally be discouraged and consolidation encouraged.
- New development inside of the urban edge that potentially impacts on areas of high biodiversity importance should only be considered under exceptional circumstances or where social and economic imperatives merit consideration of development in parts. Such development should then be sensitive to biodiversity considerations affecting these areas.

#### Public Open Space, Recreational Areas, Waterbodies, Ecological River Corridors and Flood lines:

- Re-establish and protect indigenous riverine ecosystems.
- All rivers above a minimum size shall be protected by river conservation zones, and no buildings should be located in the 1:100 year flood lines (refer to Figure 5.11 & Figure 5.12).
- Maintain and enhance river courses within the Municipality. This should include efforts to improve amenity value of these areas and encouraging positive interfaces (e.g. through building orientation, permeable fencing) between abutting development and open space systems.
- Further extension of agricultural activity, beyond existing uses and rights within these areas should generally be discouraged.
- Although some agricultural activities may be permitted within the flood risk and flood fringe areas, the nature of the impacts and appropriate mitigation must be determined in the EIA process, and must be shown to be acceptable prior to approval (i.e. they must not pollute water resources or increase flood risk).
- No agricultural activities should be approved within the 1:50 year flood line.
- Undesirable activities should only be authorised under exceptional circumstances, subject to compelling motivation (e.g. where there is an existing right).
- Where facilities associated with sports fields, golf courses or picnic areas have been conditionally permitted in the 1:50 year zone, floor levels must be above the 1:50 year flood line.
- All new buildings and developments along rivers should be orientated towards the river, where possible, and the principles of Water

- Activities in these areas should focus on conservation use with conservation management activities (e.g. alien clearing, research) encouraged.
- In general, low impact activities such as passive recreation (e.g. walkways and trails), environmental education and tourism may be appropriate, but should be subject to stringent controls (e.g. limits to development footprint, management plans).
- Where possible, all new utility infrastructure, services and structures should be located outside of these areas.
- In general, avoid new development in these areas in a manner that would compromise open space linkage.
- Encourage development to respond to and promote opportunities for linkage between identified structuring open spaces in developed areas.
- In general, development adjacent to open spaces, or which rationalises these spaces, should be orientated towards the open space to encourage the use and passive surveillance of these areas. Design which compromises this condition (e.g. excessive blank walls and backing of development onto these spaces) should be discouraged.
- Safety and security should be considered in the upgrading, landscaping or development of public open spaces.
- Where contextually appropriate, consider commercial activities such as small cafes, kiosks and restaurants that will enhance the open space.
- Where feasible, opportunities for low impact sustainable use of open spaces, by local communities, should be considered (e.g. small scale urban agriculture) but this should take into account the wider access / linkage needs and public open space provision requirements.
- All development adjacent to open spaces should be orientated towards the open space to encourage the use and passive surveillance of these areas.
- Undesirable activities should not be authorised except under exceptional circumstances and subject to compelling motivation.
- The only commercial activities to be considered on public open spaces include small cafes, kiosks and restaurants where appropriate.

#### Urban Edge:

- Land outside the proposed urban settlements should be used for agricultural production, biodiversity conservation, scenic quality and agri-tourism.
- To ensure sustainable agricultural usage, further sub-division of land should be strongly discouraged outside the proposed Urban Edge.
- Crest lines should be classified as no-go areas for development. Walking trails can be located along the ridge lines such as all reading happening along the crest of the Bottelary Hills between

Stellenbosch and Kuilsriver thus creating a tourism opportunity utilising bio-diversity conservation opportunities.

### **Mixed Use Intensification:**

All business areas associated with identified urban nodes and business complexes identified for mixed-use intensification should aim to:

- The nature of mixed use intensification should be subject to local context. Higher intensity and more intrusive commercial activities to be limited to core parts of identified areas. Such areas include: Precinct area C and E identified in this SDF (refer to Figure 7.5 & Figure 7.7).
- Support mixed use intensification as indicated in the SDF plans, subject to any local guidelines and bulk service and transport infrastructure availability.
- Promote an appropriate interface between these mixed use areas and adjacent residential areas (proposed mix-use in Precinct C, refer to Figure 7.5) through the use of sensitive design and informed by local level guidance and plans where applicable.

### **Potential High, Medium & Low Density Development**

- These areas should be considered for a wide variety of urban uses such as housing development, public open spaces, community facilities, mixed use / business development (where appropriate), but should not include noxious industrial uses.
- Sites indicated for urban development, but which also fall within identified precautionary areas should take into account associated district development guidelines.
- Sites indicated for urban development, but where potential impact may occur with natural ecosystems (e.g. critical biodiversity areas) should be subject to EIA processes which take into account principles for dealing with development proposals in these areas of potential impact.
- Acknowledge and respect the surrounding urban environment and develop accordingly. This includes considerations relating to neighbourhood density and character, and access to public transport, job opportunities and social facilities.
- In general, support the development of new development areas at higher densities than exist in these locations, but with due regard for appropriate transition to surrounding areas.
- Develop utilising the principle of socio-economic integration so as not to create poverty traps.
- Particular design attention should be given in applications to interface areas between existing development and new development areas, especially where urban character may be impacted or where socio-economic gradient is steep.
- Support the appropriate development of identified new development areas subject to infrastructure availability and in line with requirements for provision of associated social facilities and recreational spaces.

- Promote building activities that conform to the National Building Regulations and discourage unauthorized building work.

### **Kayamandi Informal Settlement – Incremental Upgrade and Re-blocking**

- Support incremental upgrading and formalisation of existing formal settlements. This includes informal settlements in Klapmuts and other areas of the Stellenbosch municipality
- Limit expansion of informal settlements into identified precautionary areas (e.g. flood prone and risk areas), or sensitive environmental areas such as high visual impact areas or biodiversity network areas identified by the urban edge in this SDF).
- All new housing should install solar water heating devices, and non-subsidy housing should be encouraged to meet the portion of the electrical demand that exceeds 300kWh per month by generators such as solar photovoltaic panels and solar hot water heating devices.
- SANS 10400-XA energy efficiency standards should be adhered to in all planning applications for new building, major renovations and usage changes.
- Alternative energy sources should be developed and integrated into the grid, and the largest energy users should be encouraged and incentivised to invest in solar energy generators.
- Peak water demand should be accommodated with supplementary water storage and recycling, and urban water conservation and demand management programs should be implemented.

### **New & Existing Industrial Development and Commercial Development**

- General industrial uses should generally be supported in identified areas.
- Due to particular requirements for road and waste infrastructure associated with industrial uses, these areas should generally be reserved to optimise this infrastructure and mitigate potential impacts.
- Allowance could be made for limited forms of non-industrial activity, but these activities should not compromise the general use of the areas, for industry.
- Focus on the development of specialised high value small and medium-scale light industrial activities within the existing industrial areas and the proposed Precinct E.
- Semi-industrial areas, where a greater mix of business activities and some residential development in certain instances, can be tolerated where the mix of activities does not negatively impact on the competitive advantage of the industrial activities in the area. These areas include areas surrounding the two existing rail way stations in Stellenbosch, and areas towards the south of the 'Onder Pappagaai berg' neighbourhood.
- Ensure effluent is not discharged into the stormwater system or rivers (particularly industry in close proximity to the Eerste River).

## Cemetery

- Support continued use of cemeteries for this purpose.
- Support the utilisation of parts of older cemeteries for other social and recreational activities (e.g. memorial gardens, public parks) subject to further exploration.
- Identify new possible areas for cemeteries.

## Urban Areas

- Support the incremental densification over time of urban areas where appropriate. This should be guided by available infrastructure capacity, neighbourhood density and character, proximity to job opportunities and social facilities, and access to public transport.
- Applications for land use change (whether temporary or permanent) within predominantly residential areas should be treated sensitively. Key consideration should be given to soft landscaping along street edges as well as street facades of buildings.
- Encourage and facilitate the establishment of home-occupation / guest accommodation in a manner that does not impact on the character of the residential area. In this regard, applications must at all times adhere to the relevant policies for home occupation.
- Consider the existing character and heritage value of areas of significance (as may be reflected in detailed policies) as an informant to development and redevelopment proposals.

## WWTW

- WWTW must be upgraded to achieve minimum water quality standards as defined by DWAF (Stellenbosch Municipality, 2012).
- Where feasible, development at new nodes should be serviced by localised waste water treatment plants that deploy appropriate sustainability oriented technologies. Peak load management systems will need to be considered for particular areas.
- Furthermore, sewage should be regarded as a potential source of water, nutrients and methane gas.

## Existing and Proposed Local & District Nodes

- New and existing nodes, should be integrated into a public transport system.
- In addition, new and existing nodes should be densified by rezoning all, to mixed-use for intensification.
- New nodes are proposed at intersections, where the movement hierarchy is the highest.

### Existing and Proposed Rail way Station:

- Increase residential densities along public transport stops.
- Upgrade existing Rail way Station precincts.
- Support the idea of an integrated public transport plan for the future.

### Proposed Connector Route as a Scenic Route

- Direct traffic to the new proposed connector route from the R44, bypassing the town's core, and connecting to the R44 again north from Cloeteville.
- Classify new proposed connector route as a scenic route.

### Development Route

- To reduce the number of cars on the road, a combination of NMT and PT facilities is suggested. Ensuring that settlement densities are adequately promoting the financial viability of public transport facilities should also encourage a shift away from ever increasing dependence on private vehicles.



