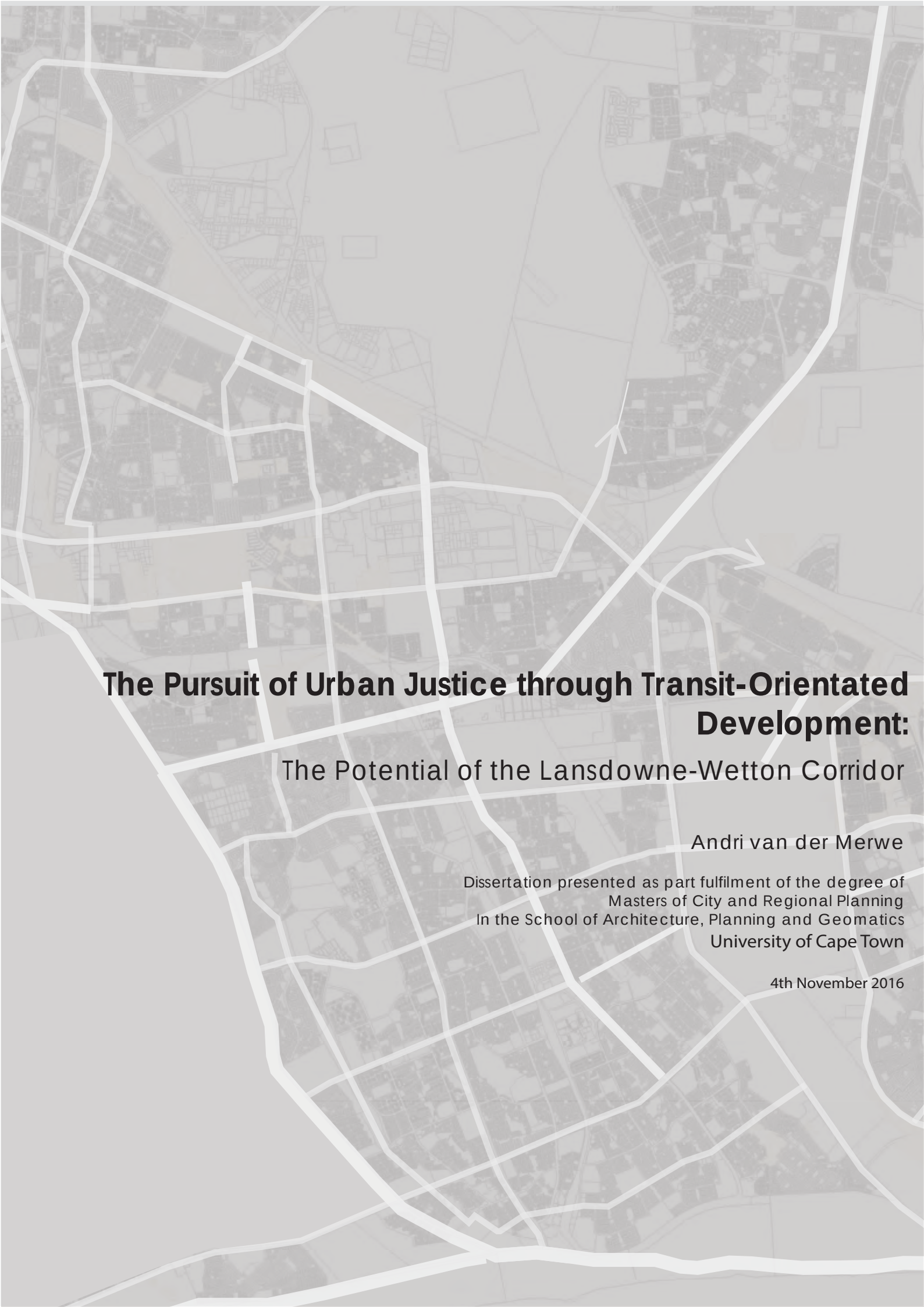

The Pursuit of Urban Justice through Transit-Orientated Development:

The Potential of the Lansdowne-Wetton Corridor

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Masters of City and Regional Planning
In the School of Architecture, Planning and Geomatics
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Abstract

South African cities are still facing highly inefficient and inequitable urban forms, established by modernist, and apartheid city models. This has resulted in low density sprawl, fragmented and segregated structures, all contributing to unsustainable and unjust city practices. The City of Cape Town is no exception. Cape Town is a tale of two cities, where the urban and spatial landscapes reflect unequal resource distribution and opportunities. Many of its residents remain trapped in an urban landscape that continues to perpetuate its city structures. More importantly, a rapidly increasing population is contributing to the current urban development patterns that are exacerbating previous social injustices and resource intensive patterns. The city is running out of land, resources, and time to restructure its current form and unsustainable development practices.

In the pursuit of urban justice, this dissertation argues that a precondition for changing Cape Town's urban performance, is to limit sprawl, increase densities and restructure towards a more intensive and mixed-use city, that will promote efficient public transportation and decentralise social and economic opportunities. Identifying urban Corridor and transit orientated development is a critical approach to structurally promoting efficient and just city structures; with the focus on the Lansdowne-Wetton Corridor as such, a critical element in the restructuring process. This site can then address the needs of some of the most marginalised communities within Cape Town.

The design method and package of plans approach was used to guide this dissertation and implement ideas and proposals in an attempt to demonstrate an example of an alternative to Cape Town's current development patterns, that are continuously perpetuating its inefficient, unjust and unsustainable city structure. The study concluded that past urban planning practices have not changed considerably over the past twenty years and that it is of utmost importance to move towards a new way of thinking and developing.

This framework can improve equal access to public transportation, social and economic opportunities and re-introducing place making principles. It is aimed at creating positive performing environments, using performance qualities, sustainability, efficiency, equity, integration, urbanity, choice, safety and a sense of place.

By focusing on an integrated public transportation system, the intensification of identified areas, designing walkable areas, the promotion of small scale entrepreneurial activities contributes to increasing the accessibility of economic and social activities for all of Cape Town's residents.

Acronyms and Abbreviations

CoCT City of Cape Town

NMT Non-Motorised Transport

SDF Spatial Development Framework

BEPP Built Environment Performance Plan

NMT Non-motorised transport

CFR Cape Floristic Region

CDI City Development Index

TOD Transit orientated Development

TCT Transport Cape Town

PHA Philippi Horticultural area

Glossary

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.

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

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

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

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.

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

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.

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 centre 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.

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

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CHAPTER 1: INTRODUCTION

1.1 Introduction

It has been twenty two years since the advent of democracy in South Africa. However, South African cities are still facing highly inefficient and inequitable urban forms established by modernist, and apartheid city models, characterized by low density sprawl as well as fragmented and segregated structures.

The City of Cape Town is no exception, with a sprawling city, resource intensive development patterns, vehicle focused movement systems and a deeply socially and economically divided city. The urban and spatial landscapes reflect unequal resource distribution and opportunities. The city is facing numerous spatial challenges, from inefficient movement systems, environmental degradation, increasing poverty and inequality, the lack of quality social facilities, economic inefficiencies, poor quality public spaces and growing informal settlements which are all inextricably interrelated. One cannot be improved without the other. More importantly, a rapidly increasing population is contributing to the current urban development patterns that are exacerbating previous social injustices and resource intensive patterns. The city is running out of land, resources, and time to restructure its current form and unsustainable development practices.

In the pursuit to seek urban justice, this dissertation argues that a precondition for changing Cape Town's urban performance, is to limit sprawl, increase densities, and restructure towards a more intensive and mixed use city. This will promote efficient public transportation and decentralise social and economic opportunities. Urban Corridors and transit orientated development have been identified as critical approaches towards structurally promoting intensification, densification and efficient structures.

The design method and the package of plans approach was used to guide this dissertation and implement ideas and proposals to demonstrate an alternative to Cape Town's current development patterns. This methodology is a process that involves continuous cyclical refinement of the need, programme, design formulation, concept, and context at a range of scales. This process stemmed out of 'a need' to improve the human and environmental requirements for the City of Cape Town. By addressing the 'need', this dissertation aimed to improve the lives of individuals and groups while protecting and enhancing its natural systems. This dissertation was largely formed by the starting point or the 'lowest common denominator'; In other words, people moving on foot, and those who have limited access to personal resources or sophisticated technologies and to discover the most equitably favoured outcomes.

This study aimed to develop a framework that could improve equal access to public transportation, social and economic opportunities and re-introduce place making principles. It aimed at creating positive performing environments through the use of

the performance qualities of; sustainability, efficiency, equity, integration, urbanity, choice, safety and a sense of place. In a complex urban environment, the focus on public transportation is not an end in itself, but a very important element of improving the accessibility of its residents to services, facilities and opportunities. Transportation is one element within the urban fabric, but its potential role is fundamental within the broader imperative of restructuring urban environments and was therefore identified as an important informant.

The study concluded that past urban planning practices have not changed considerably over the past twenty years and that it is of utmost importance to move towards a new way of thinking and developing.

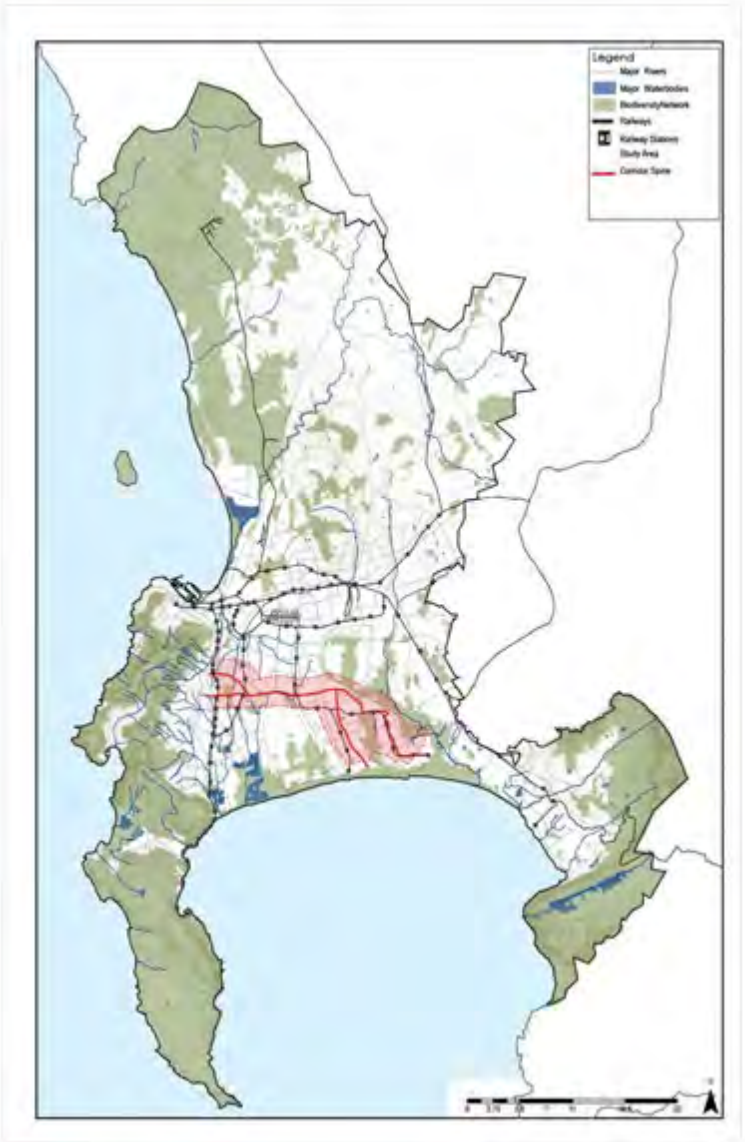
1.2 Location of the Study Area

The Lansdowne-Wetton Corridor was identified as a critical element in the restructuring process.

The study area is in the southeast section of Cape Town, which is often termed the 'Metro Southeast', which is one of the most marginalised areas in the city.

The Lansdowne-Wetton Corridor suffers from high levels of poverty and unemployment and has poor access to urban services, quality facilities or economic opportunities. It makes up 16% of the Cape Town Municipal area, with a population of approximately 400 000 people (or 80 000 households), representing 38% of the City of Cape Town's total population (CoCT, 2012).

The area is presently unsustainable. It cannot support its population; in terms of access to services, available infrastructure and the provision of economic opportunities.



Map 1 Site Located within the Metro South-east in Cape Town (Source: Author, GIS Technical Library, University of Cape Town)

This results in residents having to travel for all purposes, at a considerable cost in terms of time and money.

This emerging Corridor, presents the perfect opportunity to structurally intensify, provide mixed use activities and provide efficient public transportation; also, to improve accessibility for its residents to quality spaces, economic and social activities, and to provide for efficient east-west movement within the larger metropolitan area.

1.3 Design Methodology

The design approach is informed by the view that it is a process and not a product (Behrens & Watson, 1996). The design process takes the form of a normative and cyclical process, rather than a linear or technical one. It consists of four main elements that will be discussed below; a need, idea, programme and context (Figure 2) (Behrens & Watson, 1996).

Fundamentally, these activities are influenced by the author's ethics, adopted philosophical approach and procedural theory (Dewar & Louw, n.d; Watson & Behrens, 1996). This section is an overview of the design methodology which has been followed in this dissertation. The author's ethics and adopted philosophical approach is discussed in Chapter 4.

The process stems out of need. Firstly, it recognises that the basic function of settlement design is to improve the lives of people and cater to their human needs (Dewar & Louw, n.d). Human need refers to an individual and a collective set of concerns. The individual concerns must be met, to enrich their lives, by creating spaces that allow people to self-actualise, through creative actions to improve their current lives.

For example, in areas with high levels of poverty and unemployment, there is a need to generate small business scale activities. Settlement design should cater for such opportunities. A collective concern arises when people live socially. A vital starting point is to start at the 'lowest common denominator'. This includes people moving on foot and those who have limited access to personal resources or sophisticated technologies. This can contribute to high performing areas. Otherwise if these assumptions are not realised it marginalises those who will suffer the most.

Secondly, the environmental need stems from recognising that natural systems need to operate systematically. Spatial design needs to be placed within a 'conversationalist' perspective, to protect and preserve the natural environment (Dewar & Louw, n.d). These needs, specifically human needs, give rise to the programme.

The programme is the formulation of the quantities and the qualities which drive the design. The performance qualities need to tie in with the spatial design and the

quantities required. The quantities involve the space budget measured by a range of thresholds, land use schedules, and densities (Watson & Behrens, 1996). This gives no form but only the impaction thereof.

The idea identifies the spatial relationships that contributes to the identified need. The idea manifests into a concept, which articulates the 'what should be'. It involves concerns and identifies the implications of spatial relationships in the form of conceptual diagrams. It is guided by understanding the problems and not just dealing with the symptoms (Dewar & Louw, n.d). The conceptual design is the product of the process and it gives direction to the design process

The context is the application of the concept and for sustainable spatial planning, it requires a detailed understanding of all the contextual factors impacting the selected site (Dewar, Louw, 1996). This in turn warps the idea and design. The design methodology is recognised as a process that involves continuous cyclical refinement.

1.3.1 Design Approach

The design formulation brings together the concept and context within a range of scales. This process is warped and is adjusted to meet the demand and context, as well as the possibilities of the site (Behrens & Watson, 1996). The approach within this dissertation is a 'package of plans'approach, as an alternative to the master plan approach (Wilkinson, 1994). The master plan approach requires a comprehensive proposal that breaks down the development and requires approval in entirety before approval is received. The package of plans approach allows for more flexibility and change throughout the process.

The 'package of plans' approach is used to guide the reader through the design process that will be followed. This approach recognises that plans are planned and developed at different stages, with the biggest advantage being that it enables decisions to be made within different scales of the framework (Wilkinson, 1994). It is a flexible system that incorporates different design layers, starting with the broader conceptual design leading to a detailed precinct design.

This 'package of plan' entailed different analysis and design led processes at four different scales:

The Metropolitan Analysis

The metropolitan analysis used the primary structuring elements, green systems, movement systems and higher public institutions, at this scale to determine the logic of Cape Town's urban system.

This in turn was used to restructure and develop a new conceptual logic for Cape Town.

Site and Environs Analysis

The next scale of analysis was at a sub-metropolitan context. The purpose of this scale was concerned with the natural, structural and local context of the site and its surroundings. This was used to engage with the issues and the role of the site in order to integrate it into the adjoining areas and the larger region.

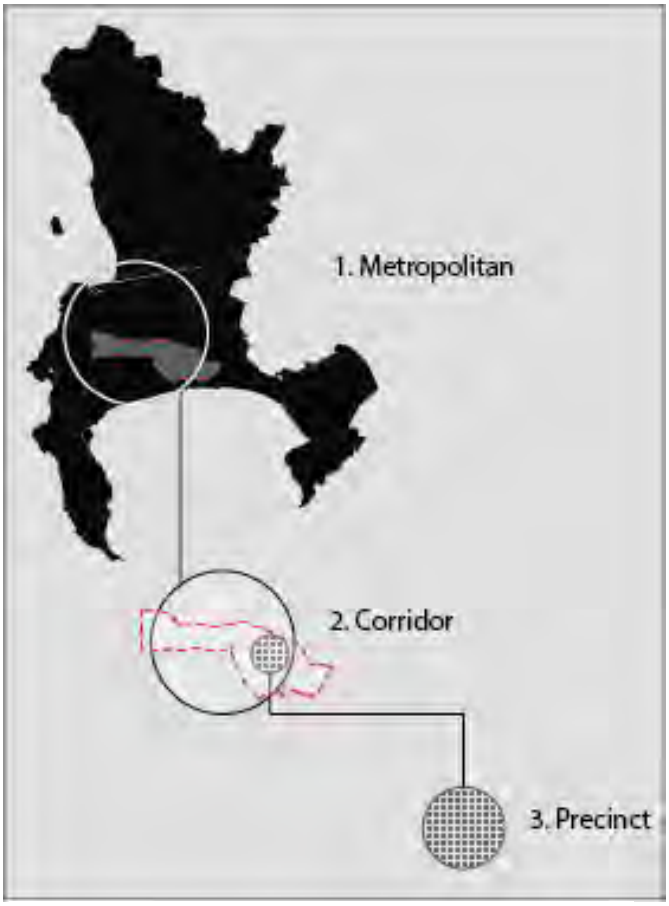


Figure 1: Package of Plans Approach (Source: Author)

The analysis followed a detailed analysis of the biophysical elements, built environment, design informants, landscape character and public spaces. This stage concluded with the major informants and constraints which informed the development proposal (Watson & Behrens, 1996).

Precinct

The last scale was the precinct plan that divided the site into a logical sequence of smaller land parcels, for further detailed urban design attention. It involved breaking down the superblock into subdivisions, the allocation of building typologies and key layout features. These did not restrain the plans' freedom but ensured the integrity and optimal potential for the environmental and spatial quality of the precinct (Dewar & Louw, n.d).

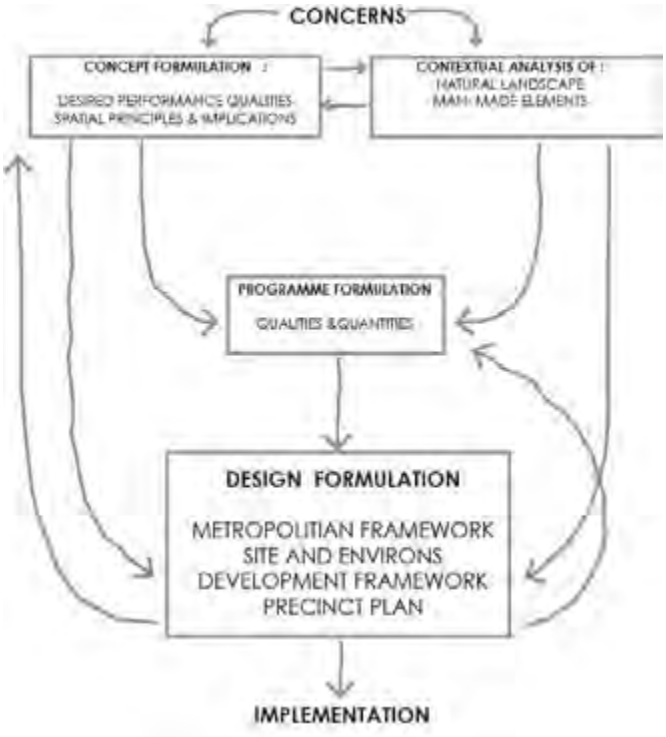


Figure 2: The Method used in the Dissertation (Source: Author, Behrens& Watson, 1996).

1.4 Structure of the Document

The document is structured in the following way: Chapters 2 to 5 describes the theoretical argument that informs the direction and the design of Chapters 6 to 10.

Chapter 2, discusses the generic problems that are occupied by the urban structure and form of South African cities and town.

Chapter 3, analyses the history, socio economic profile, environmental status and spatial and structural form of the City of Cape Town through the lens of social justice.

Chapter 4, outlines a brief position about the values and ethics of the researcher, which forms the compilation of this dissertation. It also comprises setting the direction of urban growth management. It seeks to define the desired performance qualities of planning and design, international tendencies, legislative frameworks and lastly the nature of plans.

Chapter 5, outlines various ideas of how urban growth management should be handled, and discusses the ideas used to form the planning framework; namely, urban corridor development and transit orientated development is discussed.

Chapter 6, using the theory and context of Cape Town a metropolitan concept is developed, consisting of primary elements; the open space and green systems, movement systems and tertiary facilities in order to move towards restructure the City that will inform the site scale.

Chapter 7, looks at the selected study area, the Lansdowne-Wetton Corridor. Firstly, it analyses the site and environs, built environment, landscape character and design informants of the area Secondly, the chapter proposes a development framework for the study area and identifies a precinct within the study area.

Chapter 8, identifies the precinct plan, as well as the control and the design guidelines. The implementation of the framework and precinct is discussed.

Chapter 9, comprises the various stakeholders, as well as the proposed phasing of the plan, monitoring, review and the land budget of the site.

CHAPTER 2: URBAN CHALLENGES IN SOUTH AFRICA

2.1 Introduction

South Africa is the most urbanised country on the African continent, with approximately 60% of its population living in urban areas (UN, 2014). Although the first urban settlement in the country, Cape Town, was established in 1652, urban growth has occurred mainly over the past fifty years (Dewar & Louw, n.d). Urban growth rates have historically been high. However, there is an uncertainty about growth rates, because of high death rates (HIV related consequences), external impacts (increasing refugees) and inward migration rates (Dewar & Louw, n.d). In short, there is uncertainty about the actual growth rate of populations in cities, but based on the census data, urban settlement growth in South Africa appears to show a 5-10% increase annually (Stats SA, 2011).

Poverty rates, inequality, and unemployment are on the increase globally but are specifically a major challenge in South Africa. The Gini-coefficient index of South Africa is one of the highest in the world, reflecting a large socio-economic divide and a high degree of marginalisation throughout the country (World Bank, 2015). In South Africa with 21, 7% of people living in extreme poverty in urban areas, informality is increasing, both economically and in respect to housing (Stats SA, 2011). The greatest urban growth is estimated as occurring in the poorest sections of the country.

The history of South Africa is largely entrenched within its urban form. This chapter examines the causes and consequences of the spatial patterns within South African cities. It does this in a number of ways. Firstly, it identifies the urban realities that are affecting cities and towns. Secondly, it examines the process of settlement formation in South Africa. Thirdly, it investigates the consequences of the urban patterns. Finally it explores the implications for urban planning and design. It is important to understand the history of a country and its current context in order to build towards a different future.

2.2 Urban Challenges in South African Cities

The current structure and form of South African towns and cities has been shaped by four major influences: the planning and design ideology of modernism, the political ideology of Apartheid, the informal processes of settlement formation, and rampant private development (Dewar & Louw, n.d).

2.2.1 Ideology of Modernism

The growth of South African settlements since the 1930's has been dominated by two ideologies. The first ideology is modernism, which is deeply entrenched into the policies and practices of town planning (Dewar & Todeschini, 2004).

Modernism emerged in the United States and in Europe, early in the 1900's and rapidly spread to other countries and; in the 1930's, to South Africa (Mumford, 1953; Dewar &

Todeschini, 2004). The introduction of modernism marked an extraordinary moment, as it broke away from centuries of traditional settlement building. It attempted to redefine the structure and form of cities and towns in order to create a 'good urban life' for all (Dewar & Todeschini, 2004). During the period of modernist thinking there were powerful influences from other urban movements, such as the Garden City and the New Towns Movements that was also widely accepted.

The ideology of modernism promoted a number of key ideas; an anti-city ethos, an emphasis on separation of the major activities of life (live, work, play) as well as the domination of technology efficiency and programmatically driven planning.

Modernism had a strong anti-city ethos. It encouraged the 'good urban life' by promoting the values of suburbia, as opposed to urbanisation. In this period the concept of the neighbourhood unit, which was designed by Clarence Perry in the early 1900's, was commonly used. Perry's planning model was built around vehicular movement patterns and the concept of suburbia (Banerjee & Baer, 1984). Perry designed self-contained and desirable neighbourhoods, with the focus on free-standing units on plots. The idea was to create a beautiful building surrounded by an idyllic looking garden (Banerjee & Baer, 1984). This adoption of single free-standing units on their own plots, was ingrained into the idea of the 'good urban life' and this idea prevailed mostly in lower income groups. This resulted in planning frameworks that were beneficial for higher income neighbourhoods, but in lower income neighbourhoods they resulted in plots with tiny structures and hardly any green spaces (Dewar & Todeschini, 2004).

This anti-urban ethos gave rise to an emphasis on separating major activities such as home life, work, play and movement. This separation of activities encouraged mono-functional areas and encouraged the transition away from public urban spaces.

Public spaces were traditionally seen as the basic building blocks for settlements. These public spaces took the form of social spaces that were accessible and open to all people in the form of public squares, streets and parks (Dewar & Todeschini, 2004). In instances of public parks or streets, the use of buildings helped define these spaces. With the separation of activities this replaced the view of buildings being used as building blocks for settlements. This drew the attention of designers. Modernist ideologies also replaced the concept of public spaces with predominantly green spaces, which eroded the traditions of urban space making (Dewar & Louw, n.d).

There was a strong belief that technology would overcome all natural and social constraints, in order to transform society. An increasingly important development in technology was the increasing dominance of the car (Dewar, & Todeschini, 2014). This was based on the Fordism mind-set that everyone would own a car, and it was supported as the preferred mode of transport. This radically contributed to a shifting of focus, from creating accessible cities and towns, to mobile cities and towns. This led largely to the detriment of lower income groups, who did not have the means to buy cars (Dewar, 2011). There was a focus on vehicular mobility and this introduced the

production of freeways; the elevation of freeways and the promotion of limited access routes. This placed an emphasis on roads rather than on streets. Roads are engineered to accommodate the movement of cars, whilst streets are multi-functional, aimed at providing for the movement of vehicles as well as other human activities (Jacobs, 1993).

The modernist approach to settlement making was a programmatically driven plan for cities and towns. This rational comprehensive approach to settlement planning created a programmatic and 'scientific' method based on 'facts' to determine thresholds, elements and the design of areas (Dewar & Louw, n.d), with little concern for what would work best for specific areas, or how this would fit into the greater whole (see Fig 3).

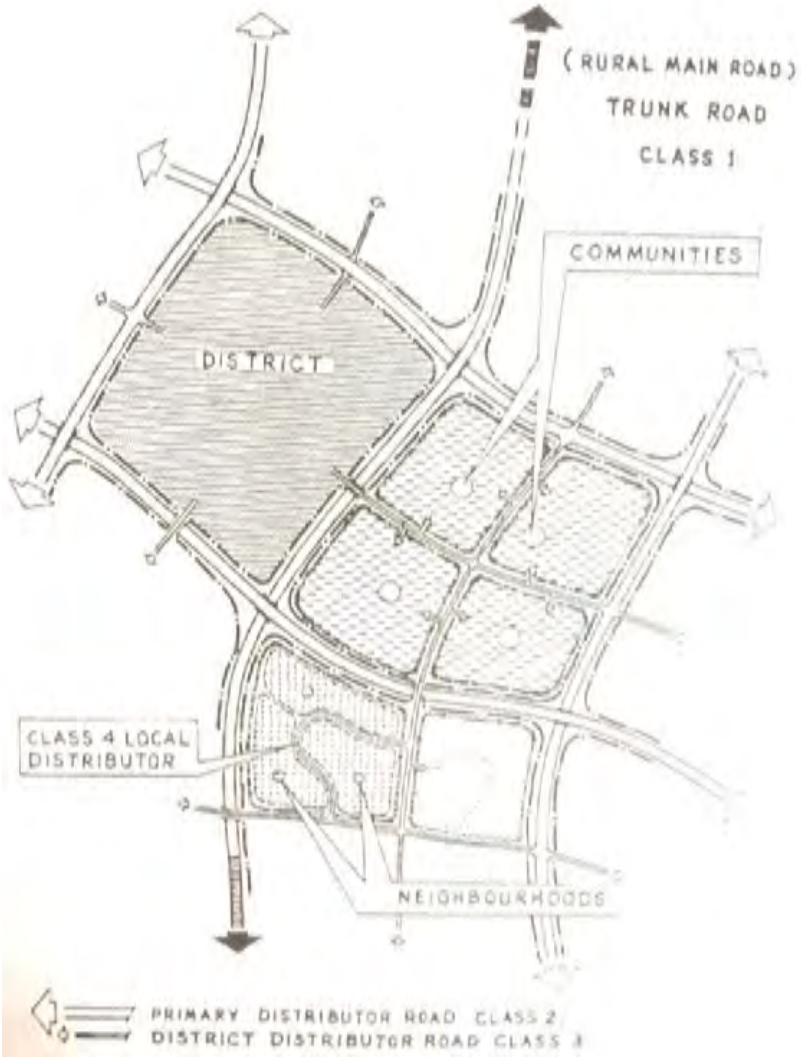


Figure 3: The Interpretation of the Modernist Model found in South Africa (Source: Dewar & Todeschini, 2004).

2.2.2 The Ideology of Apartheid

The second ideology that shaped the urban structure and form in South Africa was the socio-political policy of apartheid. This was formalised in 1948 when the Nationalist Government came into power, with its policy based on the separation of races. The spatial precept of apartheid accorded neatly with that of modernism but was distorted. The apartheid ideology took certain aspects of modernism and gave them a radical overlay (Fig 4).

Apartheid was based on the separation of races. This involved the uprooting of people from their current locations and relocating them to racially exclusive areas (Robinson, 1996). These areas were separated according to race, locating the black and coloured neighbourhoods on the periphery of the city and white neighbourhoods on well-located land. Since there was and is a direct correlation between race and income in South Africa, the poorest people are currently found on the periphery of most cities (Parnell & Mabin, 1995). These different neighbourhoods were designed as separate units and access in and out, was designed to be limited. The idea of a 'community' was warped to suit the political ideologies of the time. This, in essence, isolated certain neighbourhoods from economic and social opportunities and facilities (Dewar & Louw, n.d).

Public spaces were replaced by open spaces, which were mostly in the form of green systems. These areas were not seen as positive spaces and were predominantly used as buffers instead of areas for socialising. These open spaces sometimes became isolated and dangerous (Dewar, et al., 2012).

Picture 1: An example of how apartheid planning is still entrenched in most city structures, this depicts how green buffers separated and are still separating areas; comparing Masiphumelele and Lake Michelle in Cape Town (Miller, 2012).

The entire system of apartheid, as with the modernist conception, was underpinned by the use of high-speed routes and limited access routes to link separated parts of the city (Dewar & Louw, n.d). These movement routes were designed to encourage the use of vehicles, promoting mobility rather than accessibility.

Purchasing a vehicle was a largely inaccessible concept for the poor and this trapped lower income communities in their home areas. Most of their income was spent on transport in order to gain access to economic opportunity.

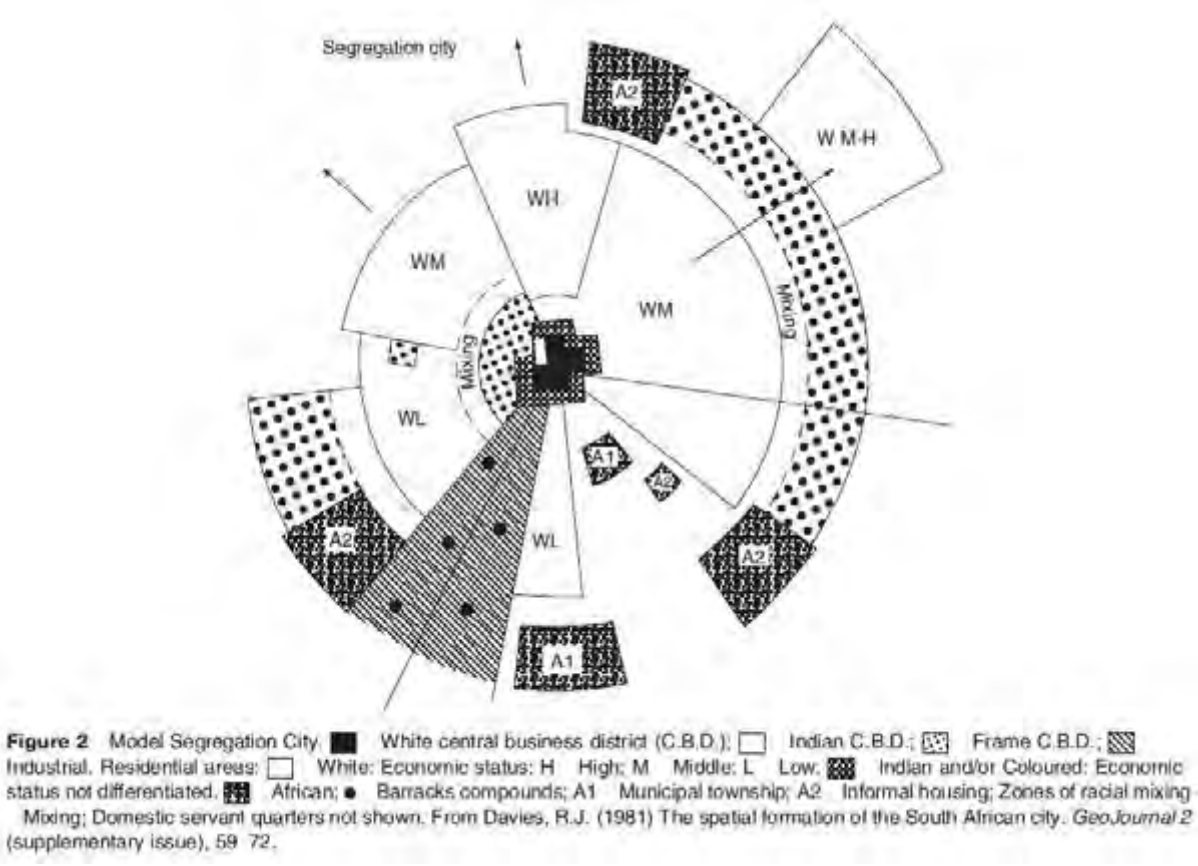


Figure 2 Model Segregation City. ■ White central business district (C.B.D.); □ Indian C.B.D.; ▨ Frame C.B.D.; ▨ Industrial. Residential areas: □ White: Economic status: H High; M Middle; L Low. ▩ Indian and/or Coloured: Economic status not differentiated. ▩ African; ● Barracks compounds; A1 Municipal township; A2 Informal housing; Zones of racial mixing Mixing; Domestic servant quarters not shown. From Davies, R.J. (1981) The spatial formation of the South African city. *GeoJournal 2* (supplementary issue), 59–72.

Figure 4: The Apartheid Model (Source: Human Geography, 2016).

2.2.3 Informal Settlement Processes

The third process forming the structure and form of South African cities has been the formation of informal settlements within cities and towns. This process has two very different forms.

Firstly, the land occupation that occurs within the main city structure has often been in the form of backyard shacks. Although these encroachments are not encouraged, they are usually left alone (CoCt, 2012).

Secondly, mainly public but sometimes private land is occupied illegally. This can be attributed to the previous two ideologies that have resulted in placing lower income groups on the periphery. As the majority of the people living in informal settlements spend most of their income on transport, there has been a drive to be closer to

economic opportunities. The occupation of well-located small land parcels close to economic opportunities has largely occurred based on practical contingencies such as land availability and to avoid the attention of authorities (Dewar & Louw, n.d).

These trends have a great influence on the shaping and evolving of cities, often resulting in an aggravation of the fragmented nature of settlements (Dewar & Todeschini, 2004). At times, these settlements formed in flood-prone areas or previous landfill sites and resulted in unsafe and unhealthy living conditions (see Picture 2 below).

Picture 2: Flooding at Kosovo Informal Settlement in Cape Town a flood prone area (Source: ENW.org, 2016).

2.2.4 Private Developer Domination

Lastly, the process of land development in South Africa has contributed to development within cities and towns. Until the late 1970's the land management system in South Africa was controlled by the allocation of land use rights on the basis of *desirability* and *need* (Dewar & Louw, n.d).

Need was defined as a real need and the developer had to justify the required change. *Desirability* was based on the change it would bring to the public good. Unless both of these could be demonstrated, rights to change or develop were often denied (Louw, n.d). Economic globalisation and the change of policy requirements resulted in a situation where developers no longer had to prove that the proposed development would benefit the greater good. This transition has led to private developer driven cities and towns, creating a reactive environment where the private developer leads and the public follows. This is in contrast to past dispensations where public infrastructural investments led the private developers.

This private developer domination is closely related to transport systems in South Africa as there is a close relationship between land development, spatial patterns, and transportation. Previously, transportation networks were established as accessibility

services and the marketers of land and private developers had the opportunity to respond to this. Places of high accessibility attracted economic and social opportunities. It encouraged the interaction between different modes of public transport and non-motorised movement (Dewar & Todeschini, 2004).

This can be compared with the current situation, where private developers have minimal restrictions and maximum free rein; thus forcing public officials to respond with transportation and utility networks. These networks connect areas to places of economic and social opportunities, encouraging mobility throughout cities and towns; instead of encouraging accessibility, where people live in close proximity to economic opportunities, public spaces and facilities (Turok & Watson, 2000). This has contributed to sprawling low-density developments that contribute to inefficient public transport systems and reactive public infrastructure investments.

2.3 Spatial Consequences Post-Apartheid

The above-mentioned planning and settlement ideologies have resulted in three main devastating spatial patterns namely: sprawl, separation, and fragmentation (Dewar, et al*.,* 2012).

Sprawl is the lateral spread of settlements in a haphazard manner, which usually results in settlements forming on the periphery of the city, or areas encroaching on the urban edge or on agricultural land (Dieleman & Wegener, 2004). Fragmentation refers to a city that is predominantly scaled towards vehicles, with a coarse city grain. Separation is where urban elements, land use, income groups and race groups all become separated from each other (Dewar, et al*.,* 2012).

These overarching patterns have led to a range of spatial consequences and environmental problems in South African cities; namely; the current consequences; inefficient movement, environmental degradation, increasing poverty and inequality, lack of accessible social facilities, economic inefficiency, poor quality spaces and informal settlement processes which are discussed below.

2.3.1 Movement Consequences

The historical pattern of sprawling, fragmented and low-density populations mitigate against public transport and the movement of pedestrians. Mobility refers to the freedom of movement of people or goods whereas accessibility refers to something being available in close proximity (Litman, T. 2011).

The dominance of the motor car determined the scale of cities and towns and dictated the design of road based infrastructure. The modernist mind-set of the separation of work, life and play enhanced the encouragement of movement throughout cities and towns. This was a dramatic move away from traditional settlement planning that encouraged pedestrian movement and accessible environments. This contributed to the sprawl of settlements in cities (Dewar & Todeschini, 2004).

This vehicle and road based system also generates large amounts of one-way traffic during peak hours, leading to congestion and frustrated residents. This forces many households to own cars or make use of badly regulated mini-bus taxi services. The increasing number of cars led to escalating accident rates and air pollution (Dewar & Todeschini, 2004). The current problem with the transport system in South Africa is that it has been focused on increasing mobility instead of finding a balance between accessibility and mobility. Accessibility brings people in closer proximity to facilities and opportunities and therefore reduces the current aggravated amount of movement; which causes detrimental effects on cities (Dewar & Todeschini, 2004).

2.3.2 Environmental Degradation

The cost to the natural environment has been extremely large. The degradation of the natural environment has led to limited agricultural land, water shortages, and sometimes the permanent loss of natural systems and species.

Urban sprawl encroaches on agricultural and natural landscapes, destroying productive land. Gasson (1995) found that an estimated 1.8 hectares of land per day between 1985 and 1995 was lost to urban developments (Dewar et al., 2012).

The low densities, separation of activities and the encouragement of vehicles have resulted in increasing levels of air pollution within cities. Toxins such as nitrogen dioxide and sulphur dioxide, C02 not only have a negative impact on the natural environment and water, but also threaten human health.

2.3.3 Increasing Poverty and Inequality

Current city structures have significantly exacerbated the social problems that exist within South African cities and towns. They have resulted in expensive and highly inconvenient environments that contribute to inequality and increasing poverty.

The poor are forced to purchase cars or spend exorbitant amounts of money on transport to access opportunities within cities. Poor residents are often trapped in spaces where their environment dictates how their money should be spent (Dewar & Louw, n.d). A United Nations review of world class cities has found that South African settlements are some of the most inefficient and inequitable in the world; which is also confirmed by its high Gini-coefficient (Dewar, Louw & Povall, 2012).

2.3.4 Lack of Quality Social Facilities

Low-density sprawl has resulted in low and inefficient levels of investment for social infrastructure (Mazibuko, 2010). The lack of coordination between social infrastructure and other urban structures, this in turn, results in urban practices where the quality of social facilities contributes to social inequalities.

Poor areas have unsatisfactory, public facilities such as schools and healthcare systems. While higher income areas have access to good quality services and facilities. Supporting structures for neighbourhood units are difficult to access and this

is essentially trapping certain communities into their current realities (Dewar et al., 2012).

2.3.5 Economic Inefficiency

City systems within South Africa generate limited opportunities for their dwellers. With the current low densities and fragmented city structures, the opportunities for self-generated, small scale economic activities and diversification of urban economies are challenged.

Economic opportunities are largely clustered within the CBD's, forcing many urban dwellers to travel far. With increasing unemployment rates, South Africans are forced to generate their own livelihood through informal trading. This has often resulted in a largely unregulated environment, contributing to health and access issues. Informal trading often leads to eviction by the police, creating barriers, cutting them off from customers and safety issues for traders (Southwood, 2007).

2.3.6 Poor Quality Public Spaces

Public spaces are important in the lives of urban dwellers, especially for poor households. Public spaces become neighbourhood 'living rooms' where people can socialise and relax.

Public spaces are also areas where markets and community interaction can take place. Unfortunately, many public spaces perform poorly with bad quality products, services and unmaintained spaces. They are increasingly difficult and expensive to maintain. These low quality environments can degrade people's dignity (Dewar & Louw, n.d).

2.3.7 Informal Settlement Processes

The formation of informal settlement processes has been driven by need and land availability. This has placed pressure on cities and towns as most of the informal settlements do not have access to basic facilities.

The settlements have rarely been shaped by reasonable urban responses and some settlements have been formed in flood plains or previous landfill sites. The formation of these settlements has had detrimental effects on the safety and security of these communities. Municipal authorities have been forced to respond to changing urban environments; to address the basic needs of communities through public infrastructure, safety, and natural disaster mitigation measures.

Picture 3: Spatial consequences of post-apartheid still prevalent in South African cities, Strand and Nomzano (Source: Miller, 2012).

2.4 Need for a New Approach

It is evident that South African cities are facing multiple challenges and a new way of designing and reimagining cities is required. The biggest challenge is that it will require the restructuring of settlements, in a number of different ways, to create more equitable, efficient and liveable cities (Dewar & Louw, n.d). The following interrelated actions have been identified by Dewar and Todeschini (2004) to allow for a significant improvement in the performances of cities:

- The compaction of settlements;
- An increase in densities to increase socio-economic opportunities and support public transport systems;
- The intensification of movement routes to encourage a viable public transport system;
- Breaking down the cellular structure of settlements by linking movement routes and integrating the urban fabric;
- The integration of different modes of public transportation to ensure that each mode plays the role it is most suited to and encouraging more closed transport systems;
- The creation of structural opportunities in a more decentralised pattern, for socio-economic opportunities to assist poor areas.

It must be noted that the achievement of these characteristics is not a short-term proposition. They are, however, achievable if initiated and sustained (Dewar & Todeschini, 2004).

2.5 Conclusion

This chapter gave an overview of the planning ideologies that have given form to the South African structure and urban form. It discussed the generic urban challenges and spatial consequences that largely resulted in urban sprawl, fragmentation and separation. It is evident from this chapter that a new approach to planning is required.

The next chapter focuses on Cape Town, where the study area is located and a city that reflects the typical spatial consequences of the post-apartheid era.

CHAPTER 3: LOCATING THE PROBLEM IN CAPE TOWN

3.1 Introduction

The following chapter gives a background to the Cape Town metropolitan area, the oldest urban settlement in South Africa. The chapter analyses the planning attitudes that have historically formed the growth of Cape Town and its current natural systems, urban structures and patterns.

Cape Town is a fast-growing metropolitan area within the Western Cape Province (Map 2). It is a lynchpin city within the greater context of South Africa. The metropolitan area is a significant political and economic hub of South Africa, and is a key driver of the country's growth and development. It is the city with the second largest population in South Africa and is one of the most visited tourist destinations on the African continent (Integrated annual report, 2015).

In line with South Africa's increasing urban population trend, Cape Town's population has also seen rapid growth over the past few years. About 65% of the Western Cape's population lives in the city; it generates 76% of the Western Cape Provinces GDP and 11% of the national GDP.

It is renowned for its spectacular natural environment, including one of the most biologically diverse plant kingdoms as well as Table Mountain, a UNESCO world heritage site(Western Province, 2014).

This chapter aims to demonstrate how Cape Town is still facing highly inefficient forms of urban fragmentation and lateral urban sprawl, due to entrenched inequalities and apartheid city structures. These urban issues have had major socio-economic and spatial consequences; many of which

Map 2: Cape Town context in relation to South Africa (Source: Author, adapted from Vector Stock, 2016)

have contributed to the fragmentation and separation of races and classes, resulting in high levels of inequality, poverty and informality (Soja, 2010).

Picture 4: The stark contrasts of Cape Town: Inequalities between Hout Bay and Imizamo Yethu (Source: Miller, 2016).

3.2 Historical Growth Patterns of Cape Town

This section briefly discusses the historic development of the metropolis of Cape Town, to help give a greater understanding of the original development patterns. Two types of development dominated Cape Town's growth (Dewar & Uytenbogaardt, 1977). The first is '*evolutionary development*' that was dominant before the 1920's and the second is '*planned development*' that occurred after the 1920s.

3.2.1 The Evolutionary Development Phase (1652-1920)

Cape Town is a port city that was founded in 1652 as a way station for the ships of the Dutch East India Company; between the Netherlands and the Far East. Although the port was established in 1652, most of the city's growth occurred in the second half of the 20th century.

The development of Cape Town was not programmed or planned but happened spontaneously over a long period of time. The developmental growth was largely influenced by the physiographic regions found in the south and west coasts. These are the piedmont slopes of the Table Mountain range, the sandy Cape Flats, the Swartland, the Sandvelt, the Winelands and the Vooreberge (Dewar & Todeschini, 1991).

Historically, settlements occurred predominantly on the piedmont slopes of the Table Mountain range and in the rolling hills to the north. The sandy low-lying Cape Flats were exposed to wind and flooding. However, lower income groups were found within this area.

Developmental growth continued by means of action and reaction that contributed towards linear development. This development did not occur in isolation. It was led by major structural elements, such as the existing roads and railway lines (Dewar & Todeschini, 2004). These originated from the initial settlement; from the Cape Town port and linked linearly to surrounding areas.

The four main 'linear patterns' or corridors during this time, were the southern corridor to Simons town, the eastern corridor to Paarl, the northern corridor towards Saldanha and the western corridor to Sea Point. This was reinforced through railway line extensions, which were implemented in 1862 (Dewar & Uytenbogaardt, 1977). Even though Cape Town had a mono-centric city structure, it was a relatively efficient spatial structure, with suburbs along its public transport routes (Wilkinson, 2000; Turok, 2001). The basic structure of roads and rail has remained (Turok, 2001).

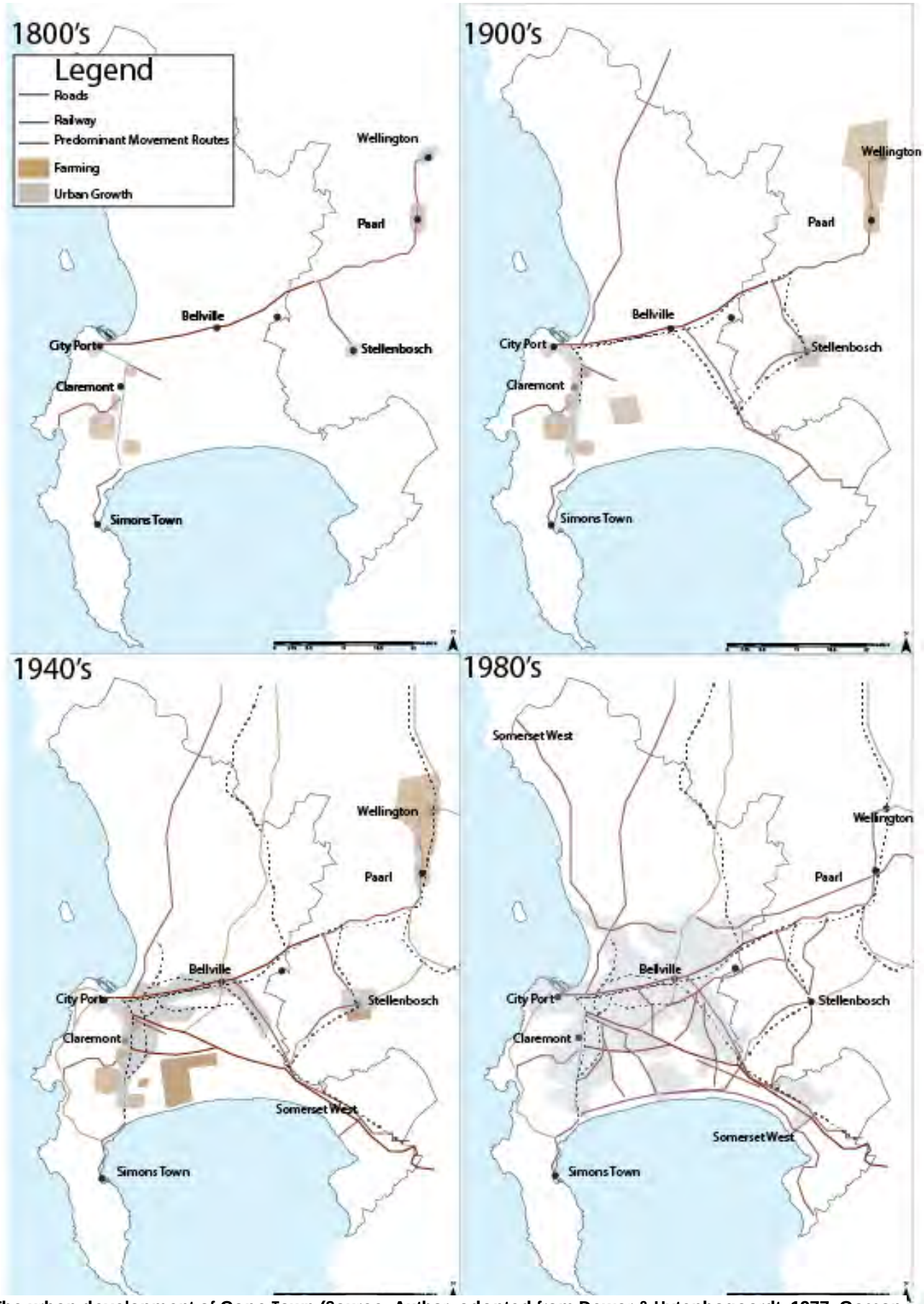
3.2.2 The Planned Development Phase (1920's–1994)

Dewar and Uytenbogaardt (1977) identified three main characteristics of the planned development phase that happened after the 1920's.

Firstly, Cape Town's population grew rapidly, and the city was unable to deal with its growth. This resulted in a demand for planning the environment to manage the growth and the demand for services and facilities. The ruling party at that time, introduced the idea of comprehensive planning. This was adopted into the city council and large parts of the city were planned extensively.

Secondly, the introduction of cars in Cape Town had a number of effects on the development pattern. People were no longer limited to public transport and moved away from the previous linear corridor development that was evident before the 1920's. This contributed towards mobility, sprawl and low density settlement patterns.

Thirdly, the planning profession emerged, which is connected to the first point. During this period planning theories and concepts were predominantly adopted or adapted from other countries. As discussed in Chapter two, growth patterns were strongly informed by modernism and apartheid ideologies (Dewar & Uytenbogaardt, 1977). Map 3, shows the growth of Cape Town over a period of time, moving from linear development following public transport availability, to a sprawling city.



Map 3: The urban development of Cape Town (Source: Author, adapted from Dewar & Uytenbogaardt, 1977; Gasson, 2008).

3.3 Urban Growth

Cape Town's rapid growth is a result of both natural growth and the increase of inward migration. The city's population grew by 45% in the fifteen year period from 1996 to 2011 (City of Cape Town, 2013: 95). The population is expected to increase consistently per annum, indicating that the urban population could be close to over 4.5 million people by the year 2040 (See Figure 5). The natural growth rate is expected to be a bit low, because of declining fertility levels (CoCT, 2012: 20). Therefore, most future population growth can be attributed to inward migration. Close to 40% of Cape Town's population growth between 2001 and 2011 was the result of inward migration (CoCT, 2012: 15). The consistent increase in population results in increased pressure on the economy, on employment, and on the services necessary to maintain a standard of living that draws people to the city.

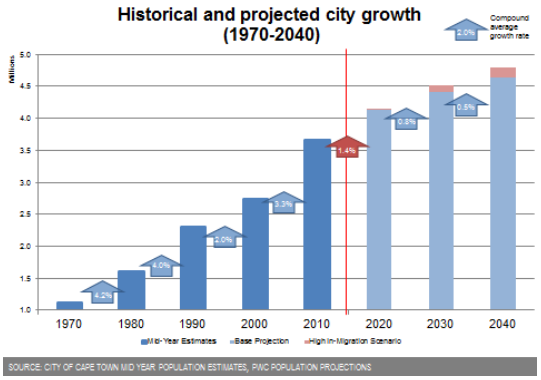


Figure 5: The Population increase in Cape Town (Rabe, 2016).

3.4 Economy

Cape Town has an emerging economy and still faces developmental challenges. These challenges include an increasing population; particularly within the lower income groups, housing shortages, low levels of education, literacy and high levels of unemployment, poverty and inequality (Dewar & Todeschini, 2016). The high levels of inequality and poverty are currently being exacerbated by increased economic globalisation, structural unemployment and high costs imposed from deeply entrenched inefficient, and by implication, unjust, city structures.

The unemployment rate of the City of Cape Town is 23, 9% (Stats SA, 2011) and the youth unemployment rate is 31, 9% (Stats SA, 2011). Cape Town is facing challenges where the labour force growth (with an increase from 19.2% to 24.9% between 2005 and 2013) has exceeded its employment growth. This is also reflected within the economically active group that has continuously grown in the past fifteen years (CoCT, 2012).

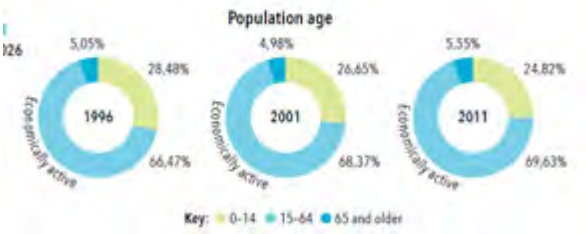


Figure 6: Population age between 1996 and 2011 (Source: City of Cape Town, 2014).

Employment growth has been driven by the tertiary sector, together with finance, business services, retail, wholesale, trade and community services (Figure 7). A substantial decrease in manufacturing jobs means fewer available job opportunities for lower skilled workers. This reflects not only that there has been a change in sectoral growth but also that Cape Town is de-industrialising. This has a direct effect on the demand for skilled workers (CoCT, 2014). The gap between available employment opportunities and required skills remains a significant economic challenge for the city. The sectors that require high skills, such as finance, and business services are growing, but the majority of the city's residents are unskilled and unable to benefit from these work opportunities.

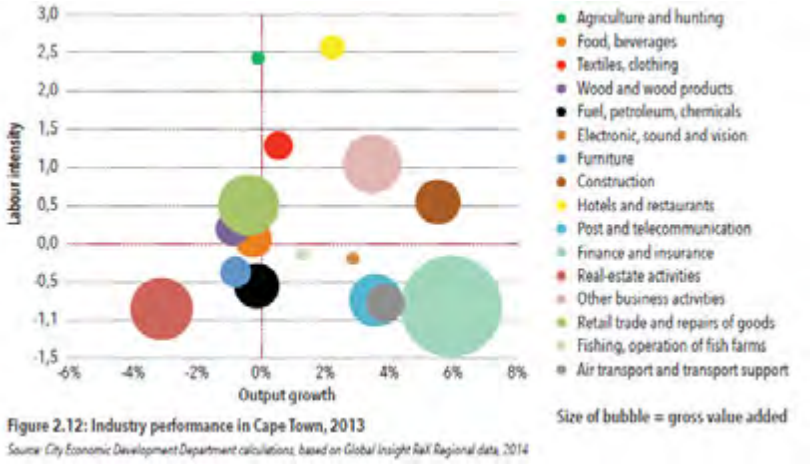


Figure 7: Employment Sector Growth (Source: City of Cape Town, 2014).

Emerging sectors such as Information Technology have very different spatial and infrastructural requirements for success, compared with other sectors such as manufacturing. Growing sectors such as finance, business services, retail, wholesale, trade and community services, require good infrastructure, and accessible and safe areas. This has manifested through mostly private investment that has largely been concentrated in a broad corridor between Cape Town and Bellville CBDs (CoCT, 2012: 24). Figure 8 gives an idea of the spatial implication of the City's economy. Bellville, with most economic opportunities, is far away from the Metro South East region, which has the lowest level of economic opportunities within the metro.

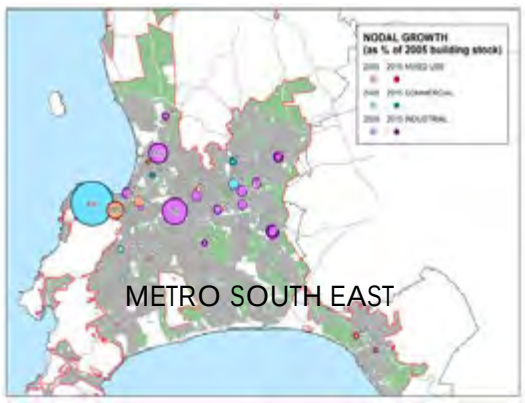


Figure 8: Economic Growth in Cape Town (Source: Rabe, 2016).

Cape Town needs to create inclusive growth in order to make a difference in the challenges of unemployment, poverty and inequality. The focus must be placed into sectors on skills development or investment and initiatives that promote low skilled labour. As Cape Town moves towards a largely service driven economy, it continues to reinforce the growing mismatch between the skills demanded by the market and the skills available within the market.

In developing countries the informal economy usually absorbs a large group of low skilled labourers who cannot partake in the formal economy. According to international norms, an informal economy consists of business activities that cannot be registered for VAT and which employ fewer than five people. However, the sector can also be defined by the precariousness of employment for those who work in it. Compared to most developing countries, Cape Town's informal economy still constitutes a very small portion of the population. Employment in the informal economy constitutes between 9-11% of the total number of employed people in the CoCT (CoCT, 2014).

Jobs in the informal economy are more suitable for unskilled labour and could offer opportunities to the unemployed population. The relatively low entry barriers and high degree of localisation in low income residential areas creates opportunities in the short-term and can help the poorest members of the CoCT. The informal economy can be used as a tool to broaden economic inclusion and help combat poverty. However, the sector is still threatened by policies and regulations that are geared towards the 'formalisation' of the informal economy. Figure 9 shows the distribution of activities within the informal sector. The wholesale and retail trade are the biggest sectors followed by community, social and personal services as well as the construction sector.

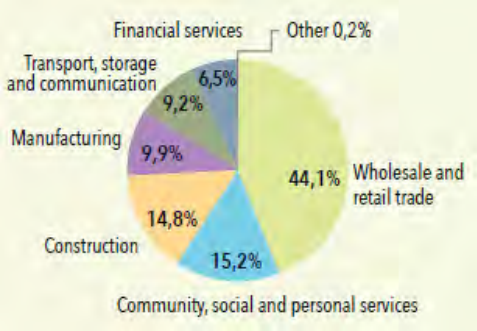


Figure 9: Cape Town's informal-sector employment industry breakdown (Source: City of Cape Town, 2014).