Figure 7.8: Proposed Public Transport network (source: Author, 2016).

Please refer to the SDF maps for detail regarding public transport stops and terminals.

## CHAPTER 8: DETAIL DESIGN FOR IDENTIFIED PRECINCT – E

During the past century, our approach to urban design, which was heavily influenced by factors such as the introduction of the motor vehicle, zoning, urban sprawl and the privatisation of public space, gave rise to the *loss of quality urban spaces* (Trancik, 1986). 'Lost space' is defined as 'undesirable urban areas that are in need of redesign', or 'anti-space' which make no positive contributions to their surroundings or users (ibid.). Inappropriate design approaches have led to humans losing their identification with the environment within which they live. One of the major requirements is therefore to design urban environments in which individual buildings are integrated with public space, thereby creating positive urban spaces. Designers should create site plans that become generations of context, and design buildings that define exterior space rather than to displace it (Trancik 1986). Against this background, three major theoretical approaches (theories) to spatial design in urban areas is used, governing the precinct, namely: Figure-ground theory, Linkage theory, and Place theory.

Together these three theories provide effective strategies for integrated urban design (Trancik, 1986). They are carefully considered in this planning and design, to ensure that anti-space does not continue to occur in the urban fabric of Stellenbosch, and that humans regain their ability to identify with their 'place'.



Figure 8.1: Indication of Precinct E - location in terms of spatial context (source: Author, 2016).



Figure 8.2: Location of Precinct- E (source: Author, 2016).

The precinct plan is driven by a strong sense of community, recognition of Stellenbosch's rich and diverse environment, and the long-term sustainable management of its natural resources. The area's social values and environmental wealth will be secured and balanced with opportunities for strong economic growth & opportunities. The opportunities generated by both the agricultural and mix-use activities will be captured to enhance the study area's resilience to economic variability, enhance service delivery and advance the community's early response to the potential effects of climate change. Healthy and liveable communities will work together with regional partners, adapt positively to the pressures of rapid growth, and maintain and enhance their cultural identities.

## MOVEMENT

Movement provides integration and enables people to move around easily and benefit equitably from urban opportunities and amenities. Access is ordinarily facilitated by a hierarchy of movement routes which performs different functions (refer to Figure 8.3). Streets in particular are regarded by theorists Dewar et al (2012) as the highest order of social space.

Movement should not be seen as a separate element but as an activity which occurs within social space. The degree to which movement dominates space varies from spaces which are entirely pedestrian dominated to spaces which are entirely vehicle dominated. As a general principle, however, most

spaces within settlements should accommodate both pedestrian and vehicular activity. However, entirely pedestrian routes, which vehicles cannot penetrate, have their place in settlements. Movement spaces should be flexible, to allow them to meet other demands - such as markets, meeting places and parking.

There is a strong ordering dimension to movement in this precinct (refer to Figure 8.3). At all scales, it is necessary to maximise continuities of movement, as this promotes choice and integration. Land uses should be able to respond freely to movement patterns as this encourages diversity and a mix of activities. While being ordered, rigid approaches to movement hierarchies, such as inflexible stipulations regarding intersection spacing and access should be avoided, as these mitigate against spontaneous settlement-making. The most important social spaces are low-order, local streets and these, in particular, must accommodate pedestrian activities (Dewar et al, 2012).

Linkage theory is derived from 'lines' connecting one element to another. These lines are formed by streets, pedestrian ways, linear open spaces, or other linking elements that physically connect the parts of a city. Linkage theory tries to organize a system of connections, or a network that establishes a structure for ordering spaces. Emphasis is placed on the circulation illustration rather than the spatial illustration of the figure-ground theory. Movement systems and efficiency of the infrastructure take precedence over patterns of defined outdoor space (Trancik, 1986).

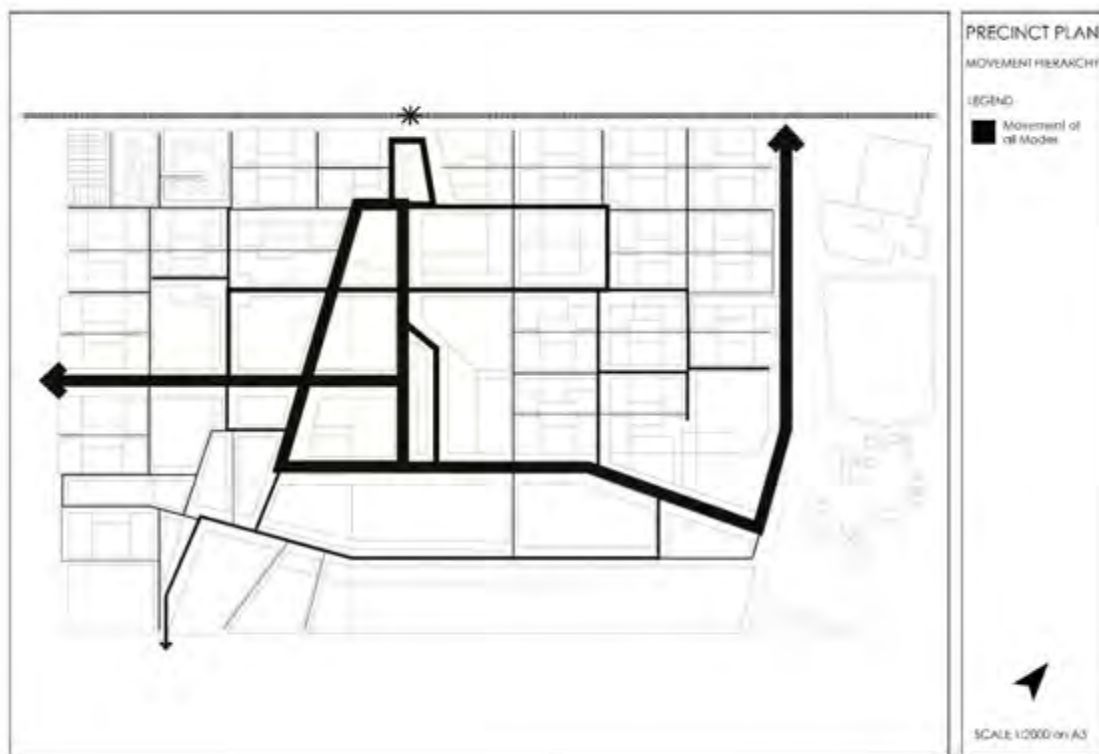


Figure 8.3: Movement Hierarchy (source: Author, 2016).

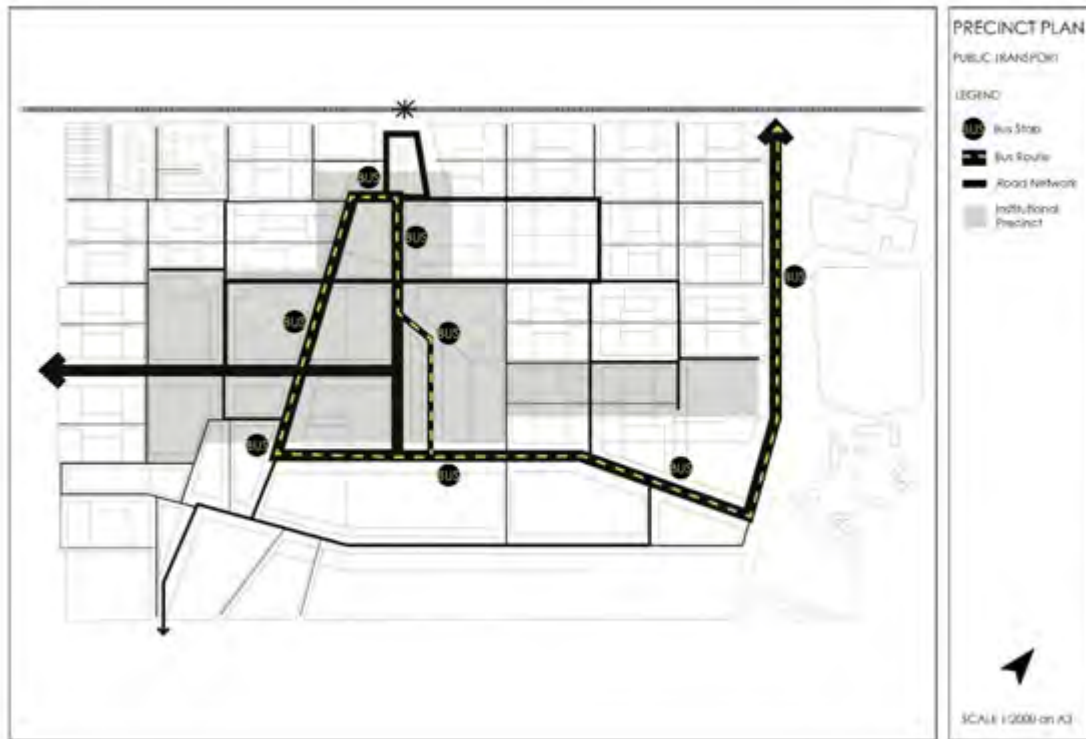


Figure 8.4: Public Transport Network and Stops correlation with Institutional Precinct (source: Author, 2016).

The movement of public transport is essential in areas that are characterised by low levels of car ownership. As far as possible, new development in such areas should support public transport (refer to Figure 8.4). Higher densities increase the viability of public transport and should be encouraged along public transport routes. Coordinating the stopping points and terminals of different movement modes significantly increases the attractive power of the zones in which they are found (refer to Figure 8.4 & Figure 8.5). These zones are ideal for high intensity, mixed-use development, such as indicated in the Figure 8.5. An intensive mixed-used area, with residential on commercial is proposed around the proposed rail way station, and along the proposed public transport route stops (refer to Figure 8.4).

The new proposed railway station is situated on a strong axis linking directly to the core of the precinct area, which is a combination of mixed use activities including retail, commercial, residential, institutional and public open space. The larger movement channels also serve as linear green spaces, and is accommodate vehicular and pedestrian movement and on-street parking (refer to Figure 8.5 & Figure 8.6).

## LAND-USE ALLOCATION

A continuous hierarchical system of public spaces organises the location of educational and other public facilities, all of which are externalised. All public space is designated as social space.



Figure 8.5: Land use allocation (source: Author, 2016).

## GREEN SPACE

Land for urban agriculture is particularly important in settlements where people are dependent on their own produce for food and nutrition, or have to supplement their incomes. Urban agriculture is also proposed in this precinct design to create a sense of sustainability and food security.

Urban agriculture is an environmental feature that can operate as an area of visual relief, particularly in situations where finance to maintain "public open space" is not available. Space for urban agriculture should generally be provided on the edge of the settlement, in order not to disrupt the continuity of the urban fabric. Stormwater runoff is organised so that this area is irrigated. The agricultural area forms part of the storm-water management system.



Figure 8.6: Public and Green Space & NMT route network integrating with it (source: Author, 2016).

Informal play spaces associated with the institutional areas are located on the periphery, to maintain the continuity of the built form along streets. The use of structuring trees are creating a rhythm of movement leading to a public square with building heights of 3 to 4 stories providing public surveillance, and emphasizing the public square to create a sense of enclosure. In addition, the road surface texture is proposed to be cobblestones, to act as a movement calming measure.

There are communal gardens for agricultural activity. The planted spaces can be used in many ways, including community events and markets.



Figure 8.7: Babylon Storen is an excellent example of an urban food garden.

---

PERSPECTIVE FOR URBAN PARK DESIGN

---



Figure 8.8: Proposed Urban Park layout and Concept (source: Author, 2016).

The proposed Urban Park is situated adjacent to the river corridor. In this way the ecological buffer is extended into the new proposed precinct site, enabling a sustainable integration with the existing river corridor. Figure 8.8 is a proposed design for the Urban Park.

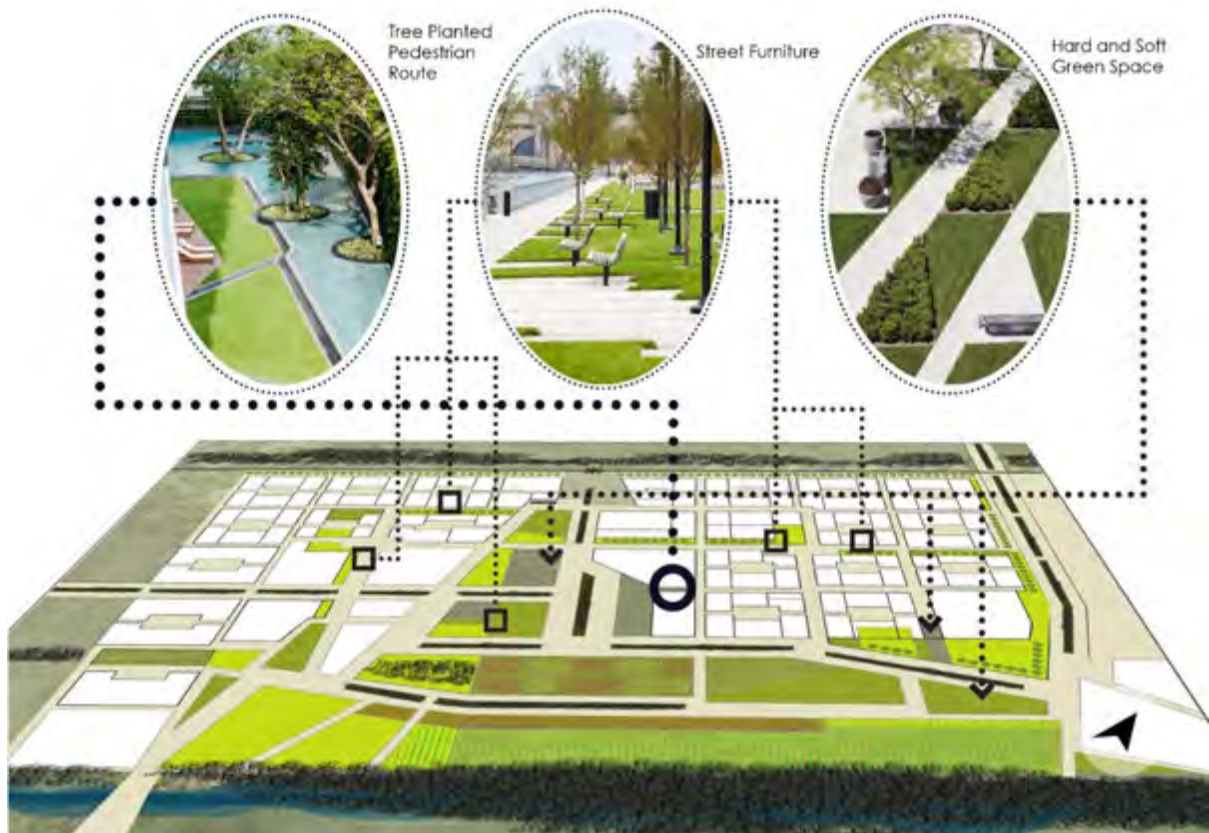


Figure 8.9: Indication of Character Areas regarding the Public space Network (source: Author, 2016).

## PUBLIC SPACE

Public space is generally open and accessible space where people can gather for a variety of reasons, and forms the backbone of public urban structure (Dewar et al, 2012). It is particularly in low income areas where public space becomes vital as it acts as extended 'living areas' in cases where private space is limited (ibid.). In such contexts, public space can take on a range of forms, sometimes unconventional and unexpected (ibid.). It could be inter alia be conceived as plazas, community gardens, play parks, or markets (ibid.). Given this range of possibilities, what become important is performance criteria and how spaces facilitate inclusiveness, multi-functionality and encourage a sense of community ownership (ibid.).

Both open-air public spaces and enclosed spaces such as community halls are important parts of social infrastructure. Halls is located in association with public spaces as this will allow for activities to spill over

into the other, or provide alternatives in case of weather changes. Halls should also be associated with other public facilities, such as schools and markets (CSIR, 2000). Given the limited number of public facilities which can be provided in any one settlement, it makes sense to concentrate these to create a limited number of special places, which become the memorable parts of the settlement (ibid.). The number and location of meeting places cannot simply be numerically derived. Rather, it is necessary to create "forum" places, places which over time assume a symbolic significance outstripping their purely functional role.

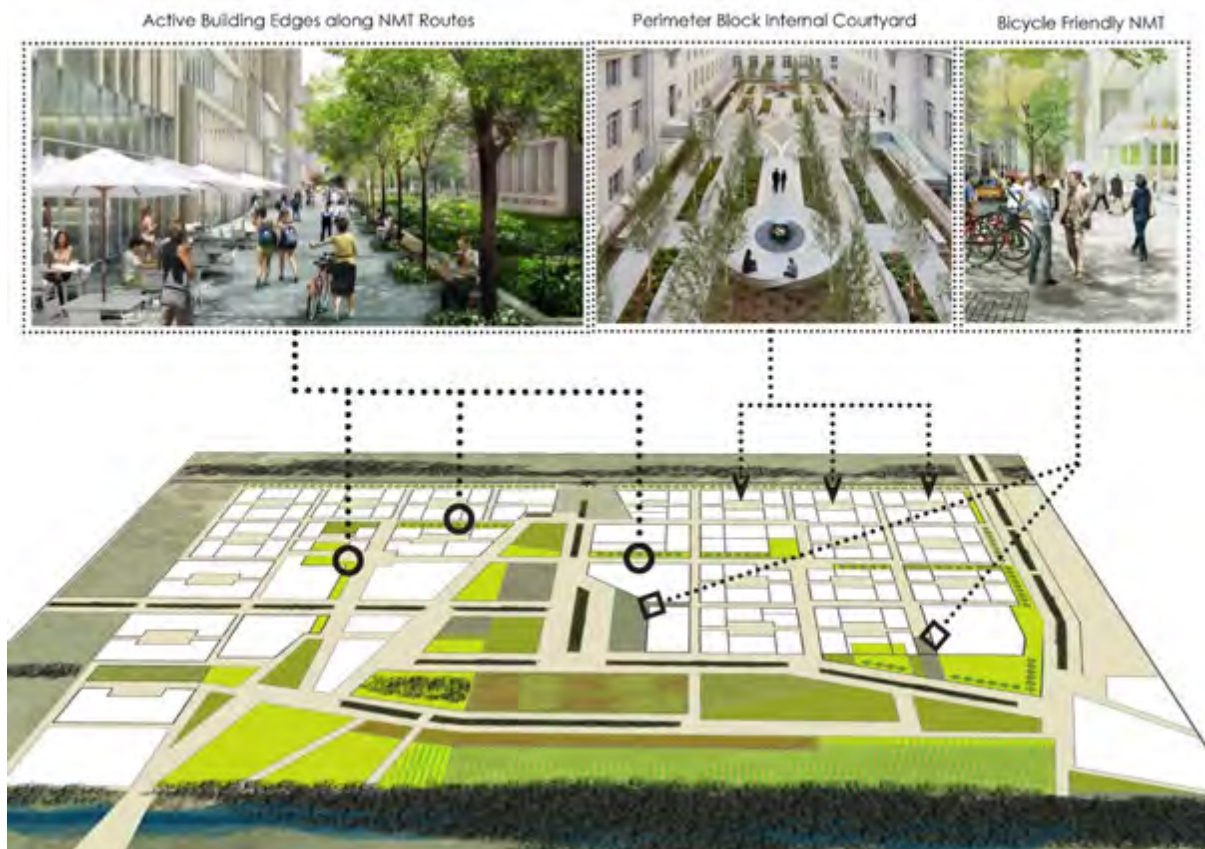


Figure 8.10: Indication of Character Area regarding Public Space, Squares and Court Yards (source: Author, 2016).