Due to the changing economy, increased economic globalisation and structural unemployment, cities such as Cape Town need to promote innovative and self-generating business activities. In order to be successful, informal enterprises require vibrant public spaces with a lot of movement. Informal activities are usually situated along transport nodes where there is a lot of movement and activity, currently such areas are few. Change is essential to stimulate and encourage the informal sector and to prevent the further marginalisation of economically disadvantaged groups.

3.5 Socio-Economic Profile

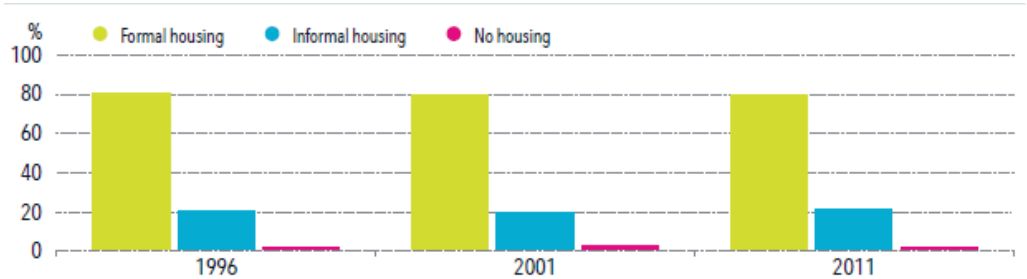
The City of Cape Town is divided into eight planning districts. A profile on the demographic, socio-economic, housing and crime information is compiled for each district (CoCT, 2012). According to the CoCT 2012 profiles, the district of Khayelitsha

and Mitchells Plain are the worst-off with the highest crime rates, housing backlogs and low income groups.

These district planning profiles are then used to consolidate the City Development Index (CDI) that depicts the average of the following indices: infrastructure, health, education and income. CoCT had a higher CDI compared to the rest of the Western Cape. Khayelitsha, Nyanga, Langa, Gugulethu and Elsie's River were the poorest areas that were below the province average (Western Cape, 2013).

The Human Development Index (HDI) is a measure of average health (based on life expectancy), education (based on adult literacy and gross indices) and income (based on mean household income). The City has the highest HDI in the province. However, within the city, the poorest performing areas are Nyanga, Khayelitsha, Langa and Elsie's River. These areas perform poorly in terms of health and infrastructure. High density areas such as these are severely affected by a backlog in infrastructure development. This chronic underdevelopment is the legacy of apartheid, which skewed infrastructure development to favour certain race groups, especially the white middle class neighbourhoods; at the expense of African or Coloured dormitory townships.

Figure 10 shows that there is an increase in the informal housing sector, which is in line with the increase in population growth between 1996- 2011. This is an expression of a growing population increase and slow housing supply, which is also seen in the slight decrease of formal housing (CoCT, 2014). The current housing backlogs and the slow delivery of housing have not effectively overcome apartheid spatial divisions, which are at the heart of the social injustice of Cape Town (Jara, 2010). The peripheral location of new housing developments such as the Delft, Khayelitsha, Mufeleni and other remote areas has entrenched inequalities and poverty. Housing projects tend to have limited or inadequate access to services, urban infrastructure and economic opportunities (Landman & Ntombela, 2006; CoCT, 2012).



	1996		2001		2011	
Dwelling type	Number	%	Number	%	Number	%
Formal housing	516 867	79,3%	599 793	78,9%	837 533	78,4%
Informal housing	125 233	19,2%	142 910	18,8%	218 781	20,5%
No housing	9 872	1,5%	17 060	2,2%	12 261	1,1%

Figure 10 : Access to housing by households in Cape Town, 1996-2011 (Source: City of Cape Town, 2014).

The estimated housing backlog is approximately between 375 000 – 400 000 houses and is expected to rise to 833 000 by 2031 (Cape Times, 2016). The city of Cape Town has recognised that they can only provide 6100 housing units per year due to the lack of resources such as funding, services, land and materials (SDF, 2012). Estimating that it would take about seventy years to eradicate the housing crises, if it continues to provide housing solutions at its current rate or increase the delivery rate to 31 00 houses annually. The current unsustainable housing policy and the cost of well-located land perpetuates historical patterns and it is imperative that the city needs to rethink its current land and housing policies.

Cape Town has, in the last few years, made progress in basic service delivery. In 2011, 87, 3% of households had access to water, 90% had access to basic sanitation and 93% had access to electricity (See Figure 11). Access to household refuse removal is the highest in the Western Cape with 93, 9% of households receiving this service (Stats SA, 2011). There are approximately three hundred and seventy six informal settlements in Cape Town and they consist of 146 488 dwellings, with an official number of 149 860 service points (CoCT, 2014). The quality thereof is however, severely questioned. Map 4 shows the severe infrastructure constraints, with lower income areas and where most if the informal settlements are found, such as Khayelitsha and Mitchells Plain have some of the biggest constraints.

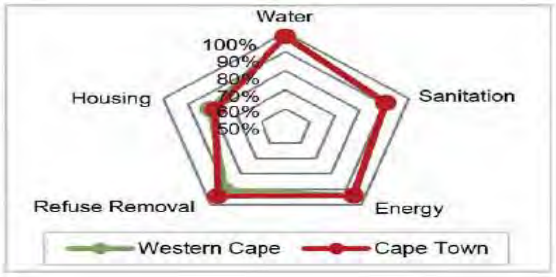
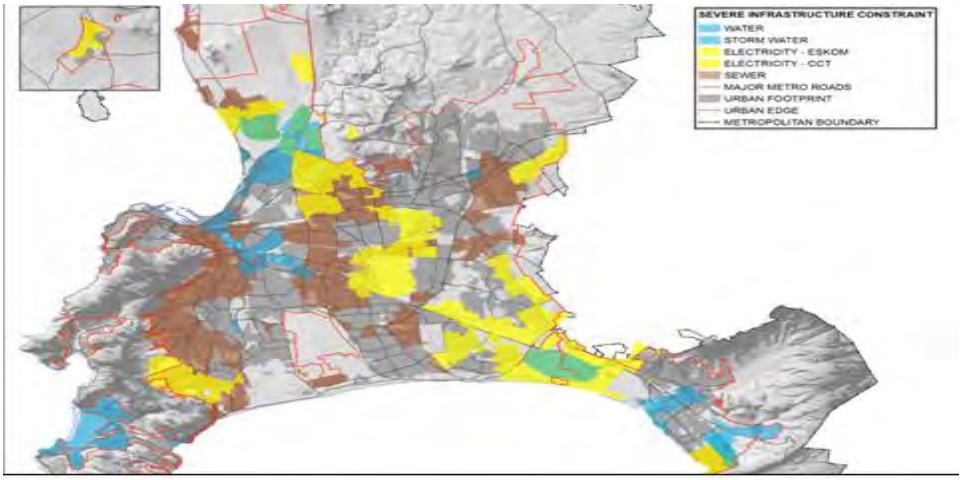


Figure 11: Access to basic services in 2011(Western Province Government, 2014).



Map 4: Severe infrastructure constraints in the Cape Town Metropolitan Region (Rabe, 2016).

3.6 Movement Systems

The dominant radial movement pattern of Cape Town is true for all the port cities within South Africa (Nelson Mandela Municipality, East London and Durban) (Dewar, Todeschini, 2016). The original settlements grew around the port functions and

became the main city centres. There was no attempt to use the movement networks structurally to create a more neutral grid-like system that would take pressure off the centre. Instead, as the years passed, the CBD became increasingly eccentric. There are four main factors that have contributed towards Cape Town's eccentric city structure.

Firstly, the growth in private vehicle ownership enabled the break away from urban corridors or existing employment concentrations. This resulted in the start of a predominantly demand based development process, which has largely been focused on private vehicles.

Secondly, the combination of modernism and a strong city engineering tradition (brought in by British colonizers) introduced the rational comprehensive system of planning and the separation of land uses.

Thirdly, the Advertising on Roads and Ribbon Development Act (Acts 21 of 1940) was formulated to prevent rural interurban routes from being transformed into urban corridors extending outwards from existing settlements. This resulted in the naturally occurring streets and arterial routes being replaced by limited access routes and essentially cutting up the city's urban fabric (Dewar & Todeschini, 2016).

Lastly, in the beginning of the 1940's the development of large highways changed the structural geometry of the city. These routes did not allow direct access along their length but only limited points of access and egress. As a result, nodal forms of activity such as car based shopping centres, industrial estates, and office parks became more prevalent. Because the distribution of shopping centres and office parks is largely determined by the discretionary income of residents, the locations was skewed to the more wealthy areas, thereby increasing the inequality of accessibility to services and facilities (Dewar & Todeschini, 2016).

These four major factors were reinforced by skewed patterns of demand. As the city has grown the CBD has become increasingly eccentric in relation to the rest of the region. In essence this has resulted in radial movement patterns with limited links between the north and south of the city. The current movement structure only reinforces past structural inequality. A change towards a neutral grid like structure is important. The heavy car based movement system has resulted in major traffic congestion, that is ever increasing and conditions of gridlock are becoming common (CoCT, 2012). Increasing car use has resulted in the overemphasis of limited access routes that break up the city's urban form into a series of isolated boxes (Dewar & Todeschini, 2016). This effectively promotes inefficient city structures and directly contributes to the socio-economic problems of poverty, inequality and unemployment. While the densities are too low to provide for viable, affordable efficient public transportation, the lack of integration within the current public transportation system is aggravating the problem. Currently the train and the bus compete with each other to meet the same long haul commuters instead of complementing each other. The movement system inefficiencies in Cape Town have

significantly negative impact on the economy, environment and society. It is critical for Cape Town to rethink its current movement systems and promote an integrated public transportation system.

3.7 Green Systems

Cape Town is renowned for its natural heritage and beauty. The natural assets and biodiversity networks contribute to the uniqueness of the city. The economy and the health of the city are also largely dependent on the state of the natural systems because these contribute to the attractiveness of the city that appeals both to tourists and residents. These natural networks are limited resources and must be protected if future generations are to experience them, because approximately 60% of Cape Town's natural environment has already been lost (BEPP, 2015).

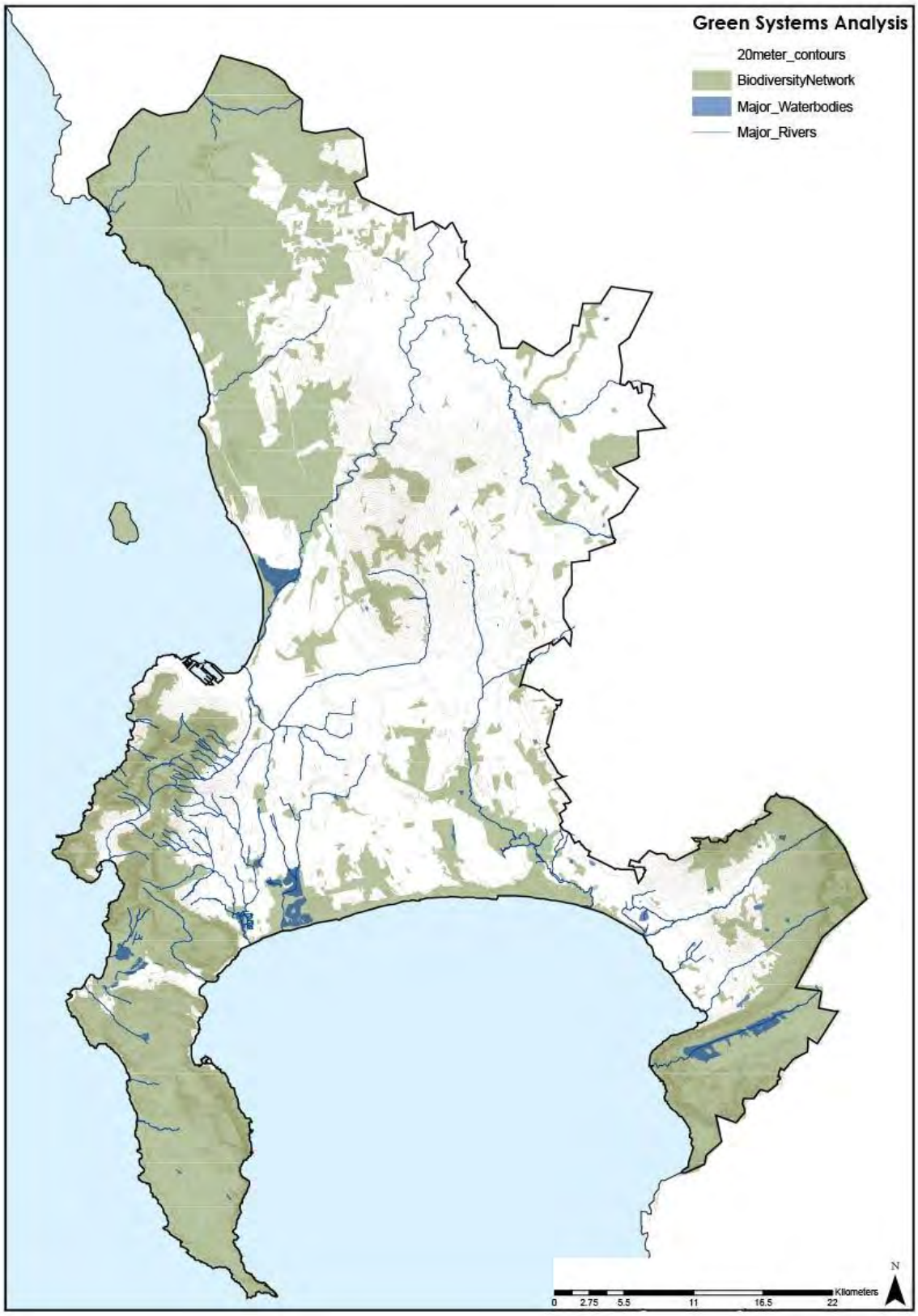
Gasson (2007) stated that urban growth in Cape Town has and keeps consuming valuable agricultural land and continues to destroy and damage many of its natural systems. This can be attributed to the current urban system, which is resource intensive and this has an impact on food security and ecological integrity (Gasson, 2007; Swilling, 2006). The integration between the urban and the natural environment is critical if Cape Town wants to preserve its natural heritage and beauty (CoCT, 2012).

Cape Town has an extensive network of rivers and wetlands throughout the city. The quality of the water is usually evaluated from two perspectives; the ecosystem's health, and recreational water quality. The rivers and wetlands are in a poor ecological condition,(BEPP, 2015) and the water quality is therefore poor. Ten out of the fourteen major rivers and nine out of the thirteen wetlands are classified as polluted, requiring proper rehabilitation (WP Treasury, 2014). Most of these rivers and wetlands are being polluted through poor waste management, and because of limited protection and planning, run through residential neighbourhoods and canalised river beds. There is also a risk of rising sea levels that can contaminate fresh water resources (CoCT, 2012). The quality of coastal and inland water bodies is an important biodiversity conservation issue, as well as a significant public health concern (BEPP, 2015).

Green spaces are the places where people and nature have the opportunity to connect. Green spaces within Cape Town are not accessible to all residents. This is largely because of past city structures. Well maintained and properly protected green spaces are usually found within the city centres or in affluent neighbourhoods. Lower income communities cannot access these areas easily and the 'green spaces' found within their local neighbourhoods are not well maintained. These 'green spaces' are sometimes vacant spaces that are unprotected and become sites for crime and illegal activities. Many of these spaces are unsafe and do not contribute to human nature relations or the ecological health of the city (CoCT, 2012).

Cape Town is surrounded by such a rich, diverse and beautiful natural environment. However, the city is depleting its natural resources and allowing the natural

environment to be degraded. If the city does not change its current resource consumption patterns, many species and systems may be destroyed forever. This will result in a potentially negative environment with resource deficiencies, food insecurity, a decreasing tourism industry and a poor living environment (See Map 5).



Map 5: Green Systems Analysis of the Cape Town Metropolitan (Source: Author, GIS Technical Library, and University of Cape Town).

3.8 Tertiary Systems

Tertiary services within the city have been provided ad hoc and not according to the needs of the city. According to the Western Province Treasury report on the city of Cape Town (2013), access to tertiary facilities are directly dependent on the number and spread within a geographic space. However, due to the major population growth in the metro south east, the area has the biggest demand for tertiary services.

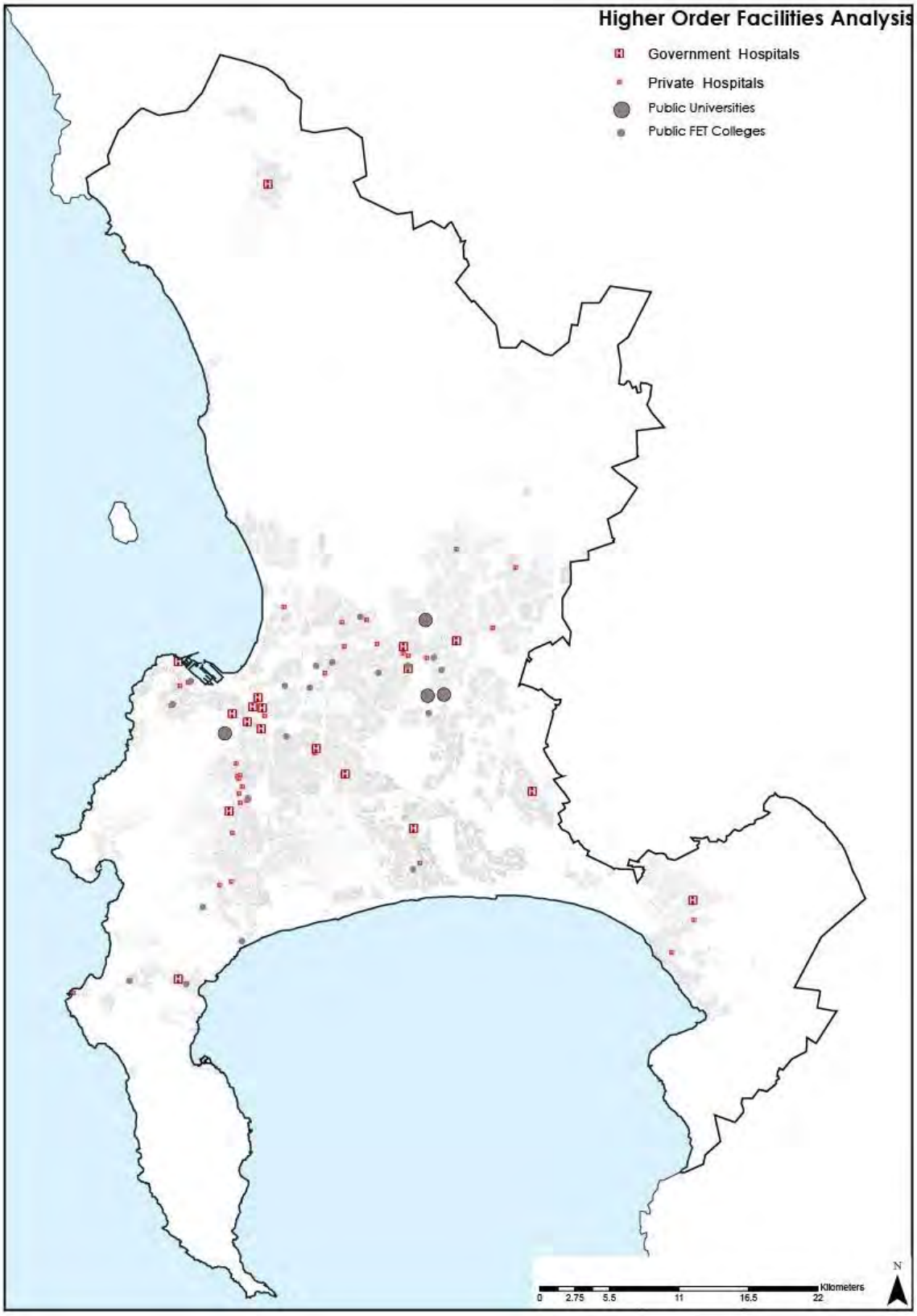
Despite high and frequent expenditure on the health care system there are still significant inequalities. This can be attributed to the public sector only receiving 40% of the available financial and human resources and the private health care services that serves 15% of the population, only receives approximately 60% of the financial and human resources available (CoCT, 2012). These private facilities are usually used by middle to higher income groups that have medical aid and who can afford to use these facilities using their medical insurance policies; whereas the lower income groups cannot afford them.

Cape Town needs to restructure its resources to support the public sector and rethink its current approach to supplying health care facilities. Mobile clinics and increased accessibility to good quality hospitals could be an alternative to locating low quality facilities in areas of need to cover its quota.

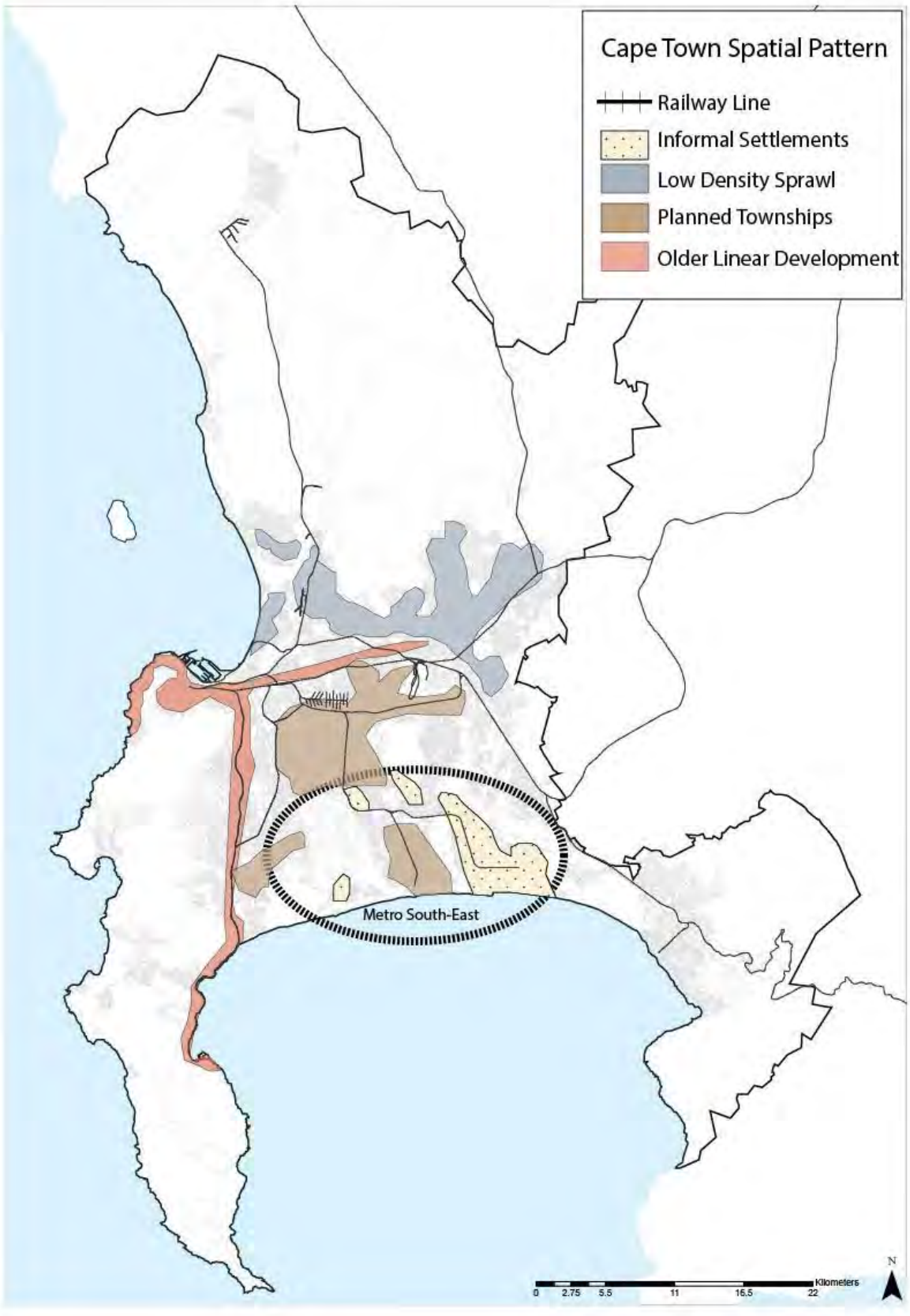
Since 2015, universities throughout South Africa and particularly UCT have been dealing with protest actions. These protest actions have exposed many issues, however, amongst these is the prominent issue of free quality education. In a country that is still suffering from colonised systems and apartheid city structures, it is evident that Cape Town should rethink its current approach towards providing tertiary education for its residents. Not only should they look at the systems and costs involved but also how they are provided. Currently, most colleges are privately owned and therefore not subsided by the government. They have exorbitant fees and universities (who are subsidised) only cater for approximately 15 % of the population.

However, the Cape Town metropolitan area is considered well-resourced for education, with four well recognised universities; UCT, CPUT, UWC and University of South Africa's smaller campuses, as well as a total of twenty seven FET colleges in the area (WP Provincial Treasury, 2012) (See Map 6). Unfortunately, the location of these tertiary facilities are not equally accessible to all, with people living in the high-density south eastern metro having to travel more than five kilometres to access these institutions.

Cape Town needs to rethink and restructure the way it provides not only tertiary educational facilities but also how its systems, locations and structures operate.



Map 6: Higher order Facilities Analysis of Cape Town Metropolitan (Source: Author, GIS Technical Library, and University of Cape Town).



Map 7: Cape Town's current spatial structure (Source: Author, Dewar & Uytenbogaardt, 1991).

3.9 Conclusion

'Cities provide a unique context for realising that resource limits and degrading eco-systems services are not simply constraints to development, but opportunities for redefining what development means' (Ewing & Mammon, 2006).

Cape Town is faced with major challenges that are associated with rapid growth, an increasing need for housing, basic services and infrastructure. This has a direct effect on the City of Cape Town's municipality and its capacity to provide for the growing population in an equitable manner (CoCT, 2014). Its past and current city structures are inefficient and unsustainable.

During early phases of development, cities can determine their future growth by effective restructuring and adaptation. However, Cape Town is maturing into a phase of spatial, demographic and economic consolidation. This leaves limited time for Cape Town to correct historical inefficiencies, current inequalities, unsustainable development patterns and destruction of its natural heritage and beauty.

The City is facing the choice of restructuring its city or allowing it to continue on an evidently destructive path. Cape Town is running out of land resources and most critically, time.

The city has two options. The one is to move towards a compact and integrated city that uses its land and resources efficiently and provides accessibility to quality services, facilities and public transportation, for residents (See Fig 12). The other is to continue reinforcing the fragmented, separated and sprawling city structure, whose movement systems mitigate public transportation and structures that support the segregation of services, facilities and income groups.

This chapter of Cape Town reveals the urgent imperative for change. The challenge of seeking urban justice in Cape Town is not merely a matter affecting individuals but is a manifestation of the structural injustice that affects the entire community (Swilling, 2010: 61). The next chapter discusses the different approaches to planning as well as external and internal factors that may affect the planning process.

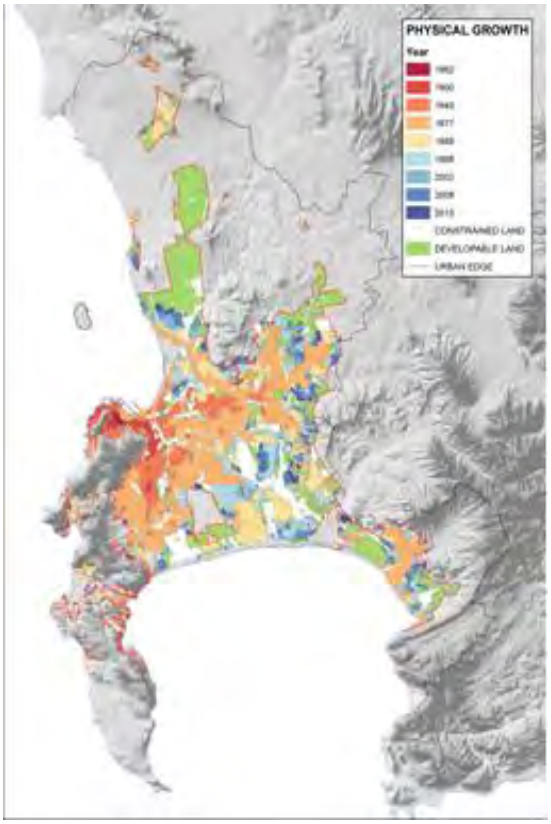


Figure 12 Physical growth capacity for Cape Town (Rabe, 2016).

CHAPTER 4: GIVING DIRECTION

4.1 Introduction

It is important to understand what forms South African cities' urban growth management, in order to develop a framework that will respond to the current challenges and create a positive environment for Cape Town.

This chapter consist of the different aspects that gives direction to the development framework. It is divided into five main sections. Firstly, it discusses the values and ethics of the author. Secondly, it discusses the desired performance qualities that will give direction to the settlement design. Thirdly, it looks at the different global issues and international tendencies and how these affect South African cities. Fourthly, it affects the legislative and policy context within which the urban growth management takes place and lastly it discusses the different planning approaches that could be used.

4.2 Values and Ethics

"The disciplines of urban planning and design are not sciences; but they have a strong normative or value based foundation. However, this does not imply all values are equally appropriate" (Popper, 1963).

The planning profession is particularly concerned with the ordering and managing of human actions and the natural landscape. It is acknowledged that this discipline has strong values and an ethically based foundation. According to Dewar & Louw (n.d.) it is the acknowledgement of these values and ethics that transform the process of design into a rational argument. This section provides an explanation of the ethics and values of the author; that will be used in the formulation of the planning framework.

4.2.1 Values

Values are the researcher's personal beliefs that will be used to make decisions about what constitutes a good or bad policy, whereas ethics are seen as a set of principles based on societal/planning based on moral values. In this dissertation it argues that planning frameworks should have the ultimate objective of seeking urban justice through sustainable development.