## MARKETS & ECONOMIC ACTIVITY

In South Africa employment generation is one of the highest priorities facing society. Therefore, economic considerations should be taken into account in all the planned elements of the settlement. It follows that a pressing priority in settlement-making is to create opportunities for people to manufacture, trade and provide services. Settlement plans should ensure that sufficient intensity is generated at points in the settlement structure to generate local markets (CSIR, 2000).

The precinct plan provide an easily readable spatial structure, which unambiguously suggests major movement channels and places of gathering, allowing entrepreneurs to respond to the structure created. As a rule, entrepreneurs will find their own place in the structure and will provide their own infrastructure where necessary. However, given problems of entry capital and urban management in many settlements, it may be necessary to establish urban markets and manufacturing infrastructure by means of deliberate public actions.

Markets is located at points of high accessibility. Particularly, they seek a close association with public transport and major pedestrian flows. The centrality of the market is reinforced by associating other forms of public infrastructure, such as clinics, halls, community resource centres, pension pay-points and services pay-points, with it. Markets need not always be permanent. The use of public spaces, including streets, for periodic markets, at certain times of the day, week or year is also a positive, cost-efficient option.

There are a number of advantages in promoting markets by means of public actions. The creation of urban markets enables small operators to gain access to viable locations. This physical concentration of traders increases their drawing capacity and enables them to compete with larger, formal operators, and simultaneously establishes the potential for other forms of mutually advantageous co-operation, such as delivery of bulk supplies form wholesalers. Markets in low-income areas can provide an important service to consumers, in that they offer variety and choice of goods and services to people who are unable to travel large distances.

Economic activity, both formal and informal, is linked with the continuous intra-settlement route. It is backed by an Urban Agricultural Education Centre. This play an integrative role, since it serves pupils from a much wider area. Pupils can access them via public transport via the new proposed rail way station, or the public transport bus system. The Urban Agricultural Centre, which serves a number of schools and the community at large, is located on the main road. Opportunities for urban agriculture are created on the periphery (south) of the site. A small-scale manufacturing hive forms the eastern edge of the agricultural belt. This is associated with larger scale manufacturing to the north of the site.

The figure-ground theory is founded on the study of the relative land coverage of buildings as solid mass ('figure') to open voids ('ground') (Trancik, 1986). Each urban environment has an existing pattern of solids and voids, and through the figure-ground relationship these relationships can be manipulated by adding to, subtracting from, or changing the physical geometry of the pattern (Ibid.).

The objective of these manipulations is to clarify the structure of urban spaces in an urban area or node by establishing a hierarchy of spaces of different sizes that are individually enclosed but ordered directionally in relation to each other. Trancik (1986) explains that space is the medium of the urban

experience and that spatial orientation is defined by the configuration of urban blocks that collectively form neighbourhoods and districts. It is the articulation and differentiation of solids and voids that make up the fabric of the city and establish physical sequences and visual orientation between places. It is therefore important that the perimeter of spaces and blocks be well articulated in order to establish positive outdoor rooms, which can be created by connecting the form of the building to the structure of the site or by turning and twisting the building's facades (Trancik, 1986).

Place theory goes one step beyond figure-ground and the linkage theories, in that it adds the components of human needs and cultural, historical, and natural contexts. Place theory gives physical space additional richness by incorporating unique forms and details indigenous to its setting and includes history, element of time and the fit between new design and existing conditions. In place theory, social and cultural values, visual perceptions of users and an individual's control over the immediate public environment, are as important as principles of lateral enclosure and linkage (Trancik, 1986) (refer to Figure 8.11 & 8.12).

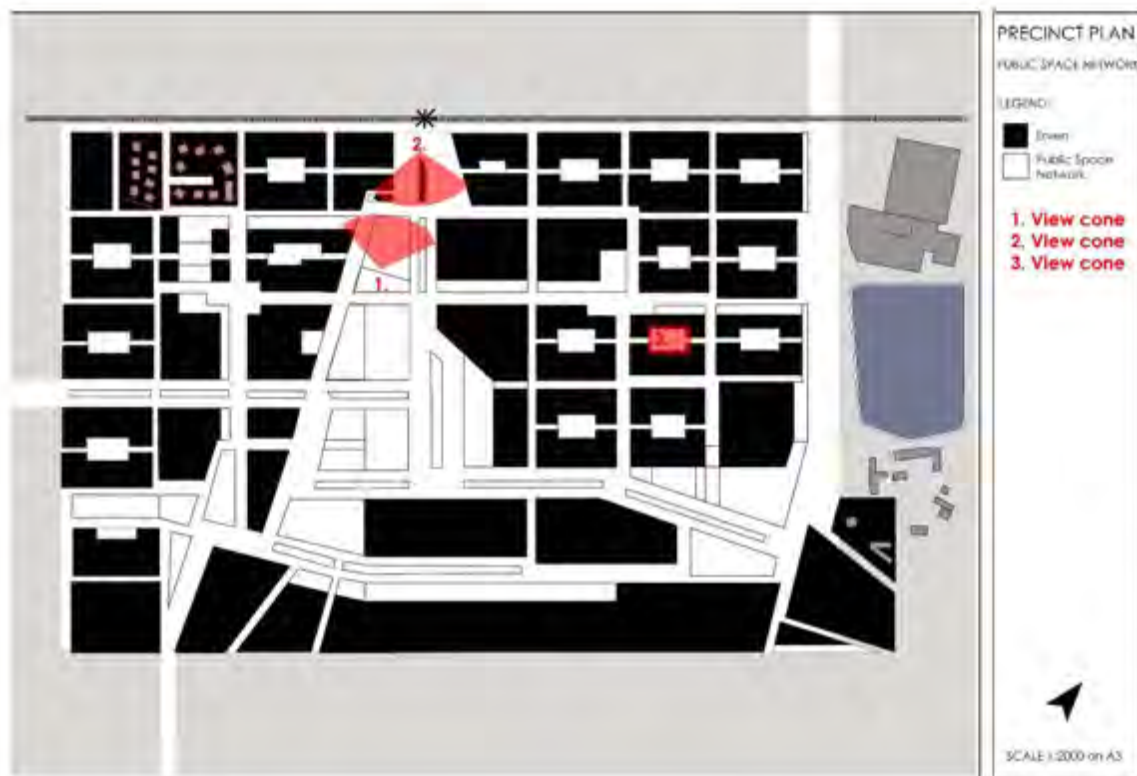


Figure 8.11: Illustrates Solid and Voids enabling a strong parti, which is the core and classified as POS, & three view cones indicating the desired spatial form for the area (source: Author, 2016).

## PUBLIC INSTITUTIONS

Public institutions are places where people congregate, and provide services which members of society value and need to sustain healthy civic lives (Dewar et al, 2012). In addition to their civic functions, facilities act as a landmark in the orientation and identification of the individual in the landscape. The considered placement of such important communal amenities (through prominent positioning and clustering of associated facilities) enhances urban structure as it enables convenient access and contributes to civic identity.

Community facilities are important place-making elements and they should be deliberately used, in combination with public space, to make memorable places. Different communities, however, have different priorities in terms of social facilities. The important thing is not to predetermine the form of all facilities, but rather the positioning of social institutions valued by the community (Dewar et al, 2012). The precise nature and form of many of these facilities can be determined over time by the community itself. Therefore, allowing for flexibility with regards to which institutional building should be placed where.

Social facilities are dependent upon public support and play an important integrating function in and between communities. They should therefore be "externalised", by being located in places of high accessibility, and made accessible to the local and surrounding communities. In this way, they bring together people from a number of local areas and are not tied to the fortunes of any one community.

The community facilities are externalised. There is a pronounced dimension of order in the system, with the largest and most important facilities associated with the highest-order spaces. It is not necessary to predetermine the form of these facilities. Communities can establish their own priorities. The educational facilities comprise urban schools. Where possible, they should be atomised (i.e. broken up into parts), with community facilities such as sports fields, halls, libraries, computer centres and laboratories being shared between schools and between school and community

Realities of resource scarcity demand that public spaces and buildings be used for more than one purpose. This is consistent with the principles of multi-functionality and the sharing of resources between user groups. Therefore, the use of mixed-use space allocations are prominent in this precinct design and the Urban Agriculture Centre that serves the entire District. An important institutional forecourt space is located at the end of a discontinuous route on the east of the site.

## **EDUCATION**

The creation of environments which promote learning forms an integral part of the settlement-making process. Learning has both formal and informal dimensions. Schooling relates to the formal dimension of education. Informal learning stems from exposing people to experiences outside the formal learning environment, such as experiencing nature, urban activities and social events. In this respect, the informal part of the learning experience can be enhanced by integrating educational facilities with the broader

settlement structure. This can be achieved by locating schools, colleges, Technicon's, adult education centres and universities close to places of intensive urban activities.

The concept of the specialised self-contained school, accommodated on a spatially discrete site and serving only its pupil population, needs a rethink. Schools should be seen as resources serving both pupils and the broader community. In this regard schools can accommodate the school population during the day and, where possible, adult education during the evenings.

## *HEALTH*

Health considerations must inform all dimensions of settlement-making and design. Particularly important is ensuring clean air, potable water, the disposal of human and toxic waste, air circulation, shelter and the prevention of overcrowding. Health facilities should be accessible and should be integrated with public transportation. This can be achieved by locating such facilities close to activity areas and regular places of gathering. The location of preventively orientated health facilities, such as clinics, in association with primary and pre-primary schools, offers advantages. Preventive functions, such as inoculation and nutritional programmes are best delivered through schools. Where a multipurpose hall serves a number of schools, a clinic may be beneficially located within or adjacent to that hall.

**VIEW CONE 1**



**VIEW CONE 2**



**VIEW CONE 3**

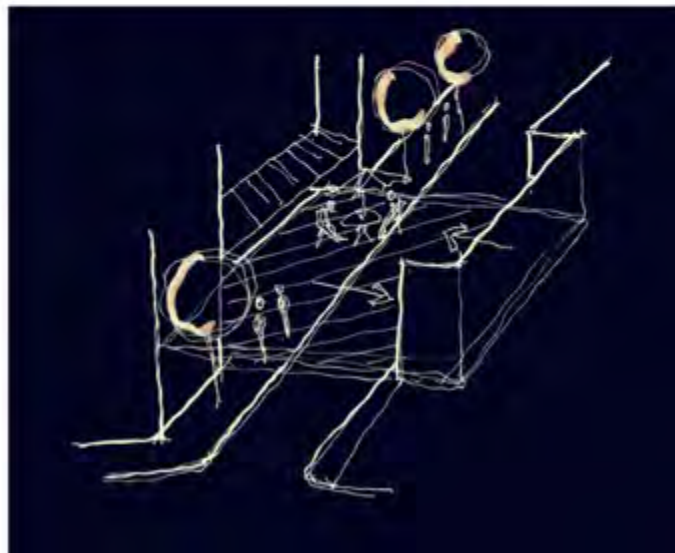


Figure 8.12: View cones of desired Spatial Form (source: Author, 2016).

## RESIDENTIAL



Figure 8.13: Proposed Housing Typologies (source: Author, 2016).

The precinct design depicts an intense, mixed-use, but primarily residential area. The area contains a wide range of uses: housing, education and other social facilities, formal and informal economic activity, small-scale manufacturing and small-scale urban agriculture. The plan also shows a variety of plot sizes and configurations, and thus different house types, can be accommodated and higher densities can be achieved. The aim is to create a fine-grained housing precinct which is effectively pedestrian dominated.

The height of buildings in the precinct is proposed to be of such a scale that it will not limit visual access to the surrounding mountain ranges; but at the same time creates a sense of safety and enclosure. The heights of the buildings differ in heights, and reaches a maximum height in the core of the precinct node, to create hierarchy.

It is suggested that the elements of the traditional building form be adopted in the planning and design of new developments in Stellenbosch Municipality. As such, the design of buildings is to draw from traditional building dimensions and footprint which would, amongst other, provide for the creation of secluded courtyards and similar sheltered areas that create a specific sense of enclosure and protection against the generally harsh local climate.

# HOUSING TYPOLOGIES



Figure 8.14: Indication of desired Housing Typologies (source: Author, 2016).



Figure 8.15: Building Height Restrictions & identification of Section A-A (source: Author, 2016).



Figure 8.16: Section A-A, illustrating the desired Spatial Environment created by Building Heights (source: Author, 2016).

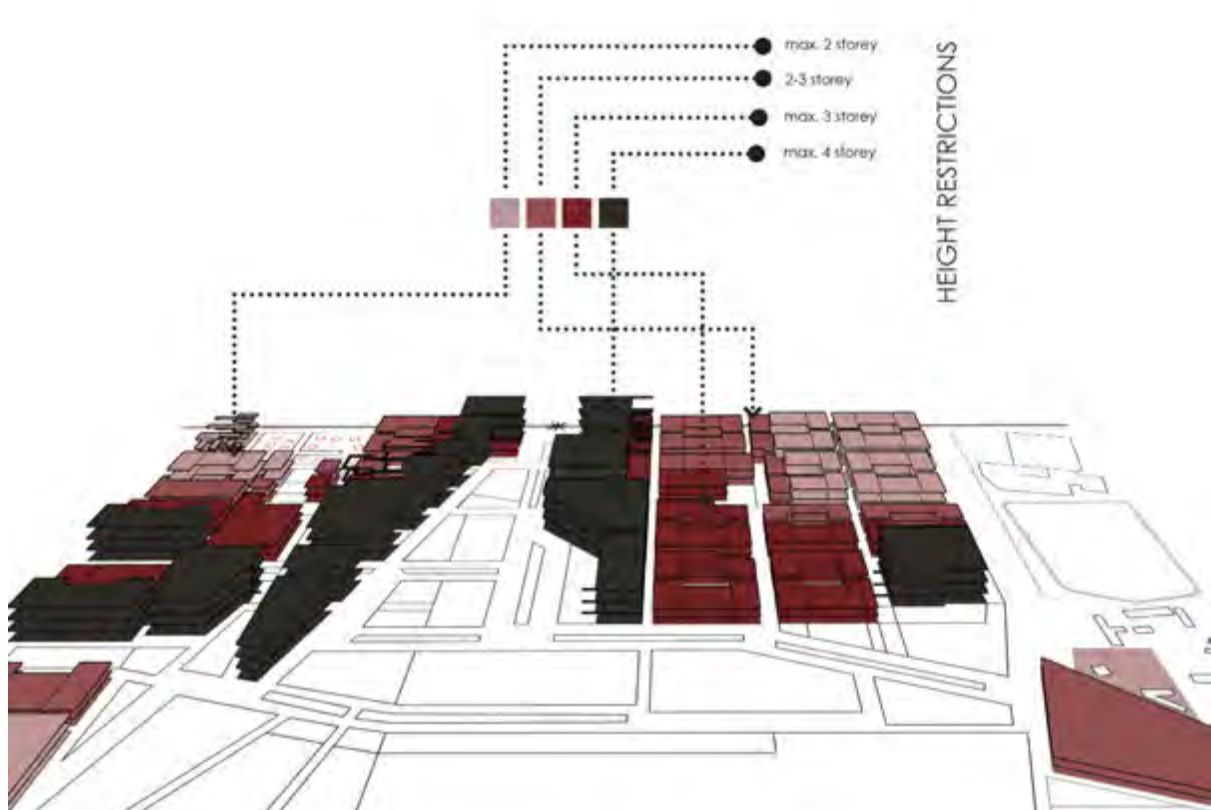


Figure 8.17: *Desired Spatial Form*, created by Solid and Void Space (source: Author, 2016).

A hierarchical system of discontinuous routes create varying levels of privacy: there is a wide range of living conditions in terms of publicness and privacy.

It is generally accepted that certain types of crime can be limited if the environment is designed appropriately.

- Ensure surveillance and visibility through multifunctional land uses, rather than mono-functional zoning, to ensure long hours of use; provide inviting and well-defined outdoor spaces conducive to users meeting and communicating; all paths and pedestrian routes should be in areas where there is surveillance, good lighting, controlled vegetation and high levels of activity; small open spaces should be strategically located within the neighbourhood (CSIR, 2000).
- Owners/users should be encouraged to take responsibility for places by avoiding tracts of vacant land without designated users or control; design the public realm to increase people's ability to read the built environment; networks of small neighbourhood parks are preferred to uncontrolled large open spaces (ibid.).

- Limit easy access and escape routes for criminals by carefully planning the location, size and design of large open spaces; avoid ending roads on vacant/undeveloped land; clearly mark pedestrian routes (ibid.).