The urban justice theory has evolved from the theorisations of justice as a group of abstract ideals of equity and fairness that was put forward by Western liberal political philosophy (Connolly & Steil, 2009, Williams, 2016), and David Harvey's (1973) influential publication 'Social Justice and the City'. He emphasized the primacy of the struggle for redistribution, to combat urban justice; attributed to the unequal distribution of resources, power and wealth through the lens of the political economy (Williams , 2016). Limitations were recognised by Iris Young (1990), arguing that the focus on economic, political and spatial inequality alone does not encapsulate the injustices of domination and oppression. (Connolly & Steil, 2009; Soja, 2010; Williams, 2016). A more recent urban justice thinking theory was conceptualised through the

"Just City" approach (Connolly &Steil, 2009) where Fainstein (2010) conceptualised justice as democracy, equity and diversity, with a Just City being one that is socially inclusive (Williams, 2016). Her (Fainstein, 2010) principles were used to judge how diverse, equitable and democratic a city might be. They are in contrast to Lefebvre's 'right to the city' urban theory, where he analyses urban spaces, relations and political issues, in order to address the injustices of a city (Fincher & Iveson, 2012; Harvey & Potter, 2009; Mitchell, 2003; Purcell, 2002; Sandercock, 2006; Yiftachel et al., 2009, Williams, 2016).

Soja (2010) developed the understanding of a Just City and the importance of spatial justice; which focuses on the geographically uneven nature of cities and their development (Williams, 2016). Soja (2010) emphasises that the cause and remedy of injustices is spatial and he also highlights the importance of 'coalition building to achieve spatial justice' (Soja, 2010: 199). Despite these integral and influential urban theories, the area of urban justice is still largely growing and developing, as there are still pieces missing as to how collective knowledge of justice might look like in practice (Fincher & Iveson, 2012; Olson & Sayer, 2009). However, there is a common recognition of injustices that are visible in cities and the need for change is imminent.

Seeking urban justice in the development framework is interconnected with sustainable development. Currently South African cities are not sustainable with sprawling urban footprints, rapid resource depletion, environmental degradation and dependency on private vehicles (Swilling, 2010).

While the importance of sustainability is commonly quoted, it is not always executed or achieved in practice. The well recognised definition of sustainability from the Brundtland Report (1987) defines it as, "… sustainable development that meets the needs of the present, without compromising the ability of future generations to meet their own needs" (Mebratu, 1998). This definition has been heavily criticised because of the loopholes within the definition and the abstraction of the model (Pieterse, 2010).

In the development of the conceptual framework this dissertation will use Adrian Allen's (2009) model. It acknowledges that urban development will only be acceptable and in the public interest, if it is ecologically justifiable, socially equitable, economically viable and can be accepted by being physically and politically integrated (Allan, 2009; Swilling, 2000). His model of sustainable development can be used in the pursuit of urban justice because it strongly encourages the five different dimensions to be holistic and interchangeable. (See Fig 13)

Economic sustainability: is the ability for the local economy to sustain itself without increasing the cities ecological footprint or causing permanent damage to its natural resources or environment. It takes into consideration the full impact of a production cycle and the long-term benefit for the community (Allan, 2009).

Social sustainability: this is strongly linked to social justice by creating policies and actions to improve the quality of life, equal access, fairness and inclusiveness and the lawful distribution of land rights in the built and natural environments (Allan, 2009).

Ecological sustainability: pertains to the impact of urban production and consumption, on the integrity and health of the city region and global carrying capacity. This demands the long-term consideration of the relationship between the state and the dynamics of environmental resources and services and the demands exerted over them (Allan, 2009).

Physical sustainability (sustainability of the built environment): is the capability and capacity of the built environment to support the life, liveability and productive activities for all city dwellers (Allan, 2009).

Institutional sustainability: is concerned with the quality of the relationship and actions of the different actors among the dimensions. It encourages the participation of civil society in all areas of decision making (Allan, 2009: 2).

It is a commonly held perception that urban justice includes the class, income; race and civil rights issues and sustainability (sustainable development) is only concerned with environmental quality issues. Fujita (2009) argues that urban justice and sustainability can be linked because of the impact of urbanisation. Climate change and environmental degradation particularly affects the disadvantaged and poor in cities and communities all over the world.

The twenty first century has brought a new set of challenges with the global financial crises and economic recessions, climate change and the growing South/North inequality (Fujita, 2009). These issues have required planners to define new objectives and methods of redefining existing theories and procedures that are viable in rapidly changing societies. Urban justice is another such issue that is both a moral and a political concept that needs to be addressed.

"Urban justice includes the unequal distribution of income, wealth and spatial housing segregation, the uneven allocation of public goods and services, and the unfair exercise of political rights, along lines of class, race ethnicity and gender in the context of communities, cities and metropolitan regions"(Fujita, 2009: 380). Many urban justice researchers focus on the social inequality, spatial segregation, poverty, sexism and racism, in order to build towards a 'just city' and a 'progressive city' but hardly a 'sustainable' and 'just city'.

According to Futija (2009) linking sustainable development to urban justice studies is critical, as evidence confirms that global issues such as climate change, food security, water scarcity and resource depletion (to name a few), disproportionately fall on the urban poor (Edwards & Miller, 2000; Agyeman et al., 2003a, Sandler & Pezzullo, 2007). Studies indicate that urban justice and sustainable development are not only compatible but interdependent. For the sake of the framework, the use of sustainability is likened to urban justice, in an attempt to restructure and re-imagine Cape Town as an equitable and liveable city for all its current and future residents.

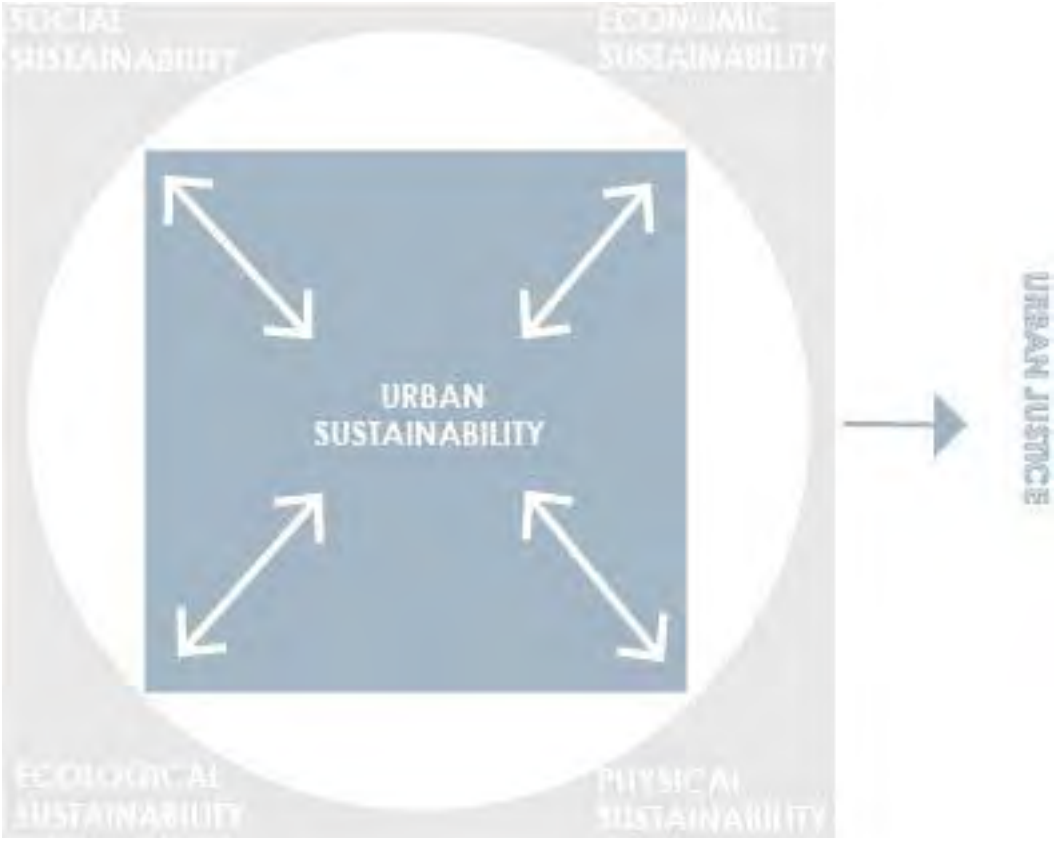


Figure 13: Linking the five pillars of sustainability and urban justice (Author, Allan, 2009).

4.2.2 Ethics

Ethics are a set of moral principles based on ideas about what is morally good or bad for the greater society. Dewar and Uytenbogaardt (1991) identified two ethical pillars upon which planning should be firmly rooted: humanism and environmentalism.

4.2.2.1 Humanism

The first ethical pillar is humanism. "Humanism recognises that the basic function of settlement design is to improve the lives of people and meet human needs" (Dewar & Louw, n.d.: 10). It is used in the context of rapid urbanization, technological change, population growth and is based in the understanding of human activity and need. In satisfying the human need, the best starting point is with those who will be the most disadvantaged as a benchmark. This can include children, people with disabilities or the aged; people who can only travel on foot and those who do not have access to personal resources or high quality technology; to create an environment that performs well and does not marginalise those who will be affected the most (Dewar & Louw, n.d.).

Humans have two different kinds of needs: individual needs and group needs. The individual needs, that must be met to enable people to live enriching lives, can be dealt with through creating a context or environment that allows people to take creative action to improve their own circumstances and adheres to their basic needs (Dewar & Louw, n.d.). It requires enabling environments. The second type of need refers to group needs that arise when people live socially or communally. This

collective set of needs places the planning and design professions within the theoretical field of 'development' (Dewar & Louw, n.d.).

4.2.2.2 Environmentalism

The second ethical pillar is environmentalism. It stems from the recognition that natural systems need to be protected, as ultimately, human life is dependent on these. The conservation of the environment is of the utmost importance to retain it for future generations. This takes the form of a conservation ethic that does not define conservation narrowly to mean 'preserve' or 'prevent change' but one that evokes the following central concepts.

Balance

The dynamic balance between natural systems and human activities is very important. Human needs must be met with ecological consideration and natural detriments; the dynamic balance between the two needs to be respected (Dewar & Uytenbogaardt, 1991).

Regionalism

This is the recognition of the inseparable interdependence between the characteristics of a place, human activities in that place and the emergence of cultural expressions, forms and values (Geddes, 1949). Mumford (1939) refers to this as the 'territorial basis of civilization'.

Resources

The natural resources on earth are finite and resource sensitivity is the recognition of the importance of all resources being used wisely (Collard et al., 2015). The importance of sustainable human nature interactions is critical, as is the transition from depleting resources to the use of renewable resources and recycling.

Place making

Place making is a central part of a design function and it is important in the creation and protection of qualities of an area (Norberg-Schulz, 1980). The genius loci of a place is the recognition that is not based on aesthetic opinion, but on the realisation that the values of people are profoundly affected by the places in which they have lived or visited (Dewar & Louw, n.d.). The retention of different landscapes are important, simply because of what they are. Therefore design needs to work appropriately to protect and enhance this.

In conclusion, planning is a creative discipline. It has the role of offering people choices and the freedom to make those choices in the most equitable manner. Planning is not concerned with giving people what they want, because people's expectations are determined by specific experiences. Planning has a role to find new opportunities and possibilities to enrich society with choices (Dewar & Uytenbogaardt, 1991).

4.3 Performance Qualities

The previous section discussed values and ethics that will be used to inform the development framework, while this section discusses the desired performance qualities which will give direction to the settlement design in this dissertation. These desired performance qualities will be used to inform the design and development of sustainable and just areas. They are in no particular order, as no one quality can be pursued maximally. The qualities that will be addressed are the meta-qualities of sustainability and efficiency as well as the equity, integration, balance, choices, safety and security, urbanity, efficiency and sense of place.

Sustainability

Sustainability was discussed earlier in the chapter in more detail but it is nevertheless a very important element to settlement design. At the most fundamental level Gasson (2000) argues that settlements themselves are similar to metabolisms, in the sense that they have inputs and outputs. Sustainability requires that in terms of input, maximum use should be made of renewable resources of both the area from which it draws or impacts upon in terms of outputs. The ecological footprint which is the amount of land necessary to support daily life must be as small as possible. The throughputs or energy flows should be optimised. Output wastes should be disposed of with minimum ecological and human impact and wherever possible, are to be recycled productively (Dewar & Louw, n.d.).

Efficiency

This is a meta-term of settlement design. An area can only be described as efficient if all the positive performance qualities are present. More narrowly, it refers to minimizing energy utilization in the context of human activities in a settlement. This requires achieving a satisfactory compromise between potentially conflicting requirements such as minimising mobility for greater accessibility (Dewar & Louw, n.d). (Mobility refers the rapid movement and traffic of people and goods compared to accessibility with limited vehicular movement and maximum NMT and public transportation (Dewar & Louw, n.d).

Equity

Equity does not mean that all parts of a settlement should be the same but rather refers to equity of access. It is to ensure that no individuals or groups are unfairly advantaged or disadvantaged over others. All people should have relatively easy access to a full range of natural and urban opportunities. The most equitable situation occurs when people have easy access to daily activity opportunities; be it walking, cycling or public transportation (Dewar & Louw, n.d.).

Integration

Performance quality is central to the context of South Africa. Integration in a settlement occurs when different elements and activities naturally lean on or reinforce each other. Integration usually consist of social (never marginalising any group or person), economic (accommodating the formal and informal, big and small

enterprises) natural and cultural mixing (Dewar & Louw, n.d.). The central principle of integration is the concept of continuity. There are three important types: continuity of urban fabric, continuity of green space and continuity of movement.

Continuity of urban fabric occurs when settlements operate as coherent systems and not as a collection of fragmented parts. Continuity of green space, is important to ensure human nature interactions but also to encourage the natural regeneration and survival of bio-diversity and ecosystems (Dewar & Louw, n.d.; Gasson, 1994). Continuity of movement, is the life of urban systems. It represents the movement of goods, services and people. The continuity of movement has the ability to break fragmented settlements and contributes to the support of connections and accessibility to activities and opportunities (Dewar & Louw, n.d.).

Balance

In settlement making, there are two important forms of balance: balance between settlements and nature and the balance between accessibility and urban opportunities.

The first is balance between settlements and nature. This ensures that people have easy access to nature and that human interaction with nature is respectful and sympathetic (Dewar & Uytenbogaardt, 1991).

The second form of balance is between accessibility and urban opportunities. This relates to ensuring that all people have access to an equal range of activities and opportunities (Dewar & Uytenbogaardt, 1991). It is important to recognise that not all areas should be the same but that there are certain basic services, facilities and opportunities that should be easily accessible to all people.

Choices, Safety and Security

The most positive environments are those that offer a wide range of real choices. This range of choices should allow for environments, where people do not have choices but are presented with equal choices along a continuum. For example, people should not have to choose between an area that has access to green spaces but with limited opportunities and convenience, or a place with no green spaces but without considerable opportunities and convenience (Dewar & Louw, n.d.).

Creating secure and safe environments is an important design challenge. It is a broad term. It can cover the meaning of an area that is surveilled (eyes on the street) to safety from fires, floods, attacks ,crime, security of food and tenure (Dewar & Louw, n.d.). It is, however, an important element to consider, within the design process, especially within this dissertation.

Urbanity

''The term urbanity also denotes concerns about the generative capacity of urban systems: the ability of these systems to yield economic, social and cultural opportunities, to which all people, the more wealthy and the poor can respond'' (Dewar & Louw, n.d.: 11). Urbanity is opposed to the suburban model of development

and requires the reversal of sprawl, fragmentation, inequality and inefficiencies, private vehicular dominance and a focus on private spaces. The principle of urbanity will be discussed in more detail in the next chapter, regarding the 'compact city' approval and the challenges and mind-sets within South African cities.

Sense of Place

Geddes (1949) introduced the concept of 'place' and the uniqueness and memories a place can provide. Place making principles reject uniformity and standardization but accept using a number of factors to encapsulate a place's 'genius loci'. These factors include the types of landscape, the quality and coherence of public space, the clarity and legibility of spaces to ensure unambiguous signals to decision makers, as well as the use of landmarks (Lynch, 1960; Dewar & Uytenbogaardt, 1991).

4.4 International Tendencies

The previous two chapters discussed the values, ethics and desired performance qualities that will give form to the development framework within this dissertation. This section however, discusses global issues and tendencies that impact cities and towns world-wide. It is important to understand the broader context of external pressures in order to develop a proactive and flexible framework. These international tendencies will be discussed as well as their repercussions for South African cities. They include urbanization, climate change, food security, resource depletion, water scarcity and economic globalisation.

4.4.1 Urbanisation

According to the UN Report, 2007, it was the first time in history that the global urban population exceeded the rural population. In 2014 approximately 54% of the world's population was living in urban areas with a predicted increase to 66% by 2050 (UN, 2014). The process of urbanisation has historically been associated with important social transformations and economic opportunities; as cities are seen as important drivers of poverty reduction, economic opportunities, social services, educational and better health care facilities (Morph Code, 2016). Nevertheless, because of the rapid increase of urban dwellers and the unsustainable nature of cities, large groups of urban dwellers, are not able to share equitably in all that cities have to offer.

Millions of the world's population live in poor or sub-standard conditions. In addition to this, inadequately managed urban growth has led to pollution, sprawl, environmental degradation and unsustainable growth patterns. These challenges will be concentrated increasingly in the cities of lower income countries, such as South Africa, where the pace of urbanisation is faster and the fiscal resources more limited (UN-Habitat, 2012).

The most urbanised continents are North America with 82%, Latin America and the Caribbean with 80%, and Europe with 73%, while in Africa 40% and in Asia 48% is still predominantly rural. These two continents are experiencing rapid urbanisation; it is predicated that by 2050 they will be between 56% and 64% urbanised, respectively

(Figure 14). Continuing global population growth is predicted to increase by 2.5 billion people, with 90% of the increase concentrated in Asia and Africa with a decreasing population growth in Europe (UN, 2014).

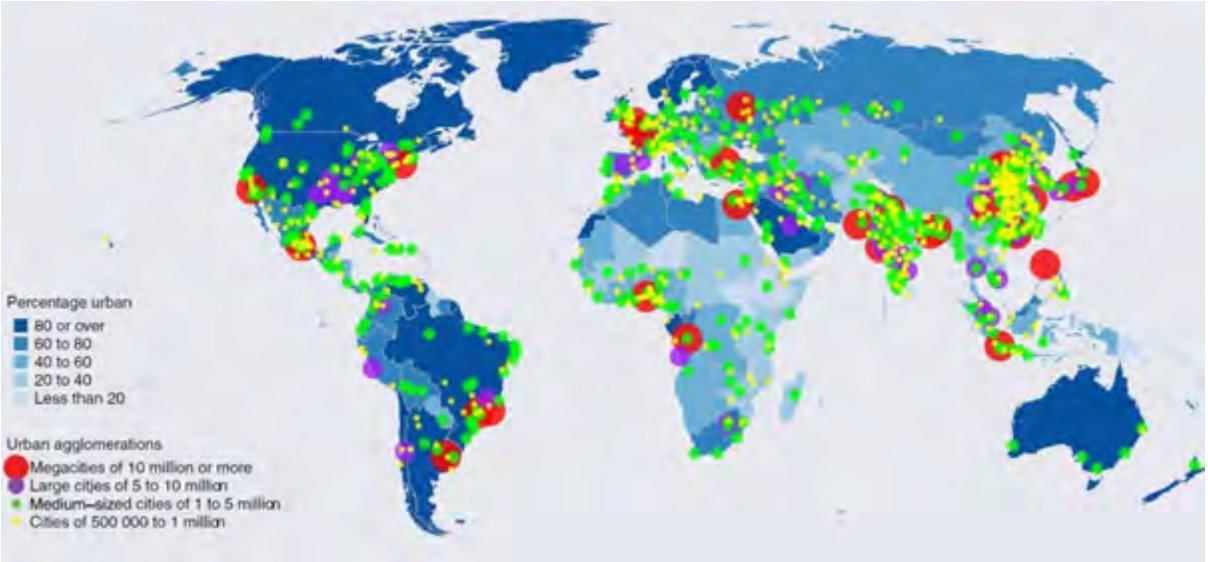


Figure 14 : Global Trends of Urbanization (Source: Morph Code, 2016).

South Africa is facing a rapidly changing environment and this requires its cities to have flexible plans that cannot be comprehensive or programmatic, but are able to address uncertainties and change. Proactive measures need to be taken as unplanned growth usually occurs in an unsustainable manner and has the potential to reinforce current inequalities. South African cities need to prepare for growing populations and to plan environments that are sustainable and just.

4.4.2 Climate Change

Urbanisation is one of the key defining features of humanity and the progressive shift from rural to urban areas has had significant impact on climate change, air quality, water quality and availability, land use and waste management. These urban areas, that cover less than 2% of the earth's surface, generate 75% of global economic production, 67% of total global energy consumption and more than 70% of greenhouse emissions (UN, 2014).

"Ecosystems and biodiversity, on which human existence depends, are increasingly facing multiple anthropogenic stresses, caused by macro and micro climate change. Cities, as aggregates of human activity, require energy in a variety of forms. Much of the primary energy sources have transformed so as to be available to most of the cities around the world, are still fossil-based, resulting in global climate change"(Sustainable Urban Futures, 2016: 5).

Climate change is having global repercussions as the planet keeps on warming and, with limited action being taken, professionals are warning cities that the continued emission of greenhouse gases will cause further warming and long lasting changes in all components of the global climate system (Fig 15). The repercussions will be the

increasing likelihood of severe, pervasive and irreversible impacts for people and ecosystems. The most affected populations are the urban poor, who are the most vulnerable to flooding, droughts and natural disasters, because of where they live and the structures in which they live (UN, 2014).

These impacts include rising sea levels from melting glaciers, which will drastically affect coastal cities and changing climates, which will have detrimental effects on natural ecosystems, biodiversity and animals. It is threatening water sources and this will have major effects on crop production and food security worldwide. The illustration shows the implication that rising temperature will have on the world with a rise of 4C.

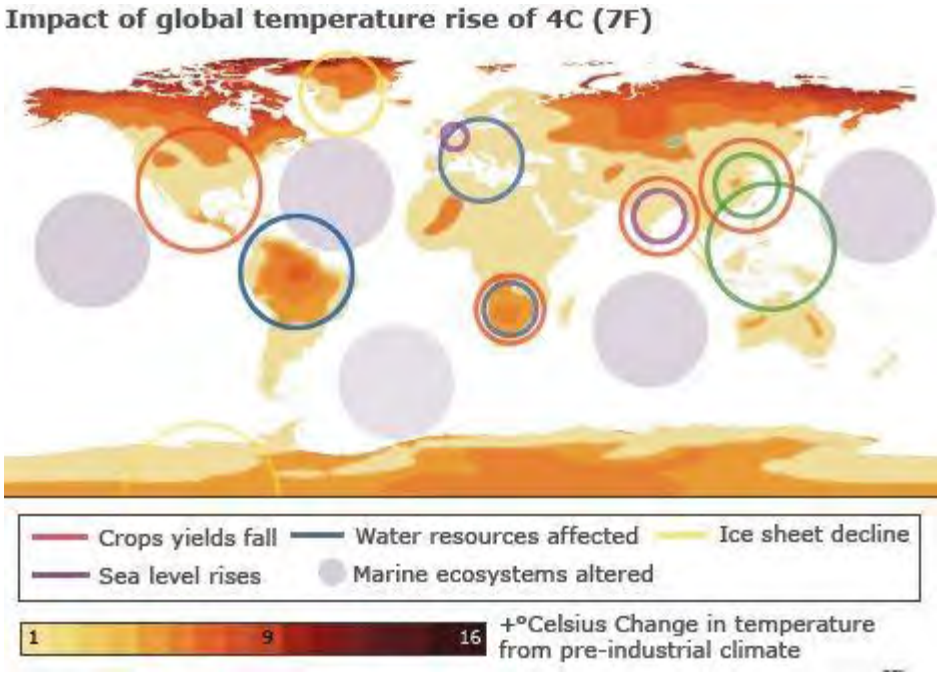


Figure 15 : The effects of climate change and rising temperatures (Source: TreeHugger, 2016).

In the light of these concerns, cities in South Africa need to address their current unsustainable development patterns and above all, reduce greenhouse gas emissions. This will require a decrease in car usage, which is one of the biggest causes of emissions, and the encouragement of public transport and NMT.

South African cities need to preserve the natural environment, through urban edge restrictions, by protecting environmentally sensitive areas. This can be done by decreasing sprawl and the urban footprint through compact city structures and strict development policies. These cities need to move away from their fossil fuel dependency and encourage renewable energy, recycling and suitable living patterns. Coastal cities and towns, such as Cape Town need to increase mitigation measures along the coast because of rising sea levels.

4.4.3 Food Security

Food security addresses one of the most basic needs of humankind. The UN food and agriculture organization (2014) defines it as the necessity for "all people, at all times, to have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".

The world is currently food insecure with over 842 million people having been unable to access sufficient food between 2012-2014. The earth will have to produce 50% more food to feed the estimated nine billion people by 2050 (UN-Habitat, 2016). As discussed above, climate change will have an effect on food security and could reduce crop yields by more than 25% because the land, biodiversity and water access is depleting at unprecedented rates (UN, 2015).

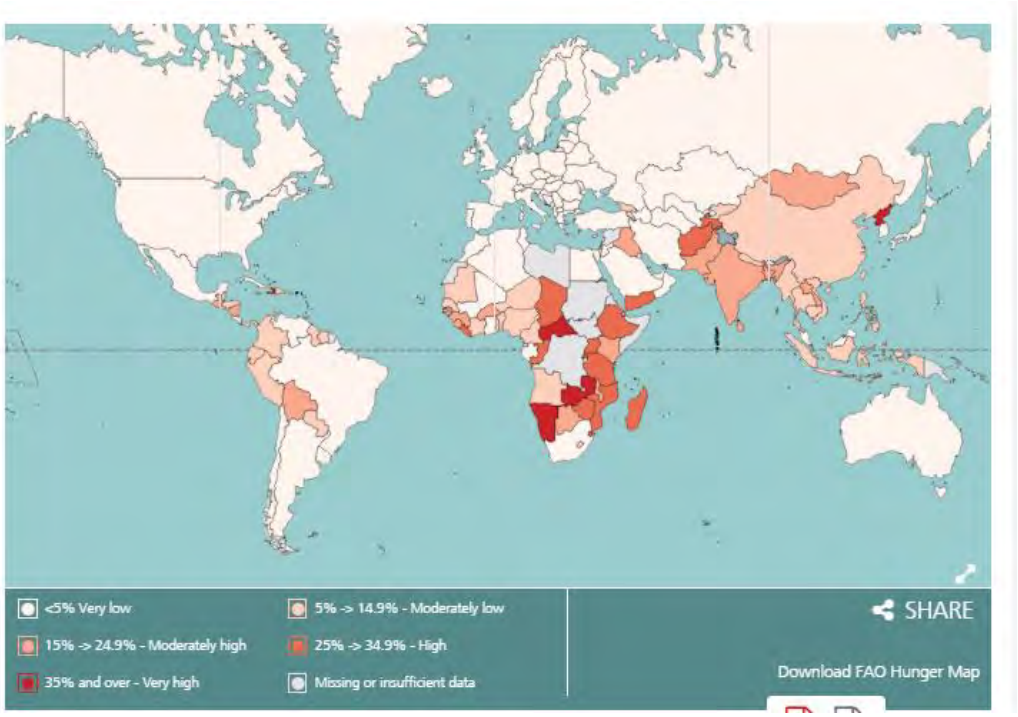


Figure 16: The world food insecure countries (Hungry Cities, 2015).

Food security does not occur in a vacuum and is also deeply connected to environmental challenges, climate change, resource management, rural and urban poverty and health issues. It is a complex task but it is critical to sustain future generations and alleviate poverty. South African cities need to promote local food production through urban agriculture, protection of agricultural land and the protection of water (See Fig 16). Local food production can also create educational hubs and potential economic opportunities.

4.4.4 Resource Depletion

The earth has limited capability to sustain the current growing population (Un-Habitat, 2016). The earth is currently living beyond its means and its consumption patterns are two to three times beyond its capacity. The current unsustainable growth patterns of cities, like those found in South Africa, are contributing towards depletion of the

earth's natural resources, the highest being oil, water and forests (The World Counts, 2010). There is an urgent need for cities such as Cape Town to change their consumption patterns to ensure a liveable planet for future generations.

4.4.5 Water Scarcity

Fresh water only makes up 2, 5% of the 70% water sources found on earth (WAPP, 2012). Approximately only 1% of the fresh water is accessible for human consumption, as most of it is trapped in glaciers. Water is an essential component of society, not only to sustain the human population but also, almost half of the global workforce is employed in water resource dependent industries (Un-Habitat, 2016). The growing scarcity of fresh water resources has been accelerated by urbanisation and rising living standards, creating an increasing demand for water. Agriculture uses almost 70% of the water, and is the largest user, followed by industries 20% and human consumption of only 10% (UN-Habitat Water Report, 2016).

Water is critical for human life and economic resources and water scarcity and deficits are likely to limit opportunities for economic growth, the creation of jobs and food security. Currently, cities are contributing to the pollution of water and have limited protection for their fresh water sources, aquifers and wetlands. Limited regulations and the monitoring of agricultural practices also contributes towards unsustainable water practices (UN-Habitat Water Report, 2016).

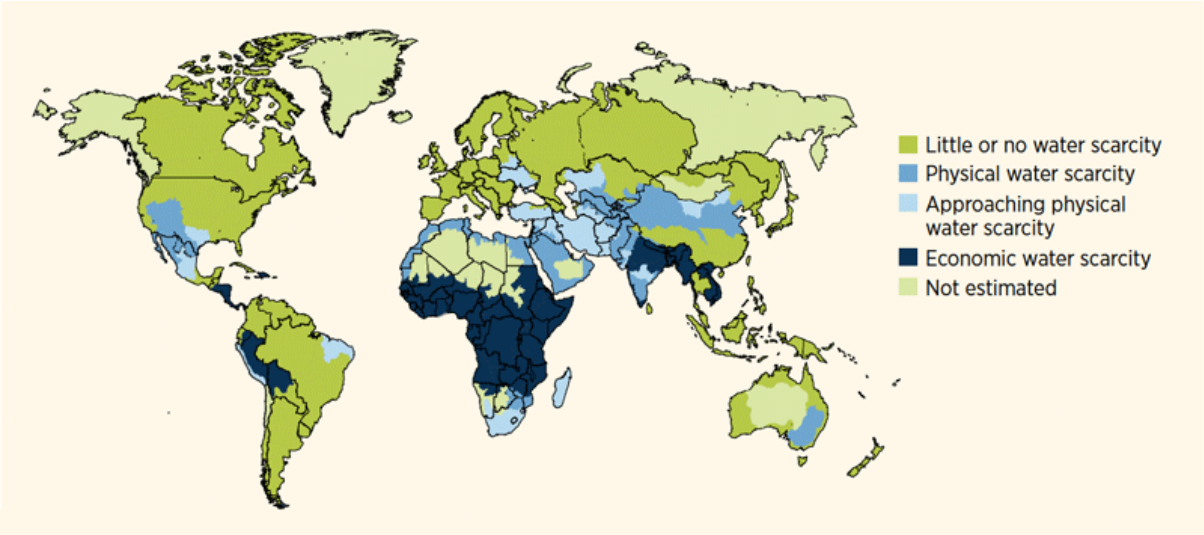


Figure 17: Global physical and economic water scarcity (Source: UN.org, 2016).

Figure 17 shows that South Africa is approaching a physical water scarcity. Water is critical to sustain life and is irreplaceable. Cities in physical or approaching physical scarcity such as Cape Town, need to start taking serious precautionary measures to recycle water, collect rain water and protect existing water bodies, wetlands and aquifers.

4.4.6 Economic Globalisation and Structural Unemployment

"Economic globalization refers to the increasing interdependence of world economies, as a result of the growing scale of cross-border trade of commodities and services, the flow of international capital and the wide and rapid spread of technologies" (Shangquan, 2000: 9).

This is a recent and irreversible trend that has been driven by the growing revolution fuelled by the development of information technology. It has led to the improvement of technology, transportation and shared labour (Un-Habitat, 2010). This borderless world has had some great advantages through the improvement of technology in the fields of medicine, food production and transportation.

The downside of economic globalisation, is that it has exacerbated unequal disparities in certain countries. The increase in technology and cheaper labour sources has contributed to a decrease in jobs and local opportunities. This has led to structural unemployment that is caused by fundamentals shifts in the economy, resulting in the labour force not having the required skills. This results in a mismatch between the skills of the labour force and a growing technology sector, which is a major problem in a city such as Cape Town (Dalbert, 1997). The biggest challenge with economic globalisation is to find an equitable manner to share its benefits (Un-Habitat, 2010).

As the urban poor tends to be the most affected, South African cities need to encourage Local Economic Development (LED) to promote economic growth and job opportunities for its residents. A focus on skills development for the lower income groups, is required, in order to be able to participate within the rapidly changing economy and sectors that provide jobs. New skills development can also assist in new and innovate job creation opportunities or assist in new start-up businesses. This could potentially help alleviate current disparities between the rich and the poor, through job creation. Planning must ensure the creation of preconditions to encourage small, self-generating and entrepreneurial activities.

The international tendencies that have been discussed above, give rise to many predispositions that are currently found within South African cities and towns. It is of the utmost importance to take these issues into consideration when developing a framework.

4.5 Legislative Framework

The previous section discussed external factors and international tendencies, and how they should give form to planning practices. This section discusses the internal factors that are found within South African legislation and policy information that gives form or that needs to be considered within planning practices. This is a brief overview of the relevant planning and environmental laws and policies.

The Constitution of the Republic of South Africa

The Constitution of the Republic of South Africa (Act 108 of 1996) is the overarching law of the country and any law that does not adhere to it, will be considered invalid. The objective of the constitution is to protect the basic rights of society as well as to advance equality and justice. The Constitution places a duty on all spheres of government to ensure that basic rights are attended to when dealing with planning matters. These rights include, but are not limited to, the following:

> **Section (24):** The right to an environment that is not harmful to people's wellbeing and is beneficial to both current and future generations.
>
> **Section (25):** Property rights.
>
> **Section (26):** The right to housing.
>
> **Section (32):** The right to access information.
>
> **Section (33):** The right to administrative justice.

SPLUMA

The Spatial Planning and Land Use Management (SPLUMA) Act of 2015, was promulgated in 2015. This Act specifies the relationship between spatial planning and land use management systems. It aims to establish a framework to assist uniformity in the implementation, monitoring, reviews and to delegate authority in decision making. It is in accordance with the *Municipal Systems (Act 32 of 2000)* that defines the legal nature, core principles, mechanisms and processes to uplift communities socially and economically.

The key principles of the Act include:

Spatial justice, to redress past spatial and development imbalances through improved access to land.

Spatial sustainability, to protect agricultural land, comply with environmental laws and limit urban sprawl, by promoting land development that is within the fiscal, institutional and decision making procedures that have minimal impact and spatial resilience.

Spatial resilience, ensuring flexibility in spatial plans to accommodate rapidly changing environments and promoting sustainable livelihoods.

Efficiency, land development must optimise the use of existing resources, infrastructure and decision making procedures to minimise impacts.

A municipal planning tribunal, that cannot be impeded in its discretion on the ground value of the land or property that is affected by the outcome of the application (Msomi, 2016).

The Act requires that municipalities receive decision making powers regarding land use. It also requires all spheres of government to prepare Integrated Development

Plans (IDPs) and Spatial Development Frameworks (SDF), to assist forward thinking and proactive approaches and integrative planning (Ogle, 2015).

NEMA

The National Environmental Management (Act 107 of 1998) gives effect to section (24) in the Constitution. It defines sustainable development as a means to integrate environmental factors into social and economic decision making and planning. The Act also identifies precautionary principles, objectives and enabling mechanisms.

This Act guides the content and processes when developing an Environmental Management Framework (EMF). The Heritage Resource Act (Act 84 of 1998) might add specific requirements and restrictions to environmental authorisations (SRK, 2011; Ogle, 2015).

Municipal Systems Act

The Municipal Systems Act (Act 32 of 2000) contributes towards the realization of the rights contained within the Constitution. The Act aims to achieve a more integrated spatial planning system and to develop plans that are more sustainable, are socially and economically inclusive and that serve the current and future well-being of municipalities. The Act requires each municipality to prepare an Integrated Development Plan IDP. This is used to guide all development within a municipality, in terms of budgeting and the allocation of resources every five years. The IDP is informed by a municipality's Spatial Development Framework (SDF) which is reviewed every twenty years (Ogle, 2015).

LUPA

The Western Cape Land Use Planning (Act 3 of 2014), repealed the Western Cape Land Use Planning Ordinance (Act 15 of 1985). LUPA works in collaboration with SPLUMA.

The act seeks to clarify the functions of the municipalities and provincial government in terms of the zoning schemes, structure plans, the subdivision of land and general provisions (Ogle, 2015).

Policy Informants

The following section analyses the institutions involved in the different spheres of government (national, provincial and local) and the main policy informants. It should be noted that there are many policies that are integrated and available, but only the main spatial development frameworks have been selected and discussed.

National Development Plan 2030

The National Government has set out the countries strategic direction. It uses the Rural Development and Land Reform Acts to prepare the national SDF and Integrated Development Frameworks (IDF) that build towards the National Development Plan (NDP) (CoCT, 2012). The NDP aims to eradicate poverty, accelerate economic growth and reduce inequality by 2030. The NDP objectives are to develop an inclusive

economy to enhance the capacity of the state. It uses spatial targeting to encourage and enhance growth. It combines targets through different zones and incentives to encourage investment into specific nodes and corridors, with hopes to promote other areas (DED, SACN, 2013). The targets include better quality public transport, densification and economic opportunities closer to communities, amongst others. National government is also charged with transferring resources via budget allocation, to provincial and local government (National Treasury, 2015).

Western Cape Province Spatial Development Framework 2013

SPLUMA (2015) requires each province to prepare a PSDF. Provinces are responsible for preparing Provincial Growth and Development Strategies (PGDS) that aim to develop the general economy and service infrastructure. It also guides environmental protection and other developments. The PSDF aims to grow the economy towards achieving greater inclusion and to promote environmental resilience. The PSDF 2013 has three main themes: settlements, space economy and resources.

It identifies and builds on the province's strengths, while attempting to connect regional nodes, developed rural areas, cluster services and infrastructure throughout the province. It uses spatial targeting of current (existing) nodes to guide investment and to develop opportunities (CoCT, 2012).

Cape Town Integrated Development Plan 2012-2015

IDP's are developed every five years. The plan's vision is to create an enabling environment that addresses social and economic growth and development, delivers quality services and creates well governed administration. The IDP focuses its resources in terms of the infrastructure investment and to facilitate economic and social growth (CoCT, 2015).

Cape Town Spatial Development Framework 2012

The CTSDF is a strategic long-term (twenty years) tool to guide the municipality's vision, goals, objectives and implementation (SDF, 2012). It maps out a vision for the city's growth trajectories, areas of need and developable land. The CTSDF's current goal is to achieve equitable, sustainable and manageable growth. It uses spatial concepts to guide future growth, which includes the city's natural resources, developing around corridors and ensuring a flexible and adaptable city (CoCT, 2012). The new SDF for Cape Town is currently being drafted (CoCT, 2016).

The legislative framework and policy information both need to be taken into consideration when developing a plan. However, unsustainable and unjust planning practices should be challenged. Before 1994, during the apartheid era, the 'law' and 'policies' did not promote acceptable planning frameworks and the repercussions thereof are still deeply ingrained within the structural policy of South African cities. Therefore, the values and ethics of the framework are critical as it will form the framework, as well as expose unsustainable and socially unjust laws and policies.

4.6 The Nature of the Plan

The nature of a plan is a critical element that impacts the quality of settlements which result from the process of design (Dewar & Louw, n.d.). This chapter has discussed the desired values, ethics, design qualities and the external and internal factors that give form to the planning approach. This section will discuss how all these factors can be incorporated, or not, into a plan.

It discusses two very different approaches to planning, namely programmatic and non-programmatic.

4.6.1 Programmatic Planning Approach

Programmatic planning approaches have been the most commonly used since the introduction of modernism and are still prevalent today. Programmatic planning is largely a quantitative approach, based on the principles of comprehensive rationality and focuses on land use planning.

The approach consists of identifying land uses that are neatly conceptualised and distributed separately into spaces. Space demands are scientifically calculated on a basis of range, threshold and a land use schedule is generated, without taking into consideration the broader context of the space (Dewar & Louw, n.d.). Planning and design becomes more or less a rational distribution of parts or elements, without creating very sterile environments (itbd).

Mitchells Plain, Cape Town

A formal fully planned township is a typical South African Programmatic plan. For the settlement to operate equitably it requires all the facilities to be built, however if this did not happen, the settlement becomes a scatter of parts with nothing holding the whole together. As seen in Mitchells Plain neighbourhood structure.

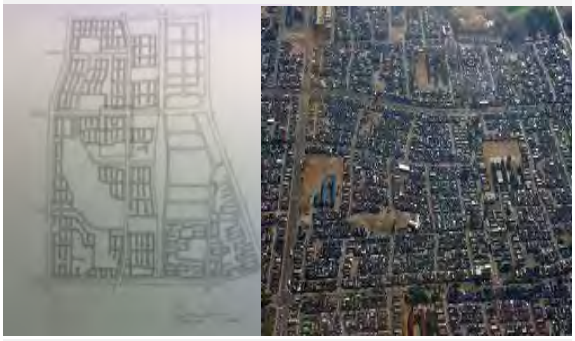


Figure 18: Formal fully planned township, Mitchells Plain (Source: Dewar & Todeschini, 1991; Wikipedia).

Major Critiques of Programmatic Approaches

Programmatic approaches are notoriously unreliable because scientific predictions on which they are based do not always take into consideration the environment and changing conditions found in cities. End of state planning is impossible as cities cannot be comprehensively managed and controlled (Dewar & Todeschini, 2004). These developments often yield large amounts of residual spaces and removes the opportunity of choice and creates sterility.

The quantitative approach removes many of the performance elements from space and creates segregated and fragmented environments that are commonly found in South Africa (see Figure 28). Dewar and Todeschini (2004) defines it as a 'scatter of

parts', but nothing holds it together. To operate equitably, it requires that all facilities have to be built and this does not usually happen.

Another issue is that these fragmented and isolated land uses often create environments that are not suitable for all communities. Often financial resources run out and social facilities are not realised and, because these areas are built for vehicular transport, accessibility to other areas is very limited.

Building on the previous statement, the systems that are based on separation generate great levels of movement. "Internationally, it is increasingly recognised that the challenge is to increase access while reducing aggregated movement, because of its associated high economic and environmental externalities" (Jenks, 2000; Dewar & Todeschini, 2004: 59).

Programmatic approaches struggles to create vibrant and liveable spaces (Dewar & Todeschini, 2004). Therefore, a paradigm shift is required, to embrace urban values, as opposed to suburban values, and to replace programmatic approaches with approaches based on structure and space.

Graaf-Reinet, Eastern Cape

The town was established before the 1920's and reflects the hierarchy of space, flexibility and sensitivity of the non-programmatic approach. No land uses or activities were predetermined and public elements such as the movement systems, public spaces, social facilities and services were formed by the context (Dewar & Todeschini, 2004).

Figure 19: Strong non-programmatic approach: Graaf-Reinet in the Eastern Cape (Source: Japha et al., 1989).

4.6.2 Non Programmatic or Structure-Spatial Approaches

The focus of non-programmatic approaches to planning is centred on the performance and quality of the 'whole'. It is based on the central realisation that for the 'whole' to work well, no one part can be maximised. The focus is not on land use, but upon the accommodation and celebration of human activities in a space. The foundation of this approach is based on the two ethical legs of humanism and environmentalism, not on idealised forms. Design based thinking begins with people on foot and not assumptions about technology. It seeks to serve all residents within a community and not only an exclusive few (Dewar & Louw, n.d.).

Non programmatic approaches are not based on top down directives but seek to create a logic of access, to which activities respond in order to generate broadly predictable outcomes (Dewar & Louw, n.d.). The approach accommodates change and growth through well thought out logic, accommodating short and long-term needs. It does not seek to define the 'good urban' life but, to create choice and

enabling environments that are not prescriptive. It is focused on the public good and not individual interests. It aims to address the performance qualities that were discussed earlier and not idealised spatial outcomes.

The concepts of structure, space and minimalism are central in non-programmatic approaches and these are discussed below:

Structure

"Structure is a design device traditionally used in settlement making to order the landscape" (Dewar & Louw, n.d.:13).

The key to the spatial logic of structure lies in the concept of access (Dewar & Todeschini, 2004). The elements of public structure are brought into association to create a logic to which all activities, large and small, formal and informal, public and private, respond in their own interests (Dewar & Louw, n.d.). These main elements of structure are manipulated and co-ordinated to create a geometry of point, line and grid. The geometry is to create an accessible surface across the landscape (these public elements of structure are commonly identified as green space, all modes of movement, public urban space, social institutions and utility/ emergency services). This creates a hierarchical reference system of points and lines of greater or less accessibility.

Every activity has its own logical requirements in terms of access, it must be efficient and provide a viable operation for each activity. 'At the most fundamental level; this logic relates to a variation in the need for publicness/exposure or privacy/secretiveness. The more complex the accessibility surface, the greater the range of choices. The structural system therefore establishes a logic of exposure and privacy to which all activity can respond. The greater the variety of choices and possibilities, the better the system, it removes the 'either-or' choices to a meaningful degree of choices (Dewar & Louw, n.d.).

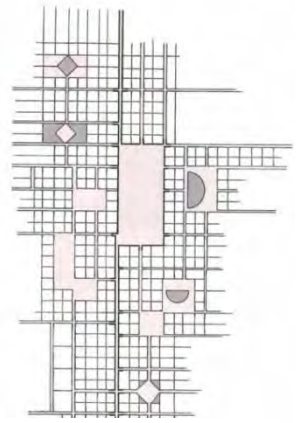


Figure 20: A synthesis of movement and spatial hierarchies (Dewar & Louw, n.d.).

Space

In the same way it is possible to create a hierarchy of access, it is also possible to generate an associated hierarchy of space. In non-programmatic approaches all public spaces are seen as a social space and are multi-functional. Good spaces are defined, enclosed, humanly scaled and surveilled.

The hierarchy of space creates a logic for the location of public facilities; facilities that can be shared by communities by being flexible are usually in the most prominent locations.

Design is the creative integration of these structural and spatial forms of hierarchies to create a logic of publicness and privacy within which all activities, large and small,

can find a place, in terms of their own requirements for accessibility. The spatial quality of the framework contributes directly to the quality of the environment and life (Dewar & Louw, n.d.).

Design is an integrative process where the concept or the idea is sympathetically moulded into and formed by the landscape and its context. This may warp and distort the idea and give it life, but it is important not to destroy the initial concept or idea in the process.

A central concept in a non-programmatic way of thinking is the quest for minimalism. At each scale plans should provide the minimum strong action necessary to give direction while giving maximum freedom for ingenuity and creativity of the design (Dewar & Louw, n.d.: 11). Positive environments are guaranteed complexity however this cannot be designed and usually results from the process.

The main reasons why minimalism is necessary in the planning approach is that it allows the plan to deal with the unexpected, and creates flexibility in a constantly complex urban environment. It is qualitative and allows for the input of a variety of informants (government officials, professionals, public participation, and local residents). Dewar and Louw (n.d.) argue that the more people involved, the better the process. This builds on David Crane's (1963) argument that a city of many designers is a better city. The economic processes of urban development has always offered opportunities of income. Especially in developing countries, such as South Africa, these processes must be as widely spread as possible over society. A wide range of development must be involved in the process. The place making principles are simple and focus on beginnings that stem from the environmentalism and humanism ethics that determine where a development should go or not go.

4.7 Conclusion

Chapter 4 gives an overview of different factors that give form to the planning process; the values and ethics of a planner, the performance qualities of design, global trends, legal frameworks, policies and different planning approaches. The common thread between these different factors is that current urban environments are rapidly changing.

These different elements need to be taken into consideration which is not possible with current planning approaches. South African cities and towns need to revaluate the planning approach to manage urban growth in a sustainable and just manner. The next section explores different approaches to managing urban growth.

CHAPTER 5: URBAN GROWTH MANAGEMENT

5.1 Introduction

"A living city differs radically from what was built in the 20th century" (Nikos Salingaros Salat et al., 2011: 53)

Given that Cape Town is going through a rapid growth and transformation process, it is critical to develop restructure and direct urban growth (Pieterse, 2010; Rabe, 2016). The challenge is: guiding intensive urban development towards the most appropriate areas, within a city, and to build liveable, sustainable and more equitable spaces (Swilling, 2010). Cape Town requires a fundamental shift from its current practices, in an attempt to combat sprawl, fragmentation and segregation (Horn, 2009).

The compact city concept attempts to provide an alternative style of urban development as a means to restructure Cape Town. This chapter discusses the compact city concept and how it forms the development frameworks and allows for restructuring through urban corridors and Transit Oriented Development (TOD).

5.2 The Compact City Model

A comparable amount of planning literature from 1990 onwards focuses on the compact city approach as a mechanism to implement sustainable development in urban environments, to counter urban sprawl and the negative economic, social and environmental issues (Arbury, 2005). There are various definitions of the "compact city concept", but the general consensus is "a relatively high density, mixed-use city, based on an efficient transportation system and dimensions that encourage walking and cycling" (Burton, 2000: 1970).

The intensification of development within the city structure has the potential to overcome urban sprawl, reduce the use of private vehicles and minimise the loss of green open spaces (Arbury, 2005). William (1999) argues that the concept fulfils more than just the environmental benefits of intensifying urban areas but that these higher density settlements are more socially sustainable because local services and facilities can be sustained and therefore, accessibility to services and goods is more equitably distributed. Furthermore, high population densities 'are seen as a prerequisite for vitality, vibrancy, cultural activities and social interaction' (William, 1999: 168). According to Katz (1994), the closer residents live to jobs, shops and social facilities, the more likely they are to walk, cycle or take public transport.

5.2.1 Central Principles

The principles that make up the compact city model include the containment of the urban footprint, minimising the use of private vehicles, the protection of the natural environment and a focus on generating accessibility.

It encourages the prevention of urban sprawl, the encroachment on agricultural land, and environmentally sensitive areas, through a high degree of urban development

containment. This minimises the urban footprint of cities and the higher densities and more compact forms allow for the reuse of infrastructure and previously developed land, as well as the rejuvenation of existing urban areas. It also encourages the sustainable and efficient use of land (Frey, 1999; Horn, 2009).

It promotes the decrease of dependence on private transport which can reduce vehicular traffic volumes, pollution, injury and death associated with promoting public transport (Frey, 1999; Horn, 2009).

The compact city approach aims to reduce pollution, greenhouse gases and emissions, lower the consumption of fossil fuels and use less energy, through the efficient use of land and its resources (Frey, 1999; Horn, 2009).

It focuses on creating accessibility by encouraging a mix of activities in decentralised areas throughout the city. This encourages easier access to services and opportunities for all residents (Jenks & Burgess, 2000). This also encourages social mixing and interaction between people, though the promotion of diversity, social cohesion and cultural development (Frey, 1999; Horn, 2009).

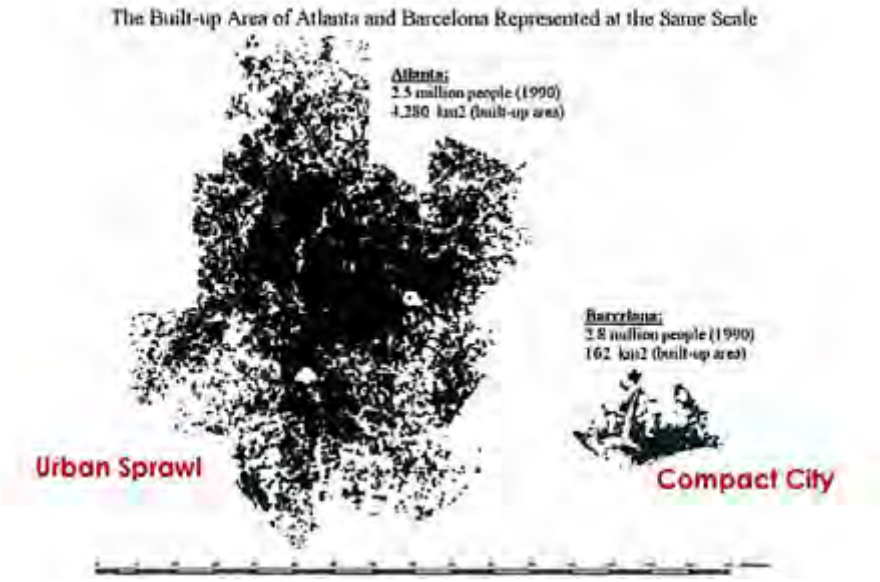


Figure 21: The built-up areas of Atlanta and Barcelona represented at the same scale, presenting how the compact model is an alternative approach to planning cities and environments (Source: Khairah Talha Associates, 2010).

5.2.2 The Critique

The compact city policies were widely accepted in the early to late 1990's in the UK and parts of Europe. However, because of the sprawling city structures found in the United States, New Zealand and Australia, many authors questioned the feasibility and implementation of such an approach (Jenks et al., 2000; Williams, 1999). The scepticism of Breheny (1992, 1996) and Gordon and Richardson, (1997) was based on the realisation that urban sprawl has a strong link to residents' preference which led to suburbanisation in countries worldwide. Combined with the vague nature of sustainable development, the benefits of urban compaction were difficult to

determine and, as a result, planning literature began to question whether a compact city was worth implementing (Arbury, 2005).

The compact city model was also questioned with regard to whether the environmental and economic benefits were sustainable in the long run. as high densities can contribute to other negative environmental factors such as pollution (Arbury, 2005). Burton (2000) also challenged the compact city model because the increased densities resulted in the reduction of dwelling sizes and there was overcrowding and health risks associated with it. The closer proximity to residential areas, industrial areas and mixed use neighbourhoods also often carried high crime rates. Burton (2000) also challenged the proposed positive social outcomes, questioning the housing affordability and the results of social segregation that could potentially rise.

5.2.3 The Advantages

Although the model has been critiqued, the principles of a compact city can underpin an approach that can move towards a sustainable city. This approach will also require society's willingness to recognise their unsustainable current lifestyles and culture and to make certain sacrifices, such as decreasing the use of private vehicles, suburban lifestyles and using renewable energy sources. The ability of planners and government officials to impose the supporting policies, directing urban growth and designing quality environments must also improve (Arbury, 2005).

"At a metropolitan and regional level, it is clear that more compact urban development provides a sustainable answer to global urban growth. This is not true only because less sprawl leads to a reduction in energy use and pollution – and cities contribute 75% of the world's CO2 emissions, but also because dense cities require less investment in public transport, infrastructure and services to make them work" (Burdett & Rode, 27: 22).

Some key factors about why South African cities need to densify include the need to decrease vehicular movement, and the encouragement of public transport to address environmental degradation and to promote the integration of areas that have been discussed in Chapter 3.

I. Decrease Mobility

The model promotes accessibility through the use of public transportation and NMT routes (movement on foot or cycling). It directly addresses the needs of the majority of the city's population, versus the minority who have access to private vehicles (State Of Cape Town, 2014; Jenks & Burgess, 2000).

II. Promote Public Transport

Sprawling, low density patterns militate against efficient public transport and the historically vehicle orientated infrastructure investment that distorted the city structures and created urban segregation. Jenks & Burgess (2001) observed that

higher densities are required for viable public transport systems. To combat historical legacies, structural strategies for intensification of certain areas is required.

III. Minimise Environmental Degradation

"The challenges that African cities face will only be exacerbated by increasing resource scarcity and environmental degradation" (UN-Habitat: State of African Cities 2016 Report). The protection and preservation of the natural environment is becoming a critical focus worldwide, as climate change, resource and environmental degradation increasingly affects cities. The compaction of the city creates an opportunity to minimise current emissions, conserve its environment and minimise resource usage (Frey, 1999).

IV. Promote the Generation of Vibrant Local Markets

The current mismatch between the growing economic sectors and the required skills of the labour force is contributing to Cape Town's growing unemployment rate which increased from 19,2% to 24,9% between 2005 and 2013 (State of Cape Town, 2014). Many residents are forced to make a living through self-generated activities. However, for the small businesses to survive; intensive local markets are required with high densities and movement of people (Jenks & Burgess, 2000).

V. Promote the Integration and Intensification of the City Structure

The compact city approach can promote the integration of the fractured city structure of Cape Town, through infill development and strategic densification, moving towards more linear developments which could link previously segregated areas through design (Jenks & Burgess, 2000).

VI. Addresses Current Urban Injustice

Frey (1999) purports there is a parallel between the compact city model and Maslow's hierarchy of human needs. Although there is no complete match, the diagram in Figure 22b depicts the needs of humans and how the principles of the compact city addresses them. Frey (1999) motivates an in-depth explanation and comparison of Maslow's hierarchy and the compact city model. However Figure 22a depicts the opportunities that the compact city model can provide.

The inequitable city structure of Cape Town was discussed in depth in Chapter 3, where it concluded that many basic needs of the residents within Cape Town are not being met. This approach is not the ultimate solution but it provides an alternative solution to address the needs and inequalities of Cape Town.

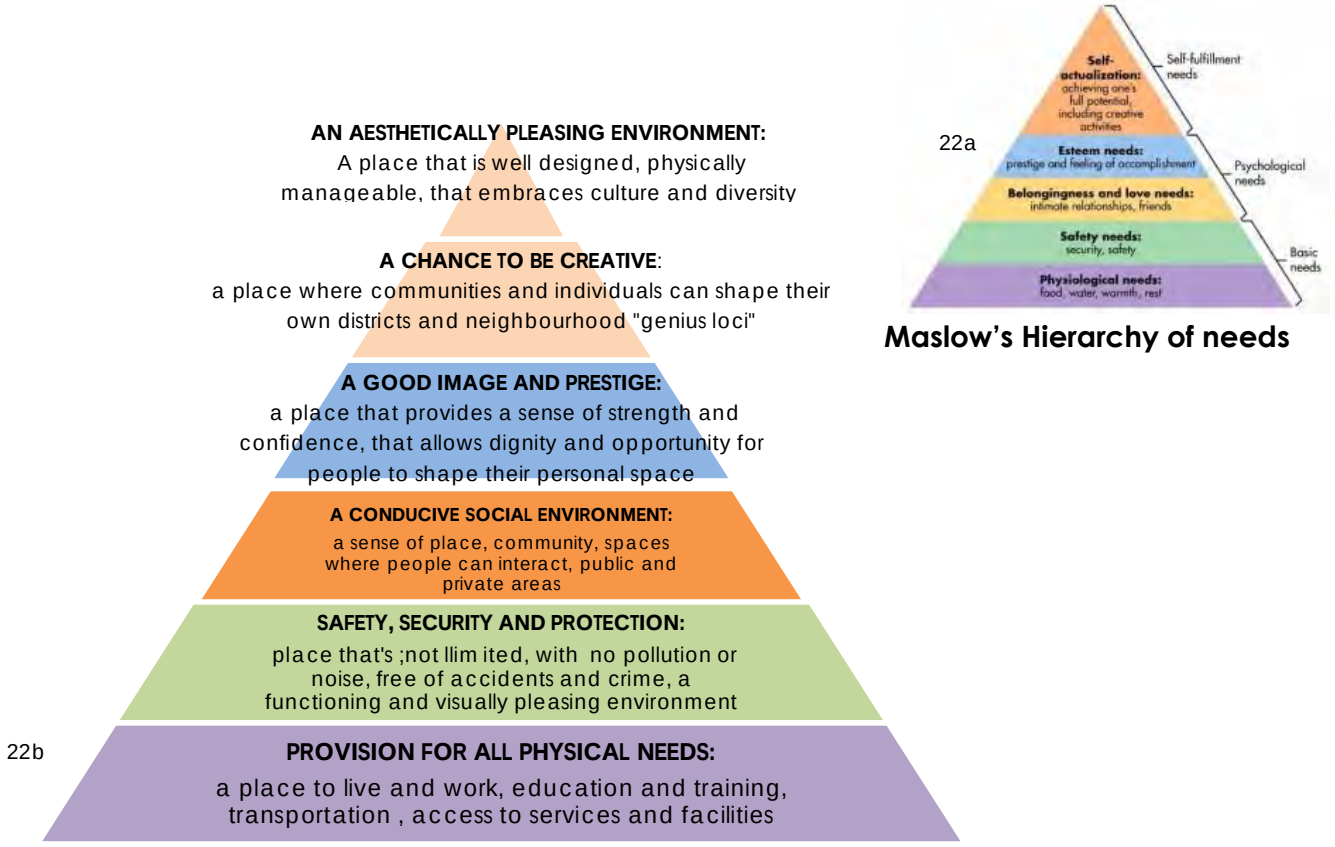


Figure 22: Maslow's hierarchy of needs with the focus of compact city principles (Source: Frey, 1999).

5.2.4 Obstacles for a Compact Cape Town

Changing the current form and structure of Cape Town is required. It will not be an easy move towards a sustainable city and a number of changes will have to be overcome (Jenks & Burgess, 2000). Major challenges of adopting the compact city approach in Cape Town include cultural and social norms, the rampant private developers and the condition of the current land market.

Firstly, the cultural and social factors that are found in a diverse country such as South Africa will need to be dramatically changed. Developments will need to be designed more economically, socially and environmentally friendly, in an attempt to appeal to residents as attractive places to live.

For example South Africa still has strong anti-urban values and the largely accepted 'suburban lifestyle' is entrenched into its development policies. Adopting this model will require the cooperation of authorities to change their current attitudes and polices around development. It will also necessitate educating residents and illustrating benefits through design quality and the creation of well performing environments.

Secondly, the private developers, are leading most developments in the city and are essentially determining the footprint of the city (Jenks & Burgess, 2000). Many of these privately led developments take the form of exclusionary gated communities, which are often located close to or beyond the urban edges, encroaching on valuable agricultural land; locations where the private sector is investing in economic opportunities, in the form of industry, commerce, and residential developments, are

still located far from where low income groups are located (McGaffin, Napier and Gavera, 2013). This builds on past growth patterns and strengthens the prevailing unequal property value growth. It is contributing to the widening gap between the rich and the poor.

Thirdly, the challenge of the urban land markets and the limited availability of land in Cape Town is the reason why land close to the city have economic opportunities and areas with good infrastructure have a higher value attached to them (McGaffin, Napier et al., 2013). The higher the value of the land, the higher the rent and the more viable a private investor may deem an area to invest in. Currently, in urban land markets throughout South Africa, and in Cape Town, land value is increasing in certain areas close to the city, where good infrastructure and economic opportunities exist.

This results in an increase in rentals and it becomes harder for middle or lower income consumers to enter the market (McGaffin, 2015). This means that the rise in rentals in land markets leads to a rise in property values, which will be a function of conditions in the financial markets and a desire by developers to supply this market demand (Rabe, McGaffin and Crankshaw, 2015). This could mean that fewer residents are able to buy properties, due to increasing land values, resulting in accessibility to a smaller percentage of individuals that have the financial means. This also restricts residents from migrating upwards from their current situation (Rabe, McGaffin et al., 2015).

The opposite happens in poor/informal areas. Due to the lack of infrastructure and economic opportunities, the land value is low and so are the rentals earned. This causes the property to be less desirable. This increases the gap between the rich and the poor and the middle ground falls away, restricting the poor to these areas (CSIR, 2014). This also goes hand in hand with the fact that many of the residents in these areas do not have title deeds and therefore are unable to sell their properties to purchase a new piece of land. There has been consistent selling of the actual materials that the shacks are built from, but these constitute a very small amount of money compared to the actual value of the property if they had ownership. This distorts the market, pushing the poor further into poverty, instead of integrating them into developing areas. This gap constitutes 20%-25% of South Africans and they are an important segment of the South African population (McGaffin, 2015).

The urban land markets poses a big challenge for the compact city model because of limited land availability, high land values in the city, and social norms and stigmas surrounding the urban poor. A challenge also lies with municipalities to try and create collaborative planning solutions to align housing provisions with city growth options, bulk services and transport (City of Cape Town, 2014).

In conclusion, the issue of urban land markets in Cape Town requires a buy-in not only from the state and the political system, but also from the residents and other players involved. The transformation and restructuring of a more inclusionary land market process cannot be left to the market alone to address the developmental and spatial challenges, but will require focused planning processes, investment interventions and

national as well as local targets. It is important to create a country with city structures that work for poor households, so that they can also benefit from land markets. This is essential to move towards an equitable and just country where the poor have previously been marginalised. This spatial reconstructing can coherently re-establish social separation and build towards a prosperous and unified country.

Cereda (2009) contends that the compact city model is the most effective strategy to combat urban sprawl and develop liveable and sustainable cities. The compact city model provides an alternative to the current development patterns in Cape Town as it addresses some of the issues that were discussed in Chapter 2 and 3. It should be noted, however, that the compact city model is not the answer to all the problems that Cape Town faces, but it provides an alternative to the current unsustainable, sprawling and fragmented city structure. The next section discusses how the model can be implemented in Cape Town.

5.3 Giving Form to Compacting the City

The 'compact city' city model may not provide all the solutions to a more sustainable or equitable future, but it has the potential to restructure the urban environment (Arbury, 2005).

Two non-mutually exclusive models have been promoted to form the development framework, urban corridor development and Transit Orientated Development (TOD). Both advocate the selective densification of urban form and consider transportation to be a critical structuring element.

5.3.1 Urban Corridors

"Urban Corridor planning is an approach that seeks to promote intensity, stimulate a mix of activity, promote small business, and encourage public transportation and NMT movement; while pursuing urban integration and the improvement of equity and convenience" (Dewar, 2011: 185).

The formation of the Corridor development or the agglomeration of intensive activities around more continuous movement routes can be seen in many parts of the world, where activities have been allowed to respond directly to movement routes. Urban Corridors represent a broad band of between 1-1.5 kilometres of mixed use activities that are intensified along an interlinked system of a public transportation line (Le Grange et al., 2000). Although Corridors are not solely concerned with transportation, these more continuous transportation routes, carry the flow of goods and people through the city, creating a synergy, linking people to a variety of activities (Dewar & Louw, n.d.).

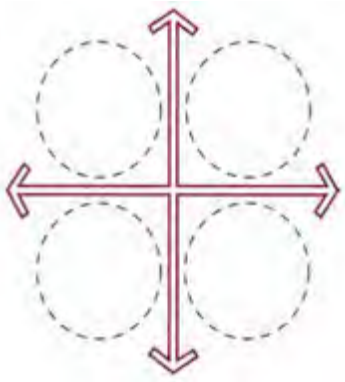


Figure 23: Space Bridger (Source: Dewar & Louw, n.d.).

The stop-start nature of public transportation is more important than rapid movement. The emphasis in Corridor development should be upon creating space integrators as opposed to space bridgers. Space integrators create greater accessibility through decentralisation rather than increasing mobility.

The **space bridgers** (Figure 23) are the result of modernist planning. These space bridgers focus on mobility and are usually limited access routes, which connect a few points along their length. They divide areas or cities into 'boxes' and these routes become barriers to permeability (Dewar, 2011). Space bridgers are most commonly found in South African city structures.

Space integrators (Figure 24) are continuous, stop-start routes that encourage a variety of activities along their length. Space integrators have the ability to bring local communities together, through shared amenities and facilities. These space integrators can also be used to break down the barriers that divide the city into 'boxes' (Dewar & Louw, n.d.). This is the primary purpose of Corridors to integrate communities by breaking down the cell-like structure of the modernist/apartheid city. This can be done by externalising more intensive activities to more accessible lines and points. This is to encourage activities along the route to be supported by a number of Corridors and not to stand as a single entity (itbd).

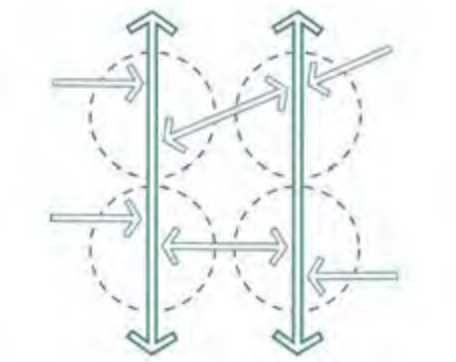


Figure 24 : Space Integrators (Source: Dewar & Louw, n.d.).

Figure 25 shows that accessibility along the Corridor is not equal. It is an area formed by the interconnections of the movement systems and the activities that cluster around the points of access. Corridors initially develop as 'beads on a string', which tend to grow towards each other over time (Dewar, 2011). Corridors are therefore usually, made up of larger and smaller Corridors. NMT is crucial to the foundation of smaller Corridor spines. Accordingly, significant generators of pedestrian and bicycle movements need to be strategically located along pedestrian friendly walk ways.

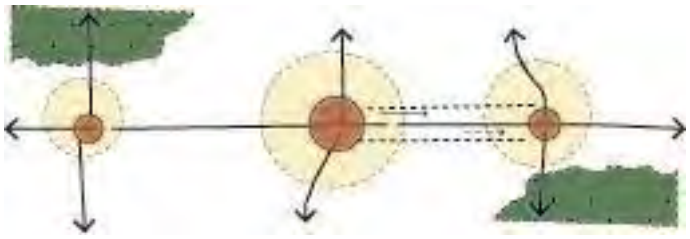


Figure 25: Corridor Growth and a hierarchy of access (Source: Dewar & Louw, n.d.).

Relatively high residential densities are a prerequisite for achieving adequate thresholds and housing, infill becomes an important part of Corridor planning. These high density areas are a precondition to supporting public transport, retail and

commercial activities and markets; ideally the higher density areas should be around primary routes.

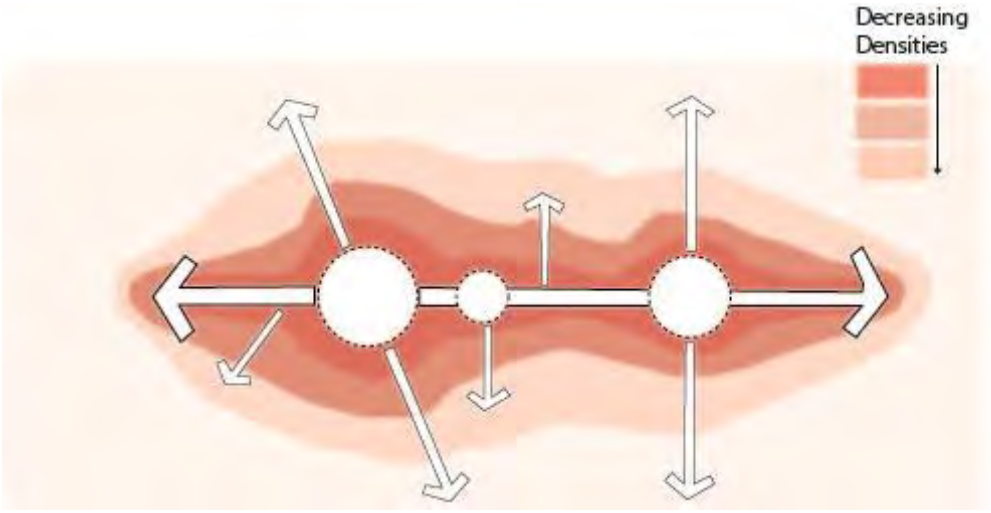


Figure 26 : The proposed densities along the corridor (Source: Adapted from Dewar & Louw).

Figure 27 explores the significance of the road widths. Corridors can be one or two sided. However, they are much stronger when two-sided, and for this to occur the road cannot be too wide. To reduce the width of roads and prevent barriers, splays or pinches can be used to spatially announce entry into a node of more intensive activity (Dewar & Louw, n.d.).

Implementation

The promotion of Corridor Development cannot be seen as a panacea to a wide range of development problems, but should rather be seen as focusing on the process or a way of thinking (Dewar & Todeschini, 2004). Corridors are long-term developments which cannot be artificially imposed or considered as a short-term project. They are processes and the planning and designing of corridors is more focused on beginnings rather than the end states. They do not develop equally in time but as a series of pockets of activities along a line, naturally growing towards each other like 'beads on a string'. Even though Corridors have similar preconditions each one is unique, because of its context, and the social and economic variables that impact on them.

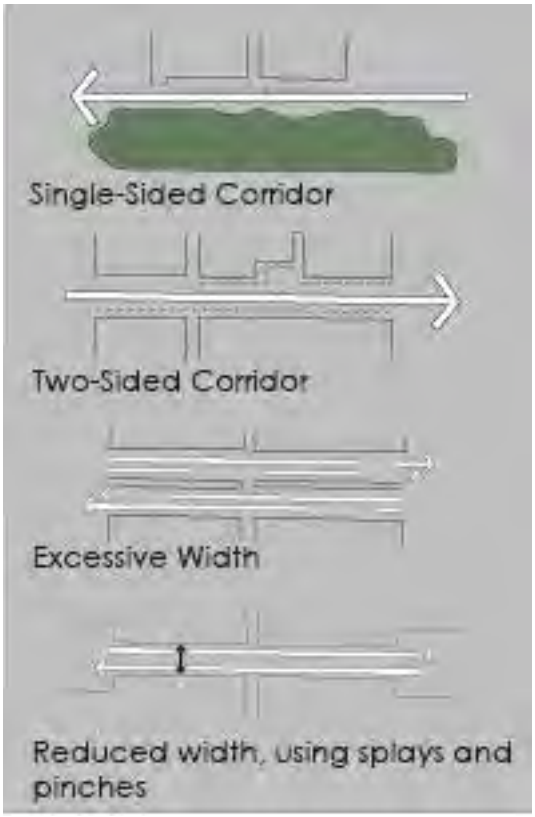


Figure 27: Corridor widths (Source: Dewar & Louw, n.d.).

Corridor projects consist of a range of different types of projects; namely, the provision of public facilities, public transport projects, infill

housing, public spaces and local economic developments (Dewar, 2004). The complexities of urban Corridors allow for numerous spheres of government, public, new developments and public private partnerships. This assists in the challenge of coordinating budgets.

Advantages

There are a number of advantages. Corridor Development results becomes a focus of planning attention. They include increased levels of accessibility, equity of access, linear developments; a wide range of activities and integrated city structures.

The role of Corridors is to increase levels of accessibility and permeability. It promotes a more decentralised activity pattern; this reduces aggravated movement and greenhouse gas emissions.

Corridor Development promotes equity of access. More intensive activities are found along public transport routes and continuous routes. These form the spines of corridors, and are always found along or in close proximity to public transportation. There will always be points of greater accessibility along any route. Land prices tend to be higher at these places, but because of its linear nature, the Corridor can accommodate a range of land prices.

Linear systems handle change and growth well. They allow for a variety of activities and functions along the routes, ranging from commercial to residential or mixed use. They promote convenience through residential space being in close proximity to intensive activities. A symbiotic relationship occurs between the different activities found within a Corridor and prevents spatial monopolization.

Corridor Development can be used as an instrument to integrate city structures and therefore can be used to break down urban fragmentation. It encourages not only the traditional spatial planning integration, but also integration across the jurisdiction of boundaries. Corridors include a wide range of different projects and therefore can be supported by different sectoral departments within government.

Warnisch and Verster (2005) argue that urban corridors directly support the principles of urban integration, intensification and containment of urban sprawl and that they attempt to ensure sustainable management and the creation of quality urban environments indirectly (Cape Metropolitan Council, 2000).

5.3.2 Transit Orientated Development

Transit Oriented Developments (TOD's) have similar characteristics to those of Corridors but they are short-term projects and they are ultimately nodal (UN-Habitat, 2009) and therefore can be used in conjuncture with urban Corridors.

Calthorpe (1993) describes a TOD as a mixed-use community within an average 500m walking distance of a transit stop, in a core commercial area. TOD's encourage the mix of residential, office, retail, open space, and public places. With the focus on a

walkable environment, that makes it convenient for residents and employees to travel by bicycle, foot or car.

The TOD model was formally introduced by Peter Calthorpe in the early 1990's in the United States of America (Jacobson & Forsyth, 2008). Calthorpe argues that TOD is a term which encapsulates the process of focusing on the development of infill housing, employment opportunities, mixed use activities and public services around existing or new public transport stations (Cervero, 1998; Curtis et al., 2009). TOD's are usually based around rail services but sometimes are also on BRT systems.

In the past few decades, TOD's have emerged as a popular and influential planning tool and have been adopted in many countries (Curitiba, Bogota, Guatemala). The TOD strategy is used to integrate land use practices and public transportation to create walkable and diverse areas with a strong link to urban design principles. The nature of TOD's has been adopted by South African policies, specifically in the City of Cape Town (BEPP, 2015).

Figure 28: Principles of TOD's (TreeHugger, 2016).

Advantages

There are a number of advantages derived from making TOD's the focus of planning such as containing urban sprawl, encouraging the use of integrated transit systems and place making principles.

TOD's are effective in containing urban sprawl, which in turn, can reduce stress on the urban growth boundary and on the costs to government for providing infrastructure. The wider transport relationship: TOD's are typically focused around public transport nodes, such as train or bus stations and along key transport routes. They encourage the use of integrated transport systems, as well as the use of NMT (PIA, 2009). Due to the focus on public transport, they reduce the use of private vehicles and increase densification around transit interchanges (Wilkinson, 2006). They encourage place making principles, TOD's are not just about housing, but the encouragement of mixed

usage reduces the amount of travel outside a commuter's immediate area. They encourage distinctive, attractive and liveable communities, with a strong sense of place, through urban design principles. They increase accessibility to services, provide economic opportunities, recreational activities, residential areas, schools, hospitals and public transport as well as NMT links.

TOD's encourage a mixture of both housing and tenure types. They match housing choice with shifting demographics with medium and high densities versus the current low densities.

TOD has been connected to value capturing initiatives that have been used to redistribute the value derived from soaring property and land markets more equally (Rabe, McGaffin & Crankshaw, 2015). Value capturing refers to the process whereby all, or a portion of land increases in value. This is attributed to public and community interventions which are recouped by the public sector. Such mechanisms can include a variety of ways to convert additional value into public revenues, such as taxes, fees and infrastructure developments which, in turn, could essentially benefit the poor (McGaffin, 2015). However, value capturing initiatives that are linked to TOD's should not primarily be aimed at securing additional financial resources, but should drive planning development instruments towards integrating and transforming the urban land market to allow the poor to access economic opportunities and resources (Rabe, McGaffin & Crankshaw, 2015).

5.4 Conclusion

Some of the challenges that Cape Town faces are not substantially different from other cities found in the global south. Most cities are faced with the challenge of building more inclusive and sustainable cities. However, each city does have a unique context and can choose how they approach these challenges. This chapter discussed the compact city model, as an option to handle urban growth in a sustainable and inclusive manner for Cape Town. It does not provide the ultimate solution to all the challenges, but provides an option to restructure the city by means of urban corridor development and TOD's.

The desired outcome for Cape Town is a compact, well integrated city that is efficient, resilient and sustainable. The next few chapters, takes the theory that has been discussed in Chapters 2 to 5 and applies it conceptually and practically to development for the Metropolitan area, the study area and the precinct.

CHAPTER 6: METROPOLITAN FRAMEWORK

6.1 Introduction

Geographically, Cape Town is a place of great beauty, characterized by the iconic Table Mountain, the Cape Peninsula Mountain chain, beautiful coastlines and a unique set of fauna and flora. Socially, the city is divided into two contrasting parts; one that reflects the devastating consequences of the policy of apartheid and the Group Areas Act. The other part, displays a wealthy population that has the highest quality order activities, services, facilities and opportunities (Dewar & Louw, n.d.). As discussed in Chapter 3, Cape Town's dominant eccentric radial spatial pattern is fragmented, sprawling and separated.

In response to the contextual analysis of Cape Town in Chapter 3 and the theory discussed in Chapters 4 and 5, an alternative approach to structuring Cape Town is discussed in this chapter. It describes a concept that rethinks the city structures and promotes environmental integrity, accessibility and equity for all its residents. For an area of this size, it is more important to develop a coherent way of thinking about the city and to guide its decision making than it is to make a detailed short-term proposal (Dewar & Louw, n.d.).

By proposing incremental changes, through a series of small actions that must be coordinated and integrated into a larger framework, this process should be initiated, based on desired urban performance quality, particularly integration, equity and sustainability.

This chapter describes the proposed regional open systems concept that will be used to protect the natural heritage and promote the ecological integrity of Cape Town, by identifying where development may not go. The concept of equitable access was the foundation of restructuring the urban structure and form through the adoption of a grid-like concept that will be applied and warped.

6.2 The Regional Open Space Systems

Historically, there has been no systematic or coherent open space system for the larger metropolitan region (Dewar & Louw, n.d.). The city's growth occurred incrementally and was formed by larger metropolitan consequences, with a focus on small scaled projects. As a result, more efforts have been expended on where urban development should go, and a minimum effort was put into where development should not go. As a consequence, green systems, rural and wilderness landscapes have been sacrificed.

The regional open space system is used as a basis to inform the metropolitan framework, in terms of where development may or may not go. Due to its complexity, such a process will largely be conceptual. This will entail identifying the different roles and their spatial implications for open spaces in cities. This was explored from four perspectives; open space as a component of nature, open space as urban space,

open space as an element of urban structure and the different functional roles open space plays in a complex urban environment.

The following section will focus on developing a concept that will guide where development may or may not go, with the aim of protecting its landscape qualities and resources.

6.2.1 Guiding Cape Town's Development

In an attempt to acknowledge the above mentioned elements of the open space system to develop a concept to guide where development may not go, Dewar and Kiepiel (2010) put forward the idea that at a regional level, both aspects, function and experience, should be used to maintain a balance between three basic landscape qualities; wilderness, rural and urban.

Figure 29: Ecological corridor concept (Source: Dewar & Kepiel, 2009).

Figure 29 demonstrates how to consider the three landscape zones diagrammatically. The aim of the concept is to reduce the footprint of settlements and thus protect their local resources, through connecting green systems (Dewar & Kiepiel, 2010).

In Cape Town, a city that has diverse and incredible natural assets, its current green and open systems have been broken and fragmented due to urban developments that have not adequately considered the impact of their projects on the natural environment.

Currently Cape Town's lacks a hierarchy that is critical to create interconnected and well-functioning systems (Dewar & Kiepiel, 2010). A hierarchy of green spaces differentiates metropolitan, sub metropolitan and emphasises the local significance of green spaces. Therefore it is a critical element in moving forward.

Figure 30: Linking the hierarchy of green spaces through green corridors (Source

At this time, the concept firstly identified a series of metropolitan areas of significance. These may include regional parks, golf courses, sport fields, complexes, open spaces and significant landscapes linked through the use of Corridors. Gaston (2010) puts forward the idea that green system Corridors are essential to provide interconnectivity, linking green spaces, and minimising the potential effects on the

fragmentation of wild life and ecosystems. These Corridors are used to connect the hierarchy of green systems, open systems and blue systems (rivers and wetlands).

Figure 30 shows diagrammatically how to create green systems. It consists of core areas, Corridors and buffer zones. The buffer zones are predominately used to protect the Corridors, and the core areas are limited to low impact activities. Sicerec (2015) argues that there are two types of Corridors, linear and stepping stones. Linear Corridors are long uninterrupted strips of vegetation and stepping stones are a series of small non connected green spaces.

Figure 31 provides the conceptual diagram of Cape Town's open space system. The purpose of the concept is to create a hierarchy of spaces and then to link them with green Corridors, while seeking to provide quality and accessibility for all people.

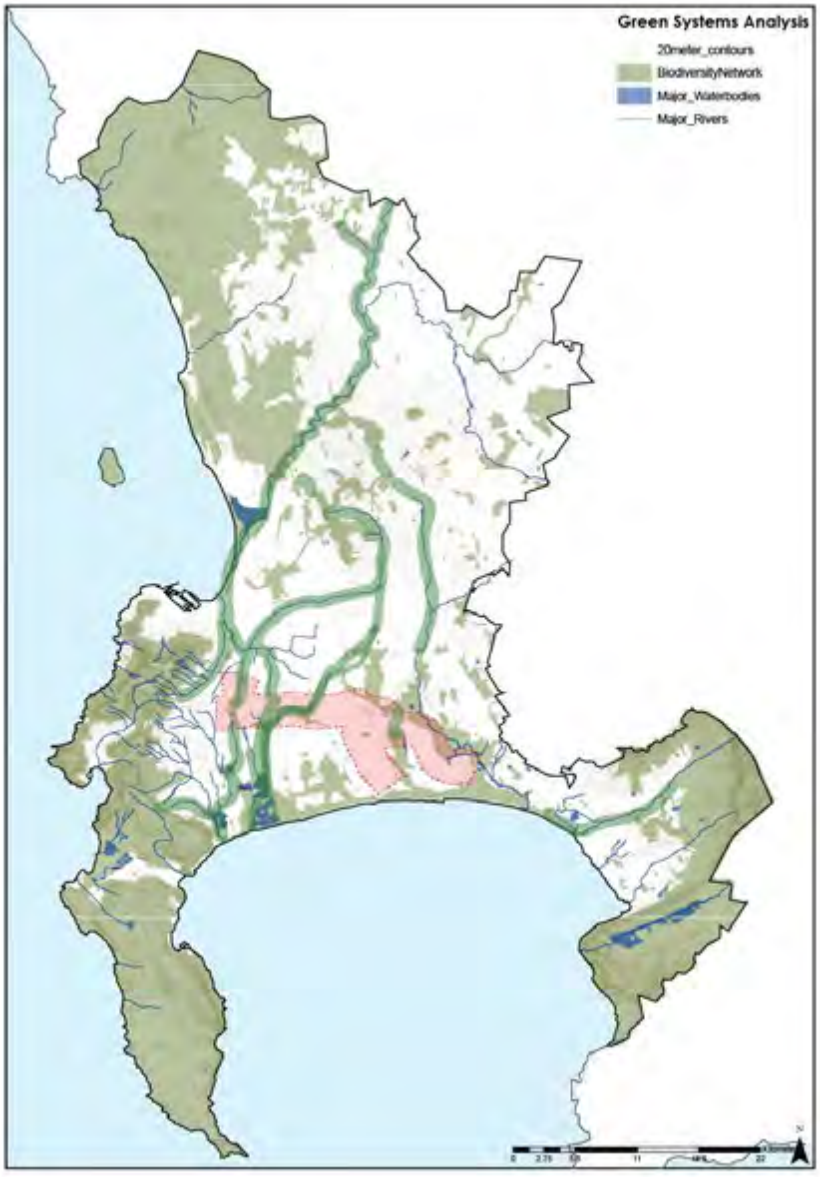


Figure 31: Green System Concept (Source: Author, GIS Technical Library, University of Cape Town))

6.3 Equitable Access

Using the regional open space and green systems concept as a guideline where development may or may not occur, the concept of equitable access focuses on how the urban environment can develop spatially into an equitable, integrated and sustainable city structure. Currently Cape Town is non-equitable and unsustainable because people do not have equal access to the natural environment and urban opportunities which exist (Dewar & Louw, n.d.). Equity does not mean that all parts of the city should be equal, but that people should have relatively easy access to broadly similar natural environments and urban opportunities such as services, facilities and spaces.

The challenge is to restructure the current city structure into a new pattern with improved equity and accessibility. This can be done by making existing opportunities more accessible, creating a new pattern of clustered activities and opportunities and creating a hierarchical system. This hierarchal system is based according to its metropolitan, sub metropolitan and local significance.

To improve accessibility, the starting point is movement on foot. This is the most equitable measurement form. If people have access via movement on foot to social facilities, services and public transportation, their quality of life can be improved.

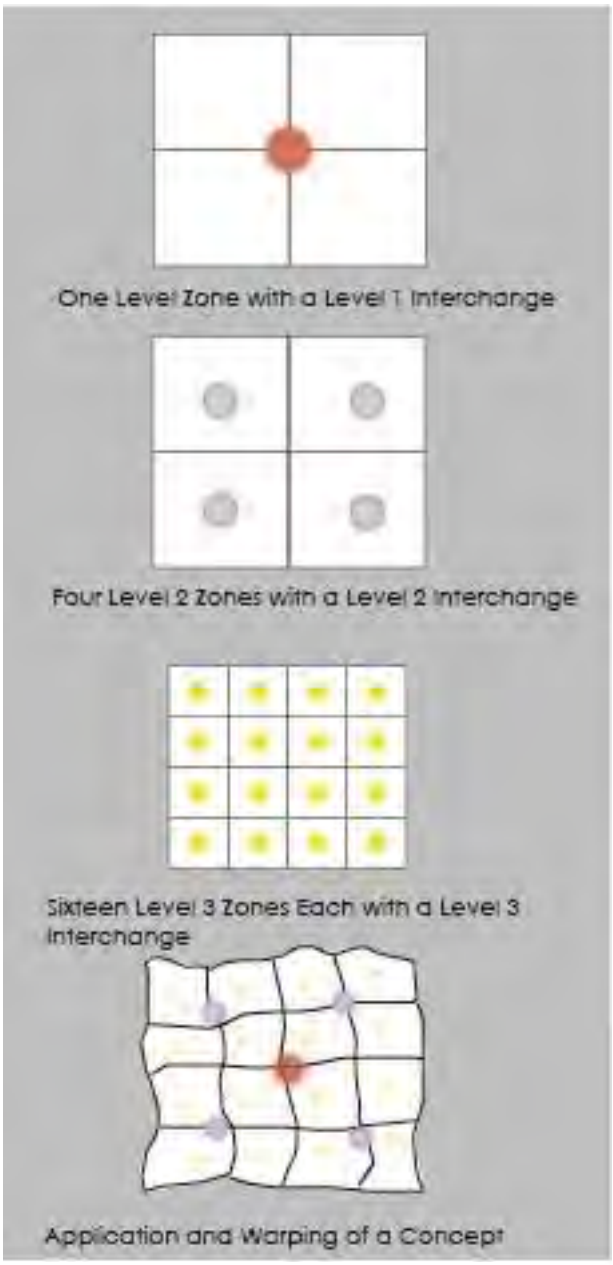


Figure 32: The grid concept (Source: Adapted from Dewar & louw, n.d)

The core concept will be explained briefly, in a coherent manner and then applied to the context of Cape Town. Figure 32, illustrates diagrammatically how the application of an adopting grid concept can create the most equitable and efficient hierarchy of spaces and movement systems (Dewar & Louw, n.d.).

Firstly, it is important to identify that there will be conflicting dynamics between the need to increase convenience and the need to maximise the use of limited public resources. The framework identified four levels of interchange, to balance the two conflicting dynamics. This was done by creating a hierarchal grid system over the region. This promoted a more neutral grid-like structure compared with the current eccentric radial spatial pattern.

Secondly, an integrated public transportation system, promotes easy access and choices for people to switch direction and modes. This requires systems that integrate different modes and it requires a new conceptualised system, to promote and activate the grid-like pattern. These transportation interchanges can have different hierarchal significance. They also promote different land uses surrounding them, such as retail, commercial and higher densities (Dewar & Louw, n.d.).

Thirdly, the importance of special places, such as heritage sites, regional parks or areas of significance, will increase its attraction for people. Cape Town needs to rethink its current approach to providing services and facilities, with the limited land that's available. Using land efficiently, through the clustering of facilities, provides an alternative. These clusters, facilitate convenience through providing a multi-purpose trip. It promotes the use of shared facilities, creating platforms for the social integration of people.