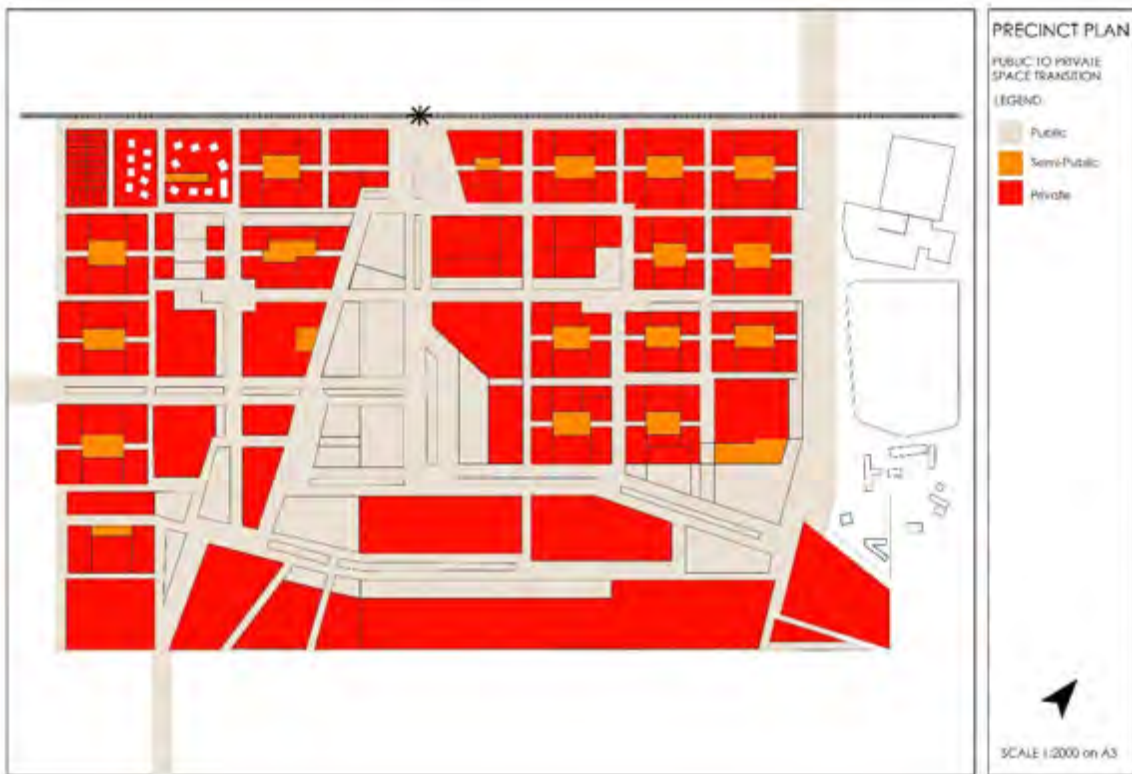


Figure 8.18: Public to Private Space Transition (source: Author, 2016).

The defensible space theory of architect and city planner Oscar Newman encompasses ideas about crime prevention and neighborhood safety.

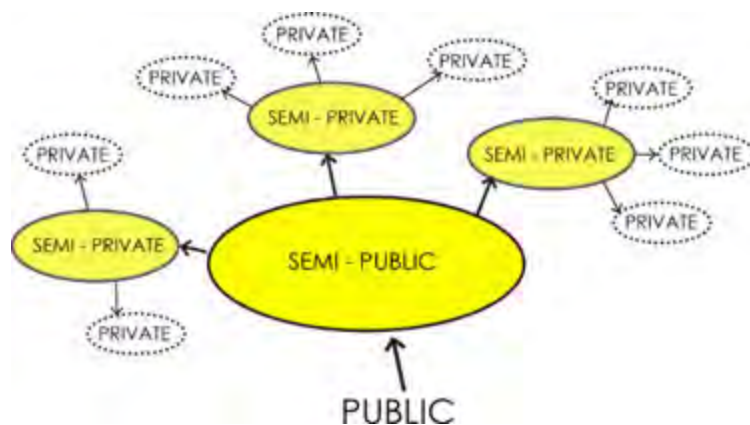
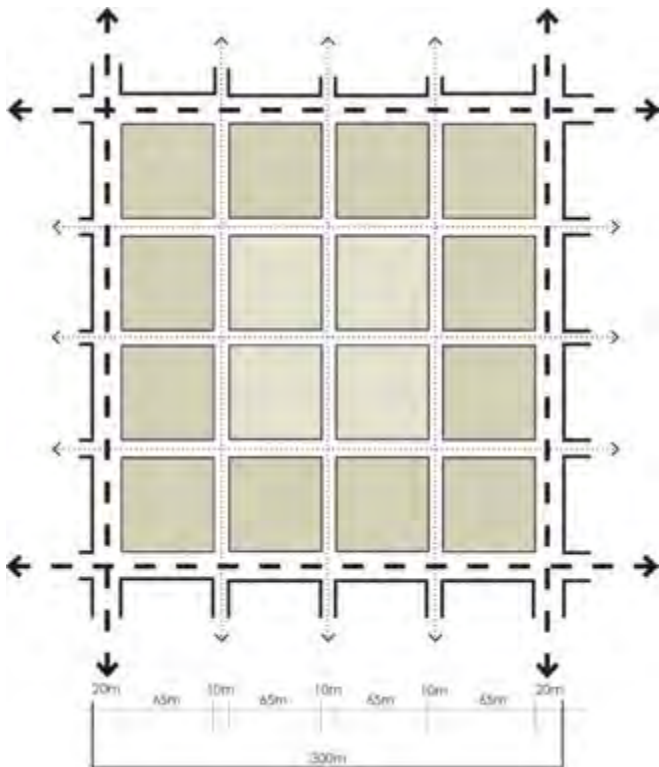


Figure 8.19: Newman defensible space concept (source: Author, 2016; Newman, 1972)

This diagram (above) illustrates the concept that is suggested by Newman (1972) to improve the safety of public spaces. The most important aspect is to ensure visual surveillance onto the public space. This can be achieved by allowing a mixed-use adjacent to public space. Commercial at the bottom, providing an active edge condition, during the day, and residential on top providing visual surveillance throughout the day and night.



### Block Layout

The precinct is primarily organised around a 300 m by 300 m super-block module. There is no one ideal block size, as this will vary with context. The choice of the block and its internal organisation reflects an attempt to optimise efficiencies in terms of pedestrian and vehicular movement. The organising system is one of nesting blocks. At the larger scale, blocks are approximately 300m by 300m (although some variation in size is necessitated by the need for space-making), which is efficient in terms of vehicular use. At the smaller scale, the basic block size is 65m by 65m, a comfortable scale for pedestrians and one which is found in many cities of the world. The smallest blocks can also be accessed by car, but are chiefly pedestrian.

Figure 8.20: Carving up the Super Block (source: Author, 2016).

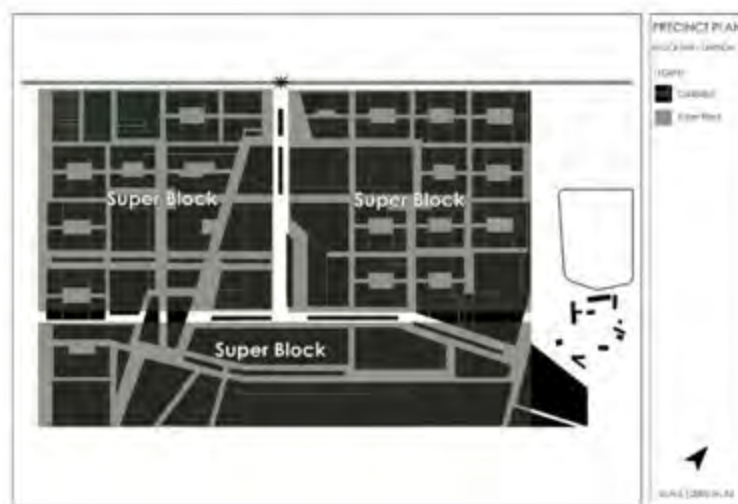


Figure 2: Applying the concept of the Super Block in context (source: Author, 2016).

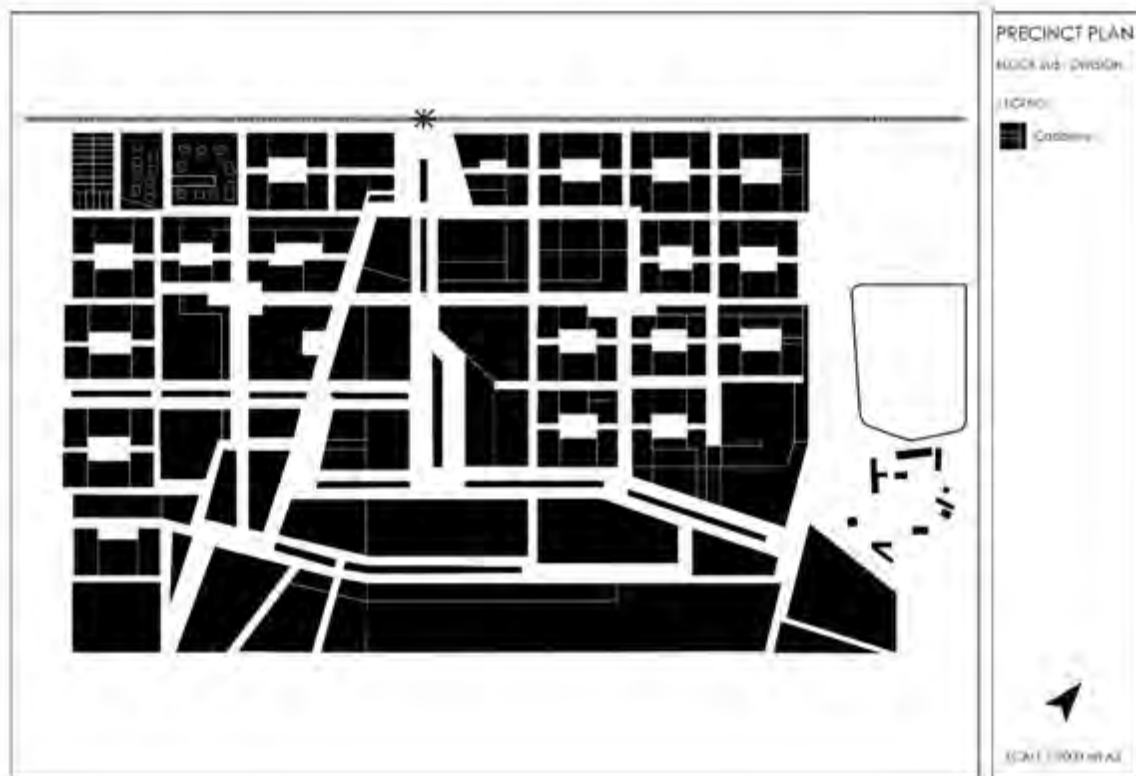


Figure 8.22: Subdivision of land parcels - cadastral map (source: Author, 2016).

## UTILITY SERVICES

Public utility services are engineering services, such as potable water and electricity into settlements, and sewage, refuse, stormwater and wastewater removal from settlements. These services are essential for healthy urban environments (Dewar et al, 2012). Their provision should be subservient to other elements of structure but they are too often regarded as a retrofit in which case electrical sub-stations ends up in parks. It is argued that public utilities should be integrated more expressly as part of the urban structure design in order to create a sustainable and efficient environment.

As far as possible, it is necessary to work with nature in terms of these "inputs" and "outputs" (CSIR, 2000).

- Water-collection technologies (e.g. roof tanks) should form an important part of the infrastructure in water-scarce areas.
- Woodlots can form important supplementary sources of energy.
- In certain places, solar energy is a viable alternative energy form.
- Stormwater and partially treated wastewater can be used for irrigation by being channelled to playing fields and urban agricultural areas.

## CHAPTER 9: IMPLEMENTATION

The implementation for the restructuring and densification deals with, firstly, changes that need to occur within the existing urban footprint to reinforce the SDF, which require sector specific capital investment. Secondly, it is informing planning around the capital investment requirements (public and in some cases private) associated with the new development areas and areas where major intensification if proposed.

### DESCRIPTION OF SERVICES REQUIRED

Expertise required in the consultant team includes the following:

- Civil Engineering
- Electrical Engineering
- Transport Planning
- Environmental Consulting
- Heritage Consulting
- Public Participation
- Land Surveying

The aim is to undertake and obtain approvals for all the necessary statutory applications required in order to secure development rights in line with the development framework for each site. The requirements of relevant legislation guiding the approvals required to enable development should be adhered to throughout the process, and where discussed in Chapter 5 of this dissertation.

It is required that the competent authorities for all applications are consulted timeously regarding the necessary statutory processes, public participation requirements, as well as possibilities for streamlining processes in order to obtain statutory approvals to implement the proposals generated during this and the preceding phases of this precinct desing.

Consultation with the Planning and Building Development Management and the Environmental Resource Management Departments as well as other Departments such as Transport, Roads and Storm Water, Human Settlements, Community Development (e.g. Sports and Recreation, City Parks), Urban Design and Economic and Social Development may be required. Furthermore, consultation may be required with Provincial Government (various departments) and State owned enterprises.

## BASELINE ANALYSIS

The aim of the baseline analysis is to investigate a range of development informants impacting on the future development of the site, including a range of *inter alia* physical, land use, environmental and heritage, engineering services, transport and development project informants in order to identify the key opportunities, constraints and fixes for development of each of the sites.

It is envisaged that the baseline analysis will be undertaken largely on the basis of desktop investigation and analysis of existing data. The baseline analysis should inform the preparation of layout alternatives in the next phase of work which reflects on ways in which the key informants and fixes have shaped the spatial and design concepts presented.

### Physical informants

The physical informants to be investigated include:

#### Geotechnical Investigation

Undertake a preliminary desktop geotechnical investigation using existing geotechnical data including past local experience, to establish geotechnical conditions and implications for the feasibility of developing the site.

The following activities are to be undertaken:

- Identify / confirm suitable locations for development and geotechnical sensitive or undevelopable areas based on existing information.
- Identification of broad geotechnical conditions and implications for development, specifically with regards to excavation, foundation and implications for landscaping etc.

#### Topographical Investigation

Undertake a topographical investigation using existing topographical data including past local experience and available studies undertaken on the site, to establish topographical conditions and implications for the feasibility of developing the site.

- Conduct a topographical survey for each site
- Establish general topographical information about the site indicating the contours and slope/gradient analysis.
- Identify / confirm suitable locations for development and steep slopes/sensitive or undevelopable areas based on existing information.

### Flood lines and Hydrology

Undertake a desktop investigation that assesses potentially significant impacts relating to hydrology and flooding. Also identify areas that are not developable due to council stormwater management policies.

### Environmental and Heritage informants

Undertake a desktop investigation that assesses significant environmental and heritage factors relating to site. This should include: consideration of particular information which would inform the identification / confirmation of areas of the site which can be developed and those which are not developable from an environmental and / or heritage perspective.

### Engineering services audit (physical locations and capacity)

The purpose of the bulk services desktop investigation is to assess, at a broad level, the informants which will impact on the development framework and ultimately the feasibility of providing the necessary services to the sites.

As part of this exercise, the investigation is aimed at identifying and determining the level of services currently being provided in the study area together with the capacities, both bulk and distribution networks to input into the feasibility assessment. This task will necessitate consultation with and inputs from the Utility Service Departments. This should include the investigation of water, waste water, stormwater, transport, electricity and solid waste management services.

The following activities are to be undertaken with respect to the bulk services investigation:

- To locate, map and identify key bulk services (sewer lines, electricity transmission network etc.) and associated servitudes as spatial informants to the formulation of the concept spatial framework.
- Determine and record the capacity of existing bulk infrastructure serving the precinct area.
- Highlight capacity constraints and identify planned and existing upgrades and their timeframes
- Locate, identify and map services infrastructure (including pipelines, cables and other infrastructure) on / over each site.

### Transport impact scoping

Transport impact scoping (desktop investigation) is to be undertaken in order to identify key transportation informants and provide preliminary transportation input to the formulation of development alternatives for each site. This work will inform the preparation of a traffic impact statement or transport impact assessment as required by statutory applications.

## **Spatial constraints and informants**

The purpose is to identify the key opportunities, constraints and fixes informing development of each of the sites which emerge from the SDF. These informants are to provide the basis (along with the identified spatial principles/performance qualities) for formulating the development alternatives. It is required that a synthesis of the key issues is presented in a manner which forms the starting points of an argument for the development alternatives.

## CHAPTER 10: CONCLUSION

The future of the Cape Winelands is depended on the *appropriate* approach towards planning. This dissertation argued for a new approach. It suggested a new model, which integrates wilderness, rural and urban rooms in a harmonious way. This model enhances the sustainability of the environment and allows for equitable and integrated (public and private, natural and built) environments. In addition, the model focused on the well-being of people and addressed local and international, past and emerging tendencies & challenges. Furthermore, this dissertation investigated the problem of past planning ideologies, which left the form and structure of South African cities, fragmented, inequitable and unsustainable. In addition this dissertation, emphasised concerns regarding the impacts caused by the loss of critical biodiversity, valuable land for food production, and an inevitable situation of urban sprawl.

This dissertation provided a new way of thinking with regards to future development in the Cape Winelands region. It comprised of the restructuring and re-evaluating of current movement patterns, and at the same time, enabled concepts and principles for the protection of wilderness, heritage, and valuable agricultural land, which suggested a new structure, promoting equity, sustainability, balance and integration, to address current and historical challenges caused by previous planning ideologies.

The dissertation concluded with a detailed precinct design, which incorporated the concepts, principles and guidelines suggested.

## REFERENCES

- Allen, A. (2009). Sustainable cities or sustainable urbanisation? *Palette UCL's Journal of Sustainable Cities*, 1: 2.
- Beall, J. (2002). Globalization and social exclusion in cities: framing the debate with lessons from Africa and Asia. *Environment and Urbanization*, 14 (1), 41-5
- Behrens, R. & Watson, V. (1996). *Making Urban Places: Principles and Guidelines for Layout Planning*. Urban Problems Research Unit, University of Cape Town
- Blakely, B. and G. Green (2010). *Planning Local Economic Development. Theory and Practice*.
- Bureau for economic research (BER) (2013), University of Stellenbosch. The local economic development department unit at Stellenbosch Municipality.
- Crane, D (1960a). The dynamic city, *Architectural Design*, April.
- Crane, D (1960b). Chandigarh reconsidered, *American Institute of Architect's Journal*.
- CSRI. (2000). *Guidelines for human settlement planning and design Vol. 1*. Department of Housing. Pretoria: Government Printers.
- Davis, D. H. (1957). *The Earth and Man*. Macmillan Company.
- Department of Environmental Affairs and Development Planning (DEA&DP) 2005: A Status Quo, vulnerability and adaptation assessment of the physical and socio-economic effects of climate change in the Western Cape. CSIR Environmentek: Stellenbosch. Report No. ENV-S-C 2005-073
- Dewar, D. 2000. The Relevance of the Compact City Approach: The Management of Urban Growth in South African Cities. In: Burgess, R. eds. 2013. *Compact Cities: Sustainable Urban Forms for Developing Countries*. E. & F.N. Spon, London
- Dewar, D. (n.d.) Forthcoming. No Title.
- Dewar, D & Uytenbogaardt, R. S. (1991). *South African cities: A manifesto for change*. Urban Problems Research Unit, University of Cape Town.
- Dewar, D. (2011). The Relationship between Spatial Planning and Transportation Planning in Southern Africa and its Consequences for Human Settlement. *World Academy of Science, Engineering and Technology*, 77.
- Dewar, D. Louw, P & Povall M. (2012). *Spatial development framework training Materials (Module 2); constructing a terms of reference for a spatial development framework*. matis. Cogta
- Dewar, D. & Kiepiel, J. (n.d.). *Spatial Development Frameworks on a broader scale: an Integrative Approach Article*.