This approach uses cohesive systems that prioritise Cape Town's natural systems, to guide where development may or may not go. It creates integrated systems of nodes and linear movement elements, to provide a grid like structure to develop systematically over time, towards an integrated, sustainable and equitable city.

6.3.1 Restructuring Cape town

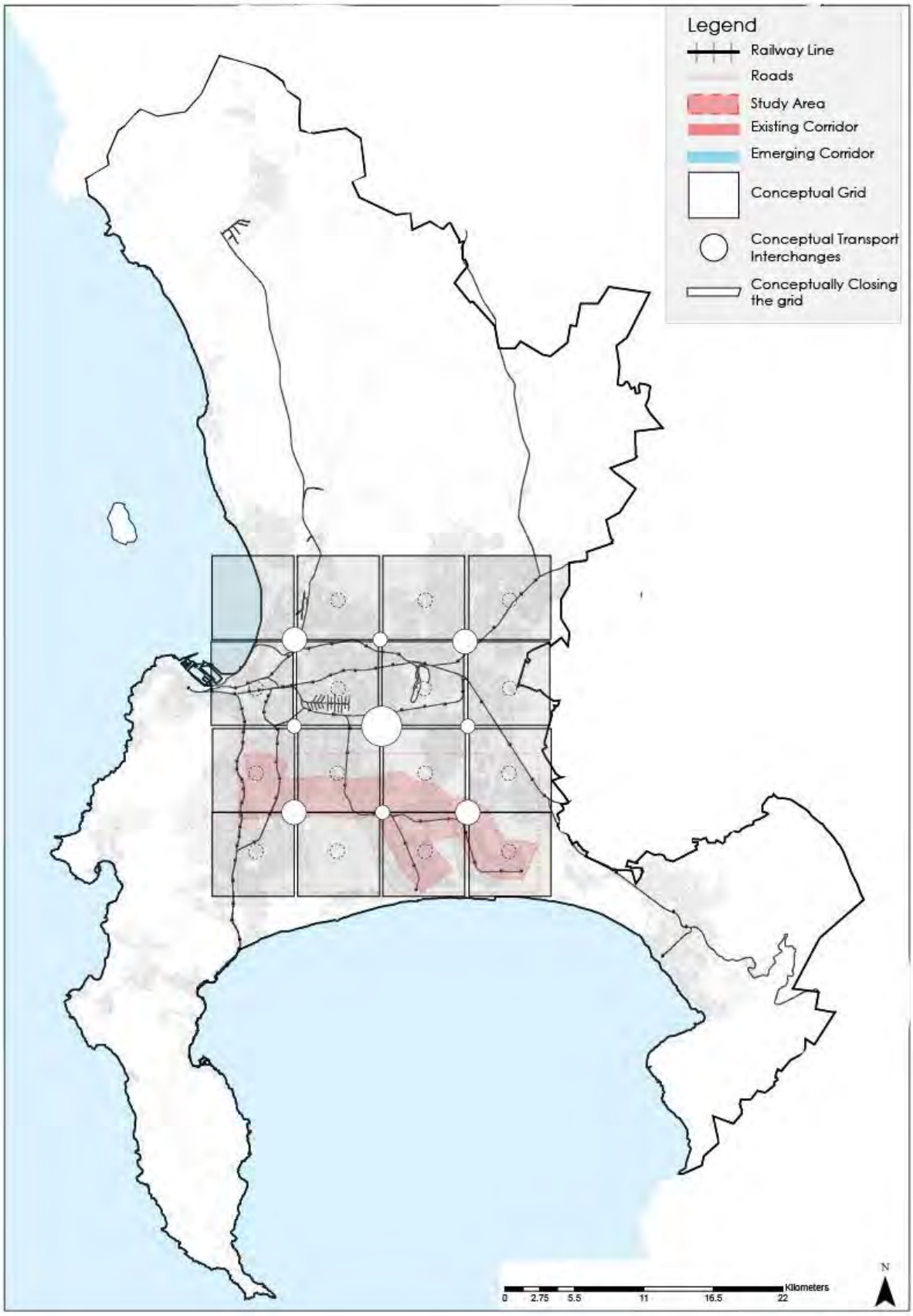
To illustrate diagrammatically how Cape Town's structure needs to be adapted, a conceptual grid of 16km by 16km was laid over the Cape Town Metropolitan area (Map 8). This will be used to inform the most equitable series of proposed interchanges. These interchanges are hierarchical, with metropolitan, sub-metropolitan and local significance.

Map 9 shows how to connect the current emerging Corridors and nodes to the proposed Corridors and nodes within the city. Map 10 shows how the concept is warped to adhere to the context and current prominent special places in the city.

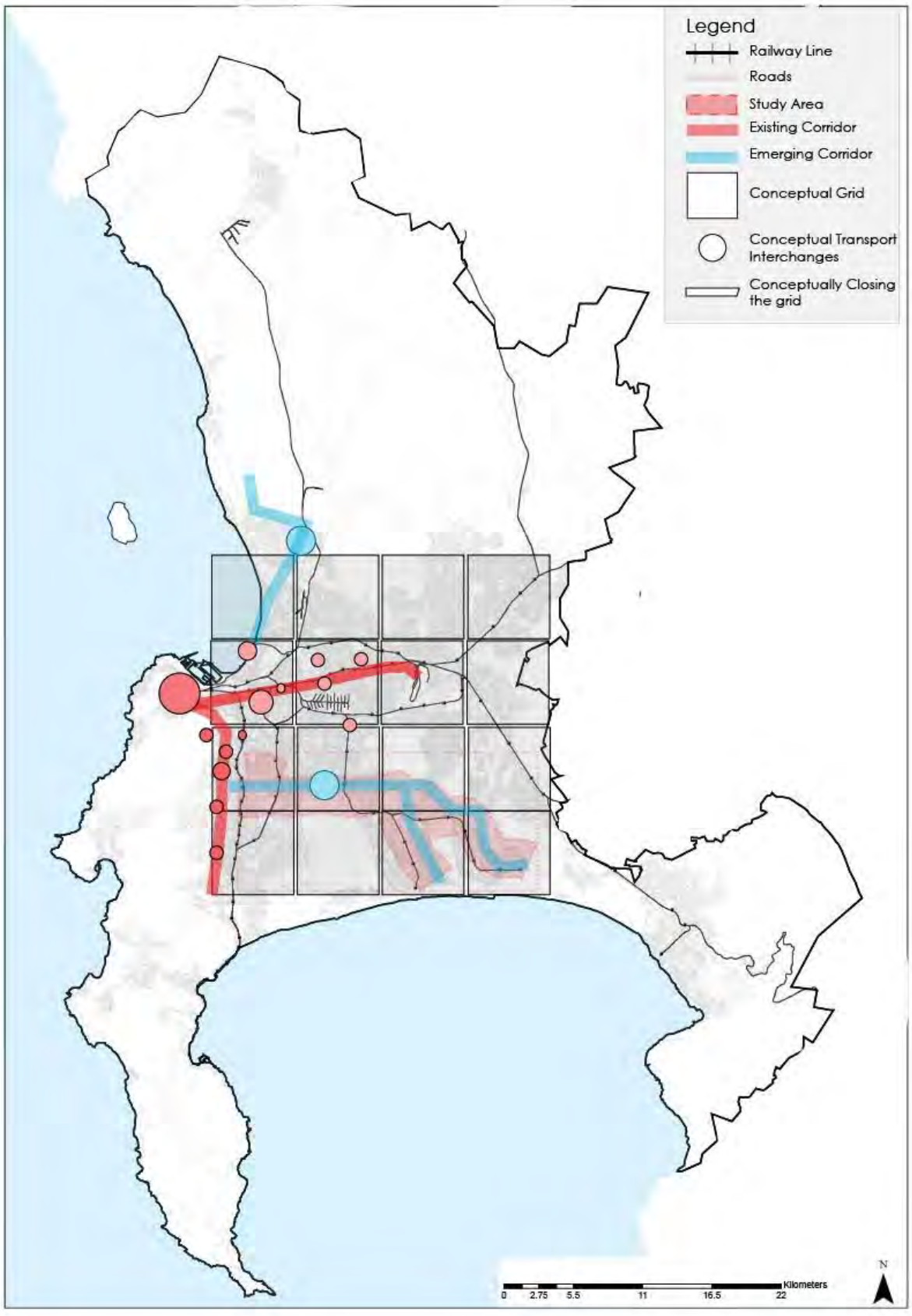
The proposed public interchanges will be supported by linear linkages, commonly referred to as activity Corridors. These activity Corridors offer a mixture of public transportation modes; land uses and facilitates ease of movement for people, services and goods.

The linking of these Corridors generates a decentralised network that is critical for improving accessibility in Cape Town. These Corridors need to be strengthened, by means of public transport routes; a mixture of land uses and by densification. An integrated public transport system is an important element to support the hierarchy of interchanges and to ensure that different modes serve different routes and that those do not militate against each other, but support one another.

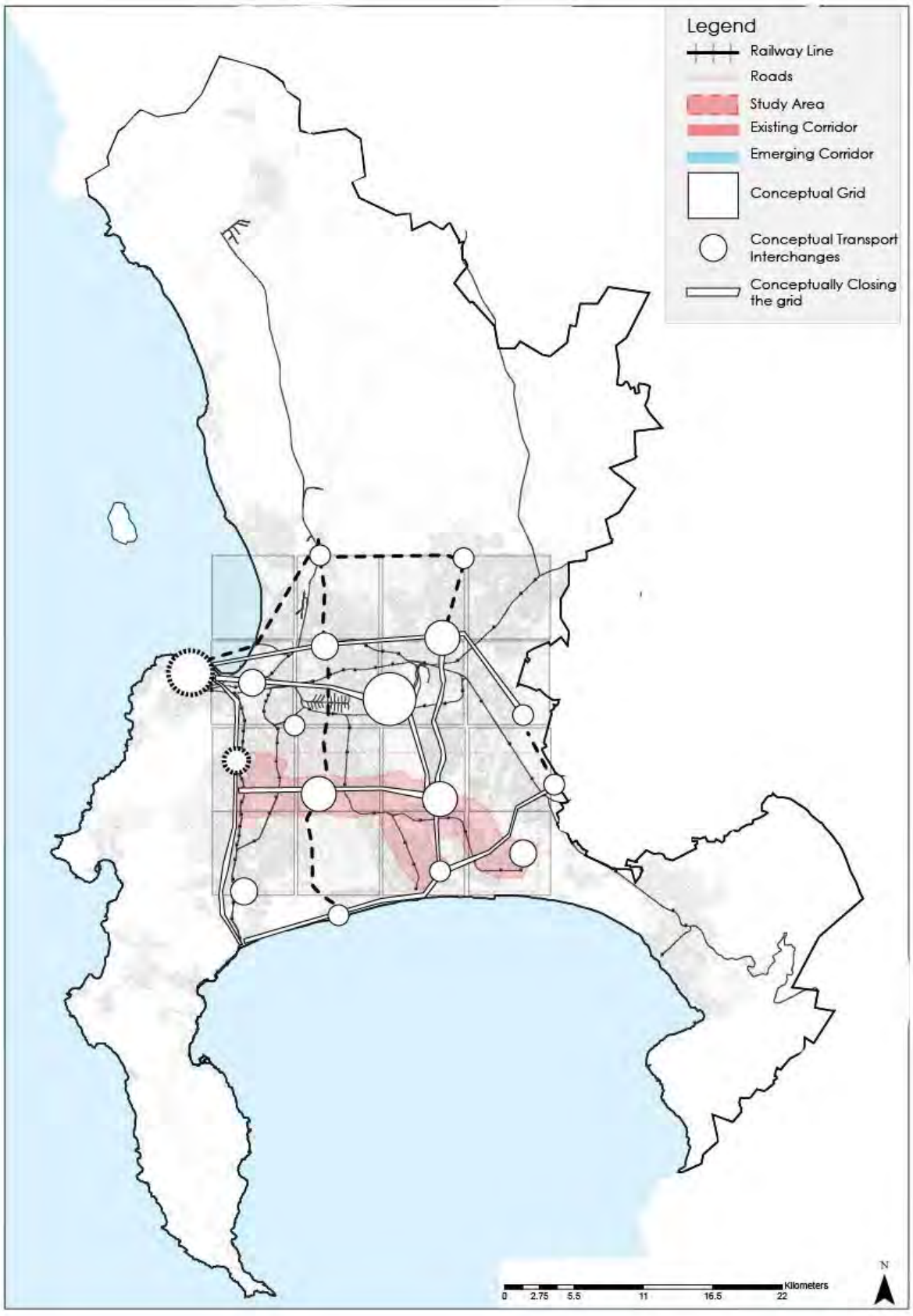
This concept aims to promote the integration of areas and the accessibility of services and socio-economic opportunities, as well as open and green spaces for all residents.



Map 8: Grid in Context (Source: Author, GIS Technical Library, University of Cape Town)



Map 9: Existing and Emerging Corridors (Source: Authors, GIS Technical Library, University of Cape Town)



Map 10: Grid warped to context (Source: Authors, GIS Technical Library, University of Cape Town

6.4 Conclusion

This chapter proposes an alternative to Cape Town's inefficient and inequitable structures. It is not a detailed plan, but a flexible framework to form smaller scale development plans. The importance of supporting the identified interchanges through linear developments is critical and therefore the Lansdowne-Wetton Corridor is an important element in an attempt to restructure the city. Therefore, it was selected as the study area, which will be described in the next chapter.

It should be noted that this approach identifies the beginning of things; an earnest attempt by the author to find an alternative and equitable option for the City of Cape Town.

CHAPTER 7: LANSDOWNE-WETTON CORRIDOR

7.1 Introduction

The study area was identified as a critical element in restructuring Cape Town towards a more equitable and sustainable city; which also promotes important east-west and north-west linkages for the region. The purpose of this corridor is not only to increase connectivity throughout the region but also to increase urban integration, accessibility and equality, by promoting the decentralisation of intensive activities and opportunities. The study area (Map 11) consists of a 1.5 kilometre wide band of development on either side of the corridor spine. The corridor spine runs through a series of suburbs, namely Lansdowne, Wetton, Langa, greater Philippi, Mitchells Plain and Khayelitsha. Throughout the chapter, it is evident that the majority of the urban poor live in the north-east section of the study area and the middle income groups lie to the west of the study area.

This chapter draws on design principles, desired sustainable development and the urban Corridor approach. Due to the size of the study area and the complexity of the problem, the chapter is divided into two main sections.

Map 11: Study area in the broader metropolitan area (Source Author, GIS Technical Library, University of Cape Town)

Firstly, the chapter analyses the biophysical area, the landscape character, built environments and design informants. This, in turn, created a composite map that informed where development may or may not go (No-go, tread lightly, suitable).

Secondly, the chapter discusses the proposed development framework that used the concept of equity (Chapter 6) and the urban Corridor approach. This consists of different elements, namely green systems, movement systems, public spaces, proposed land use, desired densities and the identification of the different precincts.

7.2 Analysis of the Site and Environs

The analysis of the site and its environment is undertaken systematically. Firstly, the biophysical analysis unpacks the natural environment in order to develop a composite map of where development may or may not go. Secondly, the landscape character and heritage of the area is analysed, as well as the design factors that may influence the framework (potential landmarks, viewpoints etc.). This, in turn, will inform the development policies. Then, an analysis of the built environment (movement systems and urban form) will reveal how it is preforming.

7.2.1 Biophysical Analysis

This section seeks to understand the natural landscape, in order to determine suitable sites for development. The analysis starts with the geology, soil and landform of the site, followed by climate and drainage patterns which determines the biodiversity. All these factors contribute to the landscape character of an area. This unfolding sequence identifies the limiting factors and opportunities within the area. These will be used to inform the development framework, which is discussed in the following section.

The table shows the screening mechanism that was used to inform the author, but it is not a definitive interpretation. The following definitions were adopted from McHarg's (1989) analysis, that uses defensible criteria relating to the natural, cultural and exiting settlement patterns, to produce constraints and informants (Dewar & Kiepiel, 2010). Below are the definitions that will be used throughout:

No-go: This restricts all urban developments, to prevent the loss or degradation of resources. They are usually environmentally sensitive areas or areas of high significance, for social and economic systems.

Tread lightly: This proposes low intensity or low impact developments. These areas are usually in environmentally sensitive areas, or in proposed buffer areas that promote the health of ecological assets.

Suitable: This proposes areas that are appropriate for development. Different design aspects should be considered for developments in different areas, to respond to their context.

Table 1: The criteria used to identify the various constraints of the biophysical elements (Source: Author; Dewar & Louw, n.d.).

Biophysical elements	Guidelines	Criteria	Indicator	Development Restrictions
Geology	Avoid any geological hazards	Stability	Fault lines	No-go
Soils	Development and foundation conditions	Stability	Unstable soils Clay > 15%	No-go
	Preserve resources	Natural resources	Building sand, clay, etc.	Tread lightly
	Preserve resources and future food security options	Productive potential	High agriculture potential	No-go
Topology	Avoid steep slopes for development	Steep slope	< 9 degrees 9-15 degrees	Suitable Tread lightly
	Avoid developing in ridges	Dominant ridges such as hill tops, watersheds		No-go
Climate	Avoid areas exposed to prevailing winds	Wind	Avoid wind exposed peaks	Suitable - design measures
			Southwest to Northeast axis	Suitable - design measures
	Avoid cold and wet slopes	Rainfall	Heavy rainfall areas	Tread lightly - design measures
	Avoid development in frost belts		Prone in river courses	No-go in river buffers/ wetland areas.
Hydrology	Hazard avoidance Protect the river and ground water quality	Wetlands		No-go
		Major rivers	30m buffer	No-go
		Minor rivers	15-30m buffer	Tread lightly
		Flood prone areas	30m buffers around rivers or water bodies on either side	No-go
		Aquifer	Sensitive/threatened	No-go
		Ground water	Poor quality	Tread lightly
Bio Diversity	Protected areas	Bio diversity areas		No-go
	Threatened ecosystems	Supported bio diversity areas		No- go
	Open space systems	MOSS(Metropolitan open space systems)	Non-negotiable priority areas	No-go
			Medium priority areas	No-go when linking the biodiversity Corridor
			Partial open space	Tread lightly
Landscape character	Significant heritage site	Heritage sites	National, provincial and local heritage sites	Tread lightly - design measures
	Design factors	Heritage significance	Gateways, landmarks, sense of place and view lines etc.	Suitable - design measures

Geology

The underlying geology comprises the Sandveld group and sedimentary rocks. The Sandveld group is a sheet of Aeolian sand, which is predominately found in the North-Western part of Philippi. This was mainly from windblown sands from the surrounding sand dunes. The sedimentary rocks that make up the bedrock which underlies most of Mitchells Plain and Khayelitsha varies between Malmesbury shale, sandstone, sand and lime-stone as seen on Map 12 (CoCT, 2012: District info).

These present no geologically significant constraints within the study area.

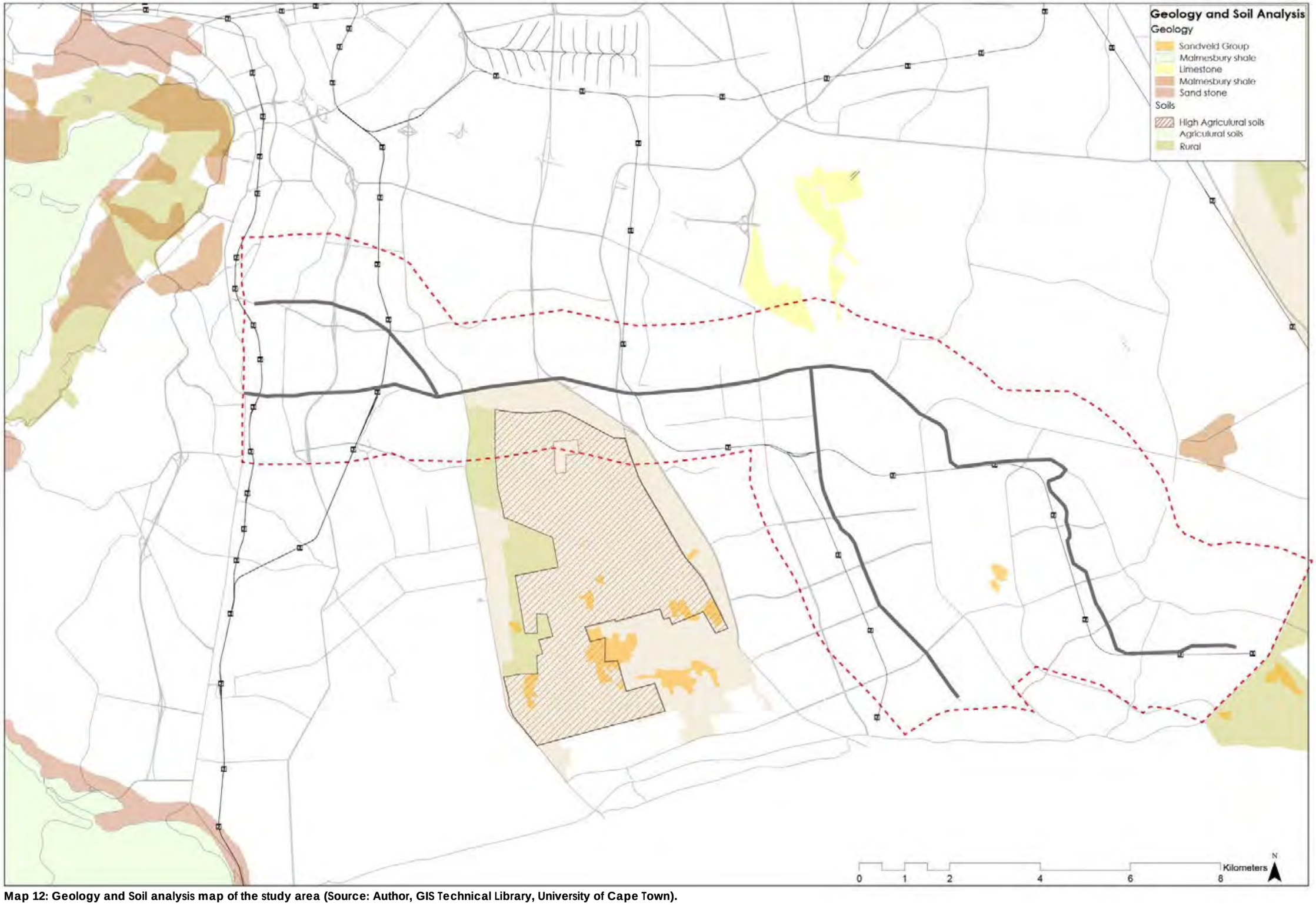
Soil

The importance of analysing the soil is to determine its value for agricultural potential and its stability for development. The soils in the study area have little variation. Most are permeable, with sandy textures and low agricultural values, except for the Philippi horticultural area and small areas around it (CoCT, 2012: District info).

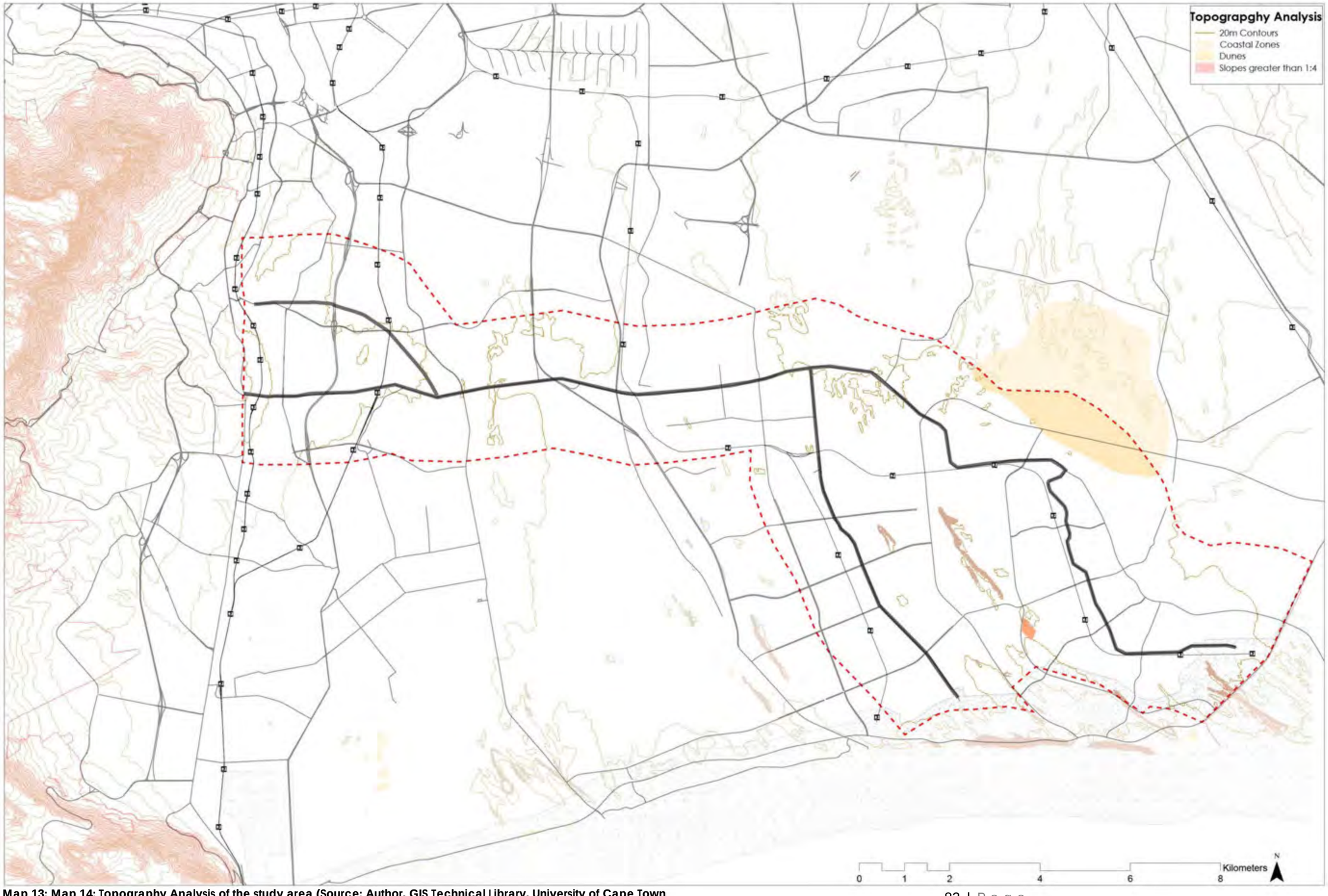
Map 12 shows that soils of medium to high agricultural significance are found in the Philippi Horticultural Area (PHA). These soils are rich in nutrients, are fertile and have a water-holding capacity; they in turn produce a good base for agriculture. The soils are an important factor for the future of the Corridor and the protection thereof is essential. Agricultural land in urban areas is increasingly important because of growing food security concerns. The northeast segment of the PHA has been contaminated because of polluted ground water and storm water run-off and is therefore defined as a no-go area for development.

Topography

Flat plains cover most of the study area (Map 13) and in many instances the area has an inability to drain water, resulting in areas flooding for weeks on end. It has been adapted significantly over the years as rapid urban development has led to the obliteration of the sand dunes and canalization of flood prone areas (CoCT, 2012: District info). Small scale engineering solutions for flooding and the removal of sand dunes has resulted in continuous constraints for the larger study area. Understanding the study area in the broader context is of the utmost importance in order to prevent further problems within the area. Buffers around flood prone areas are critical and sustainable drainage solutions should be considered.



Map 12: Geology and Soil analysis map of the study area (Source: Author, GIS Technical Library, University of Cape Town).



Map 13: Map 14: Topography Analysis of the study area (Source: Author, GIS Technical Library, University of Cape Town

Climate

The climate can be described as Mediterranean with warm, dry summers and wet, cool winters. Average maximum temperature ranges between 18°C to 32°C while the minimum temperature ranges between 6°C to 14°C. The area is very exposed to the wind, since it is very flat. The prevailing winds are the northwest wind in the winter and the southerly/south easterly wind in summer (The 'Cape Doctor'). The winter winds frequently bring rain with high levels of rainfall in July/August. The annual rainfall can vary between 400mm and 600mm.

The study area has issues of drainage. Flooding occurs mainly in the winter months, especially in the Mitchells Plain region. The summer wind is most problematic because of windblown sand, which is uncomfortable for people in the area.

Hydrology

The study area contains large water bodies, river tributaries and wetlands (Map 14). The Western side of the study area contains a number of tributaries from the Salt River that flows northwards into Table Bay. The southward flowing rivers are the Little and Big Lotus River, which have been canalised in the course of development and urbanisation (River Health Programme, 2005). The eastern side of the study area has a major river system, the Kuils River that falls under the small section of the eastern boundary of Khayelitsha. The river is surrounded by a series of small interconnected wetlands. The canalisation of rivers leads to habitat loss and reduces the rivers' eco-systemic functioning, and is therefore not recommended. Other pressures on the river systems have been urban and rural run-off, effluent release, specifically from informal settlements, and detrimental horticultural activities (CoCT, 2012: District info).

Historically, the area would remain flooded for weeks, since there was no natural outlet. Since then, artificial drainage systems and gentle gradients have been created to avoid flooding throughout the area. It is critical to identify flood prone areas, wetlands and river buffers. This is important for two reasons. Firstly, interventions and mitigation measures need to be taken to allow sustainable development within the study area. These interventions require the engineering of drainage systems by studying the whole area, and the grading of land to ensure a direct runoff into designated drainage routes. Secondly, the protection of the riparian ecosystem is important: 30m buffers need to be placed around wetlands, water bodies and river tributaries. This will not only protect the ecosystems but mitigate the damage caused by flash floods.

The managing of storm water is critical for maintaining healthy open space systems. Currently the storm water systems are under threat because of the high levels of pollution which affect the health of the people and the natural systems of the area. The point is that storm water management has never been considered systematically, and further analysis is recommended.

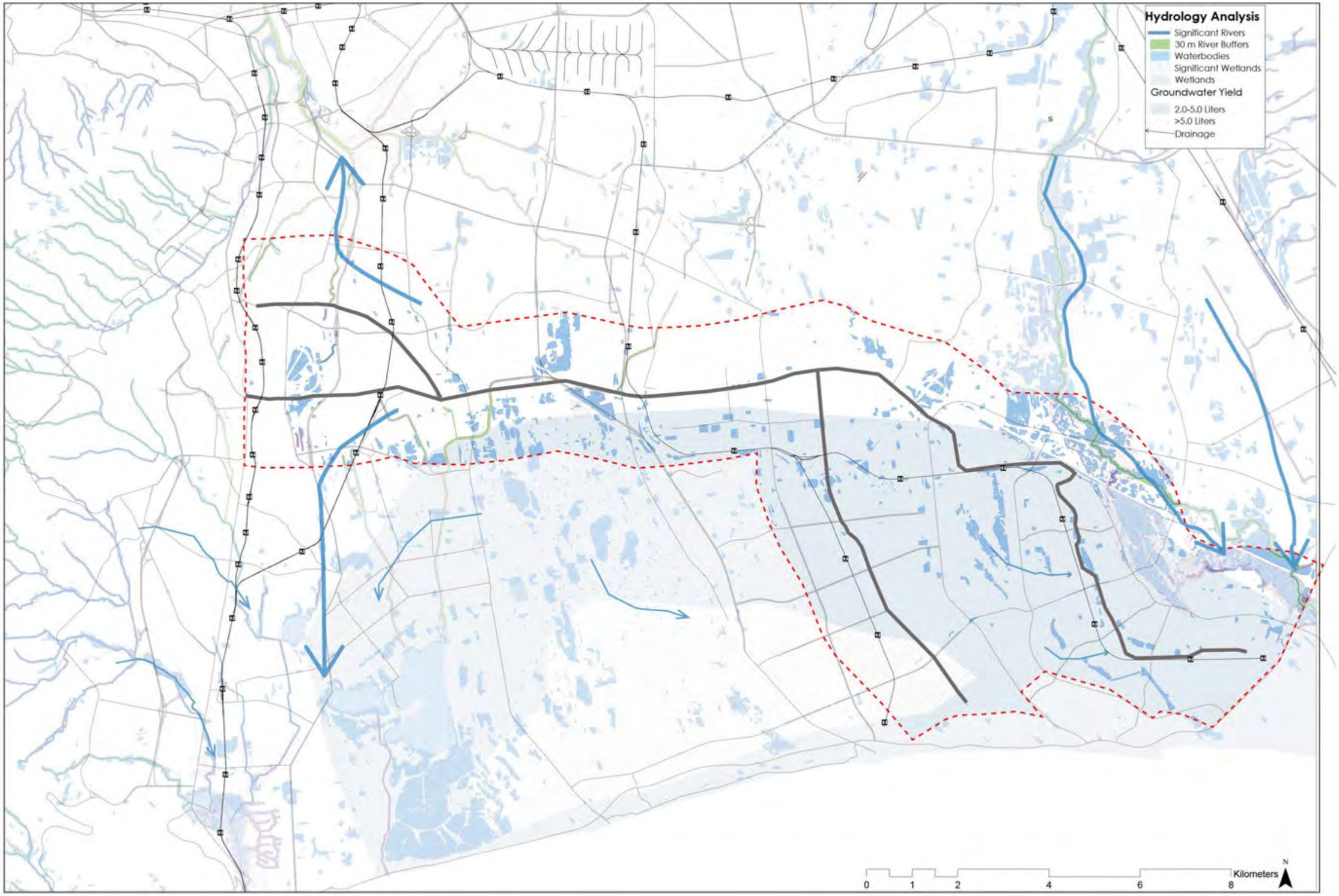
The area is very wet and has many sensitive zones. Unfortunately the development that has largely occurred within the area has been project specific and did not take

the larger area into consideration. This represents a missed opportunity, as the area could have had a different role within the larger metropolitan region. However it is imperative to start finding innovative and sustainable solutions within the area.

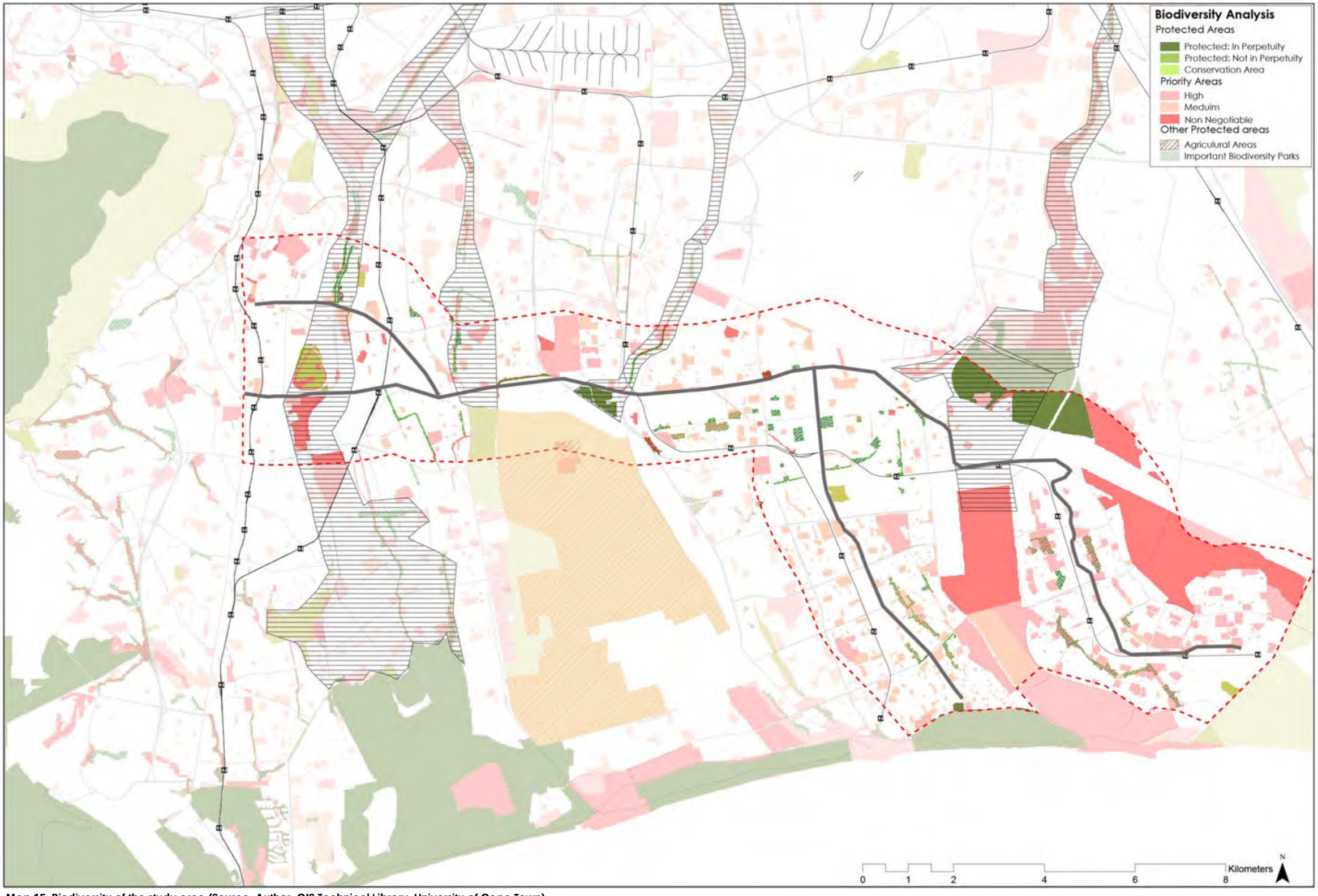
Biodiversity

A number of biodiversity Corridors have been identified within the study area. These Corridors are adopted from the metropolitan scale and are essential to ensure the ecological integrity of the area and into the larger metropolitan region. It is important to link these pockets of biodiversity, by distinguishing areas of highest priority and creating linkages through proposed riparian buffers and open space systems. Creating these Corridors and preventing urban development contributes to creating the coast to coast green belt.

The study area falls within a unique and significant biodiversity hotspot. It is surrounded by the biodiversity prioritisation areas, namely the Wolfgat-Macassar node, the Kuils River wetlands, the Swartklip site, and the False Bay Coastal Corridor that is of biodiversity importance. The remaining natural areas as seen in Map 15 have medium prioritization that can be used to link to more important biodiversity areas.



Map 14: The hydrology systems of the study area (Source: Author, GIS Technical Library, University of Cape Town)



Map 15: Biodiversity of the study area (Source: Author, GIS Technical Library, University of Cape Town)

7.2.2 The Landscape Character

The landscape character was defined as a flat plain that was rich in water bodies, sand dunes, unique biodiversity and many different animal species. Conversely as the area developed the landscape was transformed into a sterile space that did not acknowledge the importance of its landscape character. Dunes were obliterated; water bodies and flood prone areas became site specific engineering projects and most of its unique characteristics were destroyed, or those that remained were unmaintained. Previously, the wind prone area had avenues of gum trees to act as wind barricades, of which the majority was destroyed. The consistency of sterile, unkempt, unsafe and vandalised spaces is widespread throughout the area; this detracts from the potential of the landscape character.

The site has the potential to reintroduce place making principles through reintroducing the original landscape character. This can be done through the rehabilitation of natural biodiversity and water bodies. The use of barricades of trees can assist in wind prone areas

Currently, the landscape does not do justice to the cultural practices that occur within the area. By re-introducing place making principles into the area, it can contribute specific spaces, where cultural practices are found within the area such as initiation sites, herb gardens for traditional healers and grazing land for animals.

7.2.3 Design Informants

The composite design informants Map 16 includes the view lines and the following landmarks:

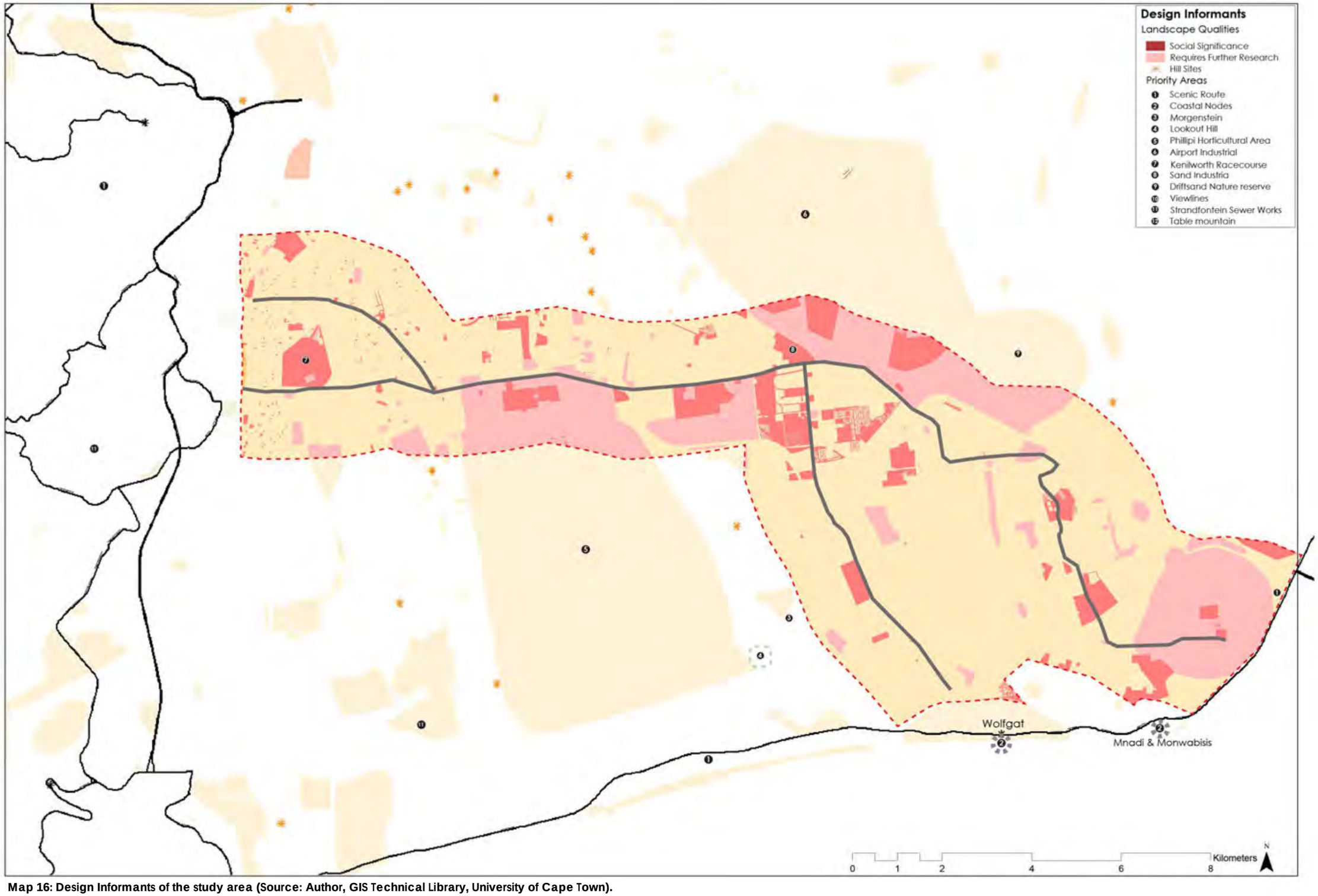
1. The Massacar dunes are defined as parabolic dunes which are the highest in the Cape Flats and one of the few places that offer exceptional views of the surrounding mountains.
2. A few destination places include the Mnandi & Monwabisi coastal nodes, the Wolfgat and Driftsands Nature Reserves, and the Khayelitsha Wetlands Park. The Wolfgat Nature Reserve is 60m above sea level, has fossil remains of animals (extinct animals such as the brown hyena) and fossil dens that date back 45000 years, but most have collapsed due to vandalism.
3. The Khayelitsha cemetery is culturally very significant, due to the cultural practice of burying rather than cremating the dead. It is important to find innovative alternatives for this.

7.2.4 Composite Constraints and Informants

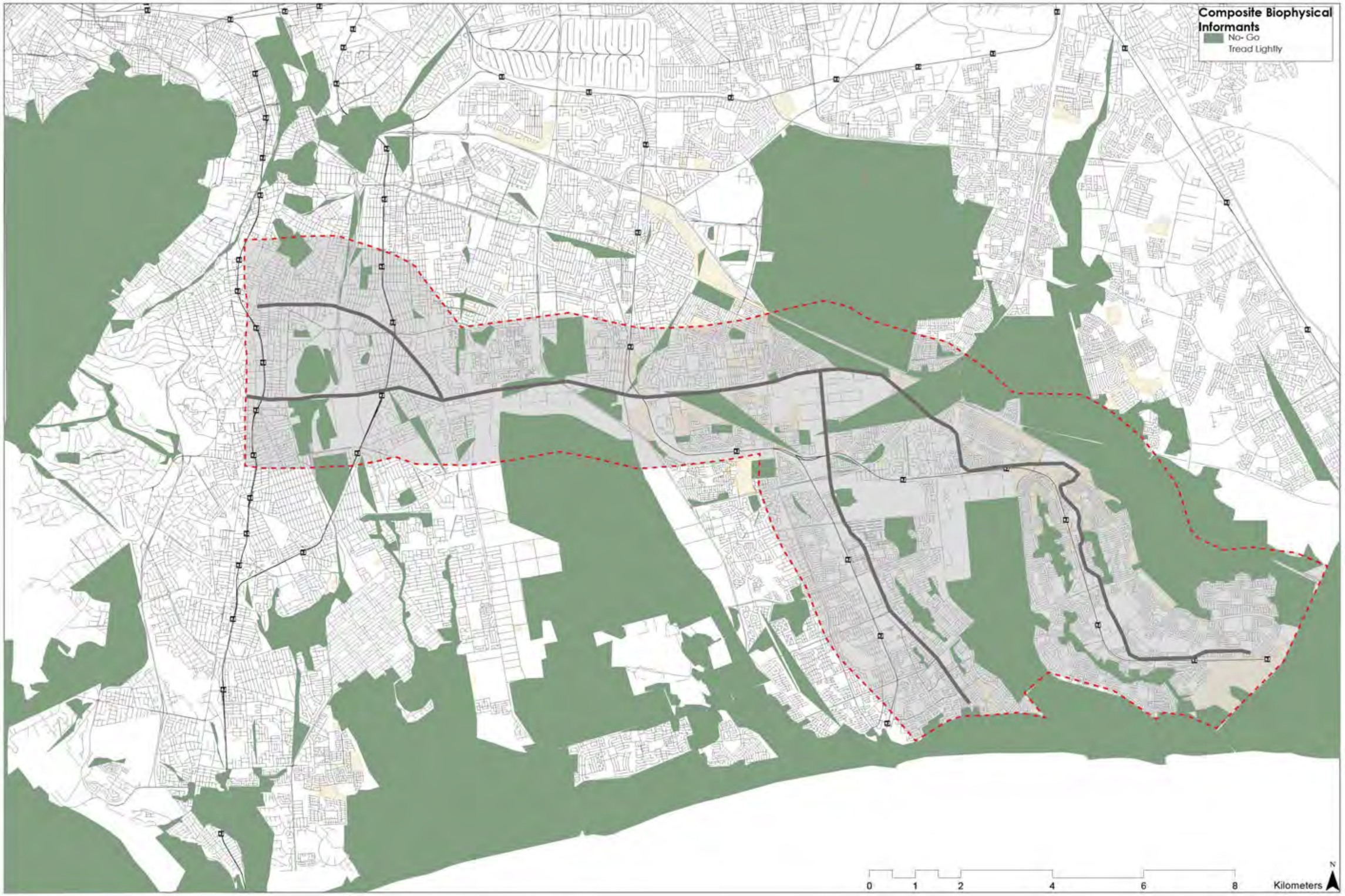
Map 18 is a composite constraint and informant map that shows where the development may or may not go. It identifies three different development classifications; no-go areas, tread lightly areas and areas that can be developed.

The 'no-go' areas have been identified under the constraints in the analysis. They consist mainly of critical biodiversity areas, agricultural land, wetlands and flood prone areas. 'Tread lightly' areas include the proposed 30m buffers around the river systems,

wetlands and areas of critical biodiversity. It also includes the sand dunes soils and areas of cultural and social significance.



Map 16: Design Informants of the study area (Source: Author, GIS Technical Library, University of Cape Town).



Map 17: The Composite constraints and informants of the study area (Source: Author, GIS Technical Library, University of Cape Town

7.2.5 Built Environment Analysis

The built environment analysis focuses on the different elements of public structure; the movement systems, public facilities, public space and the space economy of the study area.

Movement Systems

The analysis considers all types of movement including vehicular movement, public transportation modes and Non-motorised Transport (NMT). The analysis reveals three main movement issues within the study area.

Firstly, is the heavily car based movement system. This places increasing pressure on households to purchase a car, even though they may not be able to afford one. The promotion of car based movement systems results in increasing traffic jams and an increased tendency towards being in accidents, increasing greenhouse gas emissions and increasing the proportion of household budgets being spent on transport (Dewar & Todeschini, 2016).

Secondly, there is an over emphasis on limited access routes, which has contributed towards the lack of hierarchy within the study area. These limited access routes predominantly favour car mobility and do not integrate within its surroundings. Therefore, they usually cut up the urban fabric and act as barriers, dividing areas. This results in isolation of the neighbourhood areas and decreasing eligibility and permeability of the study area (MAP 18)

Thirdly, there is a lack of integration between public transport modes. The area is supported by rail, MyCiti (BRT buses), buses, mini-bus taxis and limited NMT routes.

However, the train, the bus system and the BRT system are competing against each other, all trying to meet the needs of long haul commuters, instead of trying to connect into the gap in the rail service and to complement the other mobility systems. The BRT current and proposed roll out system has almost completely ignored the rail network and has established its routes alongside the rail system. This has resulted in a malfunctioning public transportation system.

The different modes of public transport are discussed in more detail below.

Rail

The railway line is the backbone of public transport in the study areas. However, the Mitchells Plain/Khayelitsha lines are not directly connected to the southern link or to the Bellville CBD, the northern link. This results in inefficient east west movement, forcing residents to take major detours or to make use of other potentially more expensive transportation modes.

Railway Stations

The efficiency of the rail system is largely dependent on the distances between its stations. The ideal distances between stations should be 1, 5 km, which is true for most stations on the southern link, which is better serviced. The Mitchells Plain/Khayelitsha

link stations are between 2-2,5km apart. This has resulted in high activity at certain stations, placing pressure on the capacity of the system. Railway lines or stations that reach maximum capacity often result in safety issues and they have become prime spots for petty crime such as pickpocketing (Metrorail, 2012).

According to Metrorail statistics the railway stations within the study area with the highest number of passengers were Philippi station and Nolungile, followed by Mitchells Plain, Nonqubela and Khayelitsha (Metrorail, 2012).

BUS

The conventional passenger buses (Golden Arrow and Sibanye PTY), have been running in Cape Town since 1861 and are privately owned (GABS, 2016). They mainly serve the city, with direct origin destinations, meaning they do longer hauls and have less transfer stations.

BRT

In 2010 the MyCiti service was launched providing dedicated bus lanes that aimed to cut traveling time in peak hours and reduce traffic. The network had priority at road intersections and commenced in the inner city and expanded along the R27 towards Table View and Melkbos in Strand. In 2013/2014 it expanded to Hout Bay, Dunoon and other areas along the Phase 1a area. Early in 2014 it launched an express service between Khayelitsha, Mitchells Plain and the CBD. The second phase aims to link in the CBD and the Lansdowne–Wetton Corridor and the Blue Downs link, as seen in Figure 33. The CoCT 2030 integrated transport plan, aims to encourage interaction between the public transportation modes but currently, the MyCiti rollout phases are following current vehicular modes that are not contributing toward integration, but rather towards the substitution of current public transportation modes.

Figure 33: MyCiti Roll out Phase 2 (Source: MyCiti, 2012)

Mini-bus Taxis

The role of mini-bus taxis in Cape Town dramatically increased over the years due to limited public transport opportunities and connections. The BEPP (2015) report stated that it was the most popular public transport route, followed by trains and buses. It is not recognised within the current integrated transport strategy but the taxis operate on 565 different routes (BEPP, 2015). These mini-bus taxis usually travel between economic nodes and other forms of public transportation nodes. There has been a lot of adversity between the mini-bus taxis and the implementation of the MyCiti, routes.

NMT

This predominantly car-based movement system features excessively limited access routes. The service in the study area is severely limited by NMT. The condition of the roads within the study areas is poor and unsafe.

Map 18: The Movement system analysis of the area (Source: Author, GIS Technical Library, University of Cape Town

Public Facilities

The analysis of public facilities for the study area includes discussion of the current health and education facilities provided, as well as social and service facilities.

Currently, the study area is short on most public facilities and those that exist are not of the best quality or are over capacitated. The most important concern relating to public facilities is their accessibility. Accessibility is defined as the travel time and distance people have to undertake in order to reach a facility, it also refers to capacity (Behrens & Watson, 1996).

Healthcare Facilities

The first point of access to health care facilities is clinics and in the positively performing environments, people can access them on foot (1.5km radius) (Behrens & Watson, 1996). The Southeast portion of the study area performs badly whereas the Western side is better serviced.

Education

Education is one of the most important investments a government can make for people and for a city's future (Globalpartnership.org, 2016). Pre-primary schools perform positively within a 500m radius, Primary schools in a 1,5km radius and Secondary Schools in a 2, 5 km radius.

Using these criteria the western side of the site is served relatively well but there is a sever shortfall of schools in general on the southeast side. This section of the study area needs special attention because it is the area most affected by a lack of well-trained teachers, inadequate learning materials and unsuitable education infrastructure (Globalpartnership.org, 2016). The lack of quality education has resulted in many students having to commute long distances to attend good quality schools in other suburbs, which in turn entrenches economic polarisation, because of financial costs and time. (See Map 19)

The study area as a whole is a negatively performing environment with low quality and severe shortages within the education services provided.

Social and Service Facilities

The social facilities analysis includes community halls, civic centres, libraries and places of worship. Whereas the service facilities include police stations and fire stations. The distribution of these facilities is badly skewed, with a large portion of the study area being under supplied.

The study area's south eastern portion, Mitchells plain and Khayelitsha is poorly serviced with civic centres, community centres and libraries. Places of worship are quite prominent, throughout the study area, except for the south-eastern part of the study area. Services in this area may be provided informally or may make use of open spaces, for initiation sites and ceremonies outdoors.

The study area is not adequately serviced in terms of police stations. The area suffers from high levels of crime: Mitchells Plain has been identified as an area with high crime rates. Khayelitsha has the highest murder rates (Crimestatssa.com, 2016). It is vital to take this into consideration, when designing the framework as safety is an important factor, forming the design.

7.2.6 Public Spaces

There is no systematic or coherent system of public spaces in this area because most of the growth has been incremental and random, unaffected by the larger region. The site as a whole, has low quality public spaces and almost no hierarchal structure. Therefore, the complexity of the problem was unpacked systematically through various steps.

Firstly, analysing public spaces as a component of nature was done in great detail in the biophysical analysis; which reflected that the natural systems were fragmented and offered very little ecological integrity throughout.

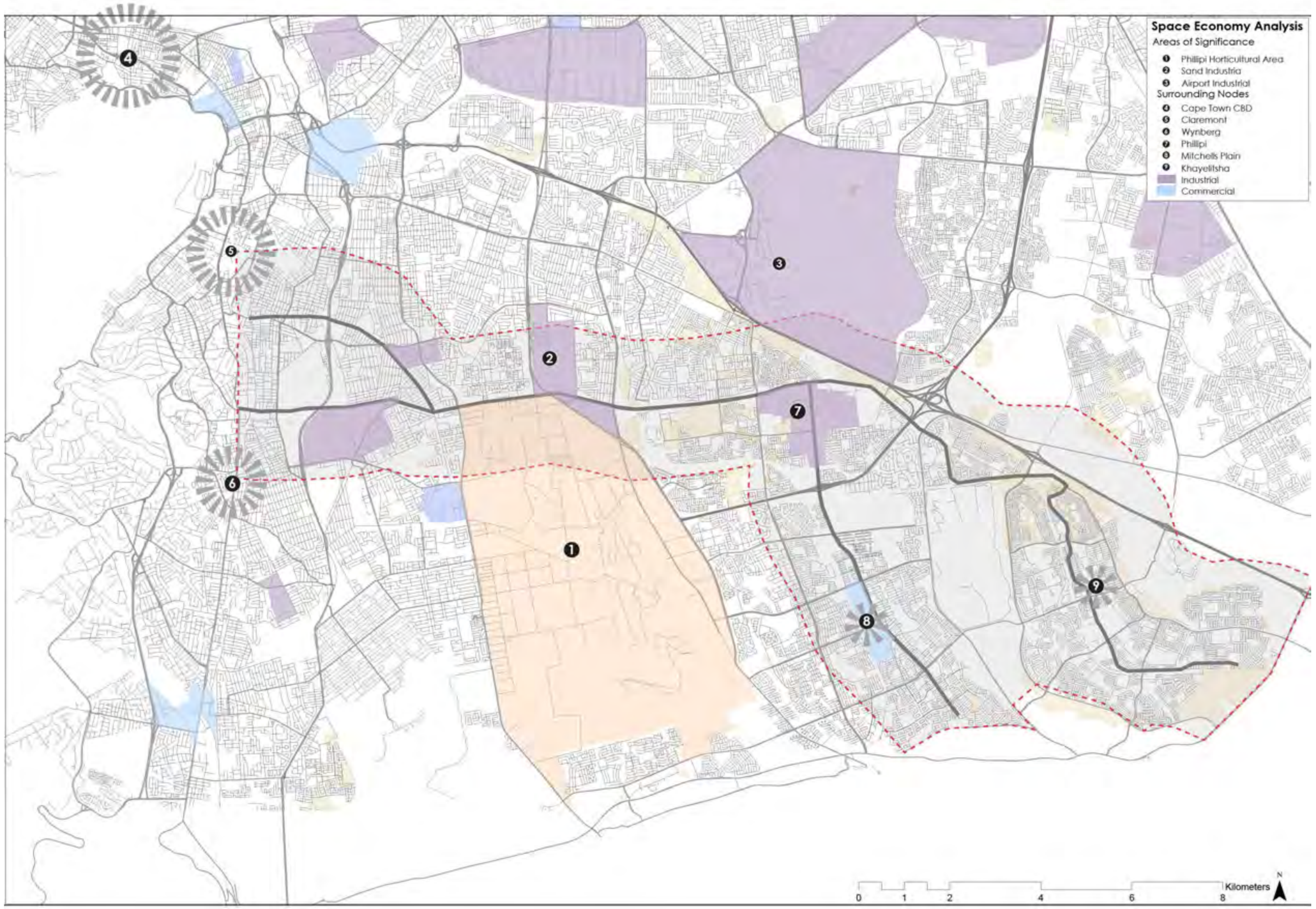
Secondly, the importance of the concept of place (genius loci), where the area has the potential to reintroduce place making principles, but is currently performing negatively, with a sterile and unsafe environment. Most public spaces are degraded and of bad quality, with strong correlation to the prevalence of crime happening in such areas (VPUU).

Thirdly, identifying the productive and economic spaces within the site consists of an analysis of urban agriculture opportunities and spaces of trade, with low overhead costs. The Philippi horticultural area is of metropolitan significance. However, it is currently underutilised, but has a lot of potential. There are also limited public trading areas, of which most are found along public transportation interchanges.

Fourthly, are urban public spaces, which will be properly analysed on a smaller scale.

Lastly, is the analysis of active and passive recreational spaces. Passive recreational spaces are where individuals, families and communities can escape the intensity of urban areas. These are areas where they can relax, walk and socialise (regional, district, community and pocket parks). Active relational spaces usually include sport, such as sports stadiums, complexes and sports fields. The study area is underserved in terms of both passive and active recreational areas, with many being degraded, is of low quality and is unsafe, particularly in the southeast region.

Map 19: The Public Institutional Analysis of the area (Source: Author, GIS Technical Library, University of Cape Town



Map 20 : The Economic analysis of the study area (Source: Author, GIS Technical Library, University of Cape Town)

7.2.7 Space Economy

The study area is notably lacking in economic activity, with very small areas of commercial and industrial activity. The closest economic nodes are Claremont, Wynberg and Airport Industrial, but they are highly inaccessible. The preconditions and investment for the study area is historically poor because the area is dislocated from economic drivers and has large risks associated with it, such as safety and security (SDF, 2012). Public investment is key; a major problem underpinning inequalities in spatial investment patterns has been the lack of investor confidence in areas such as this (Dewar & Louw, n.d.). Therefore, it is necessary to lead the way with public investment, in order to create economic opportunities within the area.

In the low-income areas, where manufacturing and retail activities occur