- Dewar, D & Todeschini, F. (2004). Rethinking urban transport after modernism. Aldershot, Hants, England: Ashgate Publishing
- Eberts, R.W., McMillen, D. (1999) Agglomeration Economics and Public Infrastructure. In P. Cheshire and E.S. Mills (eds) Handbook of Urban and Regional Economics, Vol. 3. New York: North Holland.
- Ewert, J. 2013. Poverty and inequality in Stellenbosch – the key role of education. Cape Times. 5 February. [Online] Available: <http://blogs.sun.ac.za/news/2013/02/06/opinion-editorial-poverty-and-inequality-in-stellenbosch-the-key-role-of-education/>
- Fujita, M., Krugman, P., Venables, A.J. (1999). The Spatial Economy: Cities, Regions and International Trade. Cambridge MA: MIT Press.
- Gasson, B. (2007). Nature, Cities and Impact Assessment: P A Conceptual Framework. School of Architecture, Planning and Geomatics. University of Cape Town. Lord Charles, Somerset West.
- Gold, J., (1998), Creating the Charter o Athens: CIAM and the Functional City, Town Planning Review, Vol 69(3)225-247.
- Gregory, P. J., Ingram, J. S., & Brklacich, M. (2005). Climate change and food security. Philosophical Transactions of the Royal Society. Biological Sciences, 360(1463), 2139-2148.
- Henderson, J.V., Shalizi, Z. Venables, A.J. (2001) Geography and Development. Journal of Economic Geography. 1: 81-105.
- Hindson, D and Swilling, M (1995). Inter-departmental circulation, Planning Department, Greater Johannesburg Transitional Metropolitan Council.
- Huchzermeyer, M. (2001). Housing for the poor? Negotiated housing policy in South Africa. Habitat International, 25(3), 303-331.
- IIC. 2014b. Quo Vadis Document. (Unpublished). Stellenbosch.
- Isard, W. (1949) The General Theory of Location and Space-Economy. The Quarterly Journal of Economics, 63 (4) 476-506.
- Jefferson, M. (1931) The Distribution of the World's City Folks: A Study in Comparative Civilization. Geographical Review. Pp. 453.
- Jenks, M & Burgess, R. (2000). Compact cities: Sustainable urban form for developing countries. New York: Spon Press.
- Jones, J. (1970). Design methods: Seeds of human futures. Letchworth, Hertfordshire: The Garden City Press Limited.
- Krugman, P.R. (1991b) Geography and Trade. Cambridge, MA: MIT Press.

- Le Corbusier. (nd) *The Athens Charter*. Grossman, New York.
- Lynch, K. (1960). *The city image and its elements*. MIT Press, Cambridge Massachusetts.
- Malizia, E. E. and E. J. Feser (1999) *Understanding Local Economic Development*, Centre for Urban Policy Research.
- Mebratu, D. 1998. Sustainability and sustainable development: Historical and conceptual review. *Environ Impact Assess Review*, 18: 493-520.
- Midtown Greenway Coalition. (2015). About the Greenway | Midtown Greenway coalition. [online] Available at: <http://midtowngreenway.Org/about-the-greenway/> [Accessed 1 October 2015].
- Marshall, A. (1980) *Principles of Economics*. London: Macmillan.
- Max-Neef, M A (1991). *Human Scale Development Conception, Application and Further Reflections*. The Apex Press, London and New York.
- Miller, M. M. (2010) *Theory and Practice in Economic Development: Eight Entangled Years in Search of Panacea*. *Theories of Local Economic Development*, Ashgate.
- Nel, A. and Van Zyl, J.A (1962) *Universiteits uitgewers en Boekhandelaars (EDMS.) BPK. Stellenbosh/Grahamstad*.
- Nicks, S. 2011. *Sustainable Stellenbosch—a new rural and urban spatial vision for Stellenbosch: the 2009 SDF*. (Unpublished). Stellenbosch.
- Nicks, S. 2012. *Spatial planning – planning a sustainable Stellenbosch*. In Swilling, M.
- Norberg-Schulz, C., 1984: *Genius Loci: towards a phenomenology of architecture*. Rizzoli International Publishers, Inc.
- Norberg-Schulz, C., 1993: *The concept of dwelling*. Rizzoli International Publications, Inc.
- Ogle, F. (2014). *Planning Law*. APG4025s, University of Cape Town.
- Pieterse, E. (2009). *Post-Apartheid Geographies in South Africa: Why are Urban Divides so Persistent? Interdisciplinary Debates on Development and Cultures: Cities in Development Spaces, Conflicts and Agency*. Leuven University, 15 December 200
- Porter, M. E. (1998) *Clusters and the new economics of competition*. *Harvard Business Review*. 76(6) 77-90.
- Postel, S. (2000). *Entering an era of water scarcity: The challenges ahead*. *Ecological Applications*, 10(4): 941-948.
- Satterthwaite, D. (2006). *Climate change and cities*. *Sustainable Development Opinion*.

Schmithusen, J., 1964: Was ist eine Landschaft. Erdkundliches Wissen.

Smailes, A. E. (1953) *The Geography of Towns*. Hutchinson's University Library, cited in Nel, A. and Van Zyl, J.A (1962) *Universiteits uitgewers en Boekhandelaars (EDMS.) BPK*. Stellenbosh/Grahamstad.

Statistics South Africa. (2015). Quarterly Labour Force Survey: Quarter 1 2015.

Stellenbosch Municipality. (2014). Environmental Management Framework. [online] Available at: <http://www.stellenbosch.gov.za/about-us/documents/municipal-policy/planning-and-development/1782-stellenbosch-environmental-management-framework-june-2014/file> [Accessed 7 July 2016]. Stellenbosch Municipality. 2014. Stellenbosch Environmental Management Framework.

Stellenbosch Municipality (2014) Division Spatial Planning Heritage and Environment, 2014: 28.

Shatkin, G. (2007) Global cities of the South: Emerging perspectives on growth and inequality. *Cities* 24(1): 1–15

Solomon, S. (Ed.). (2007). *Climate change 2007-the physical science basis: Working group I contribution to the fourth assessment report of the IPCC (Vol. 4)*. Cambridge University Press.

Soja, E. and Kanai, M. (2007) 'The urbanization of the world', in R. Burdett and D. Sudjic (eds) *The Endless City*, pp. 54–69. London: Phaidon Press.

Sicirec. (2015). Ecological corridors and biodiversity [online] Available at: <http://www.sicirec.org/definitions/corridors> [Accessed 26 August 2016]

Swilling, M. & Anneke, E. 2012. *Just transitions: Explorations of sustainability in an unfair world*. Cape Town: UCT.

Swilling, M., Sebitosi, B. & Loots, R. (eds). 2012. *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: African Sun Media. 24-30. [Online] Available: <http://www.africansunmedia.co.za/Portals/0/files/extracts/Sustainable%20Stellenbosch%20Extract.pdf> [20 May 2013].

The World Counts. (2015). Consequences of depletion of natural resources. [online] Available at: [http://www.theworldcounts.com/stories/consequences\\_of\\_depletion\\_of\\_natural\\_resources](http://www.theworldcounts.com/stories/consequences_of_depletion_of_natural_resources) [Accessed 3 September 2016]

Todes, A. and Watson, V. (1984) *Growth pole theory and regional development in South Africa: Results of a survey in selected growth areas*. Carnegie Conference Paper No. 245

Todeschini, Fabio & Jansen, Liana (2016) *Heritage Resources in the Stellenbosch Municipality – An Inventory and management Plan*. Cape Winelands Professional Practices in Association, September 2016.

- Turok, I. (2001). Persistent polarisation post-apartheid? Progress towards urban integration in Cape Town. *Urban studies*, 38(13), 2349-2377.
- Turok, I., & Watson, V. (2001). Divergent development in South African cities: strategic challenges facing Cape Town. *Urban Forum*. 12 (2), 119-138.
- UN-Habitat. (2001). *Cities in a globalizing world: global report on human settlements*. London: Earth scan Publications.
- UN Habitat (2009) *Planning sustainable Cities. Global Report on Human Settlements 2009 – Annual Report*
- UN-Habitat. (2012). *Urban patterns for a green economy*. Nairobi: United Nations Human Settlements Programme.
- UN Habitat (2013). *Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlements 2013-United Nations Human Settlement Programme*.
- UN-Habitat. (2013). *State of the World Cities 2012/2013: Prosperity of Cities*. Routledge, New York.
- UN Habitat. (2015) *International Planning Guidelines on Urban and Territorial Planning*. United Nations Settlements Programme.
- Venables, A.J. (1996a) *Equilibrium Locations of Vertically Linked Industries*. *International Economic Review*, 49: 341-359.
- Venables, A.J. (1996b) *Trade Policy, Cumulative Causation and Industrial Development*. *Journal of Development Economics*, 37: 179-197.
- Vörösmarty, C. J., Green, P., Salisbury, J., & Lammers, R. B. (2000). Global water resources: vulnerability from climate change and population growth. *Science*, 289(5477), 284-288.
- Watson, V. (2009). 'The planned city sweeps the poor away...' *Urban planning and 21st century urbanisation*. *Progress in planning*, 72(3),
- Wilkinson, P. (1994). *The 'Package of Plans' Process: An Innovative Approach to the Planning of Major Urban Redevelopment Projects in Cape Town, South Africa*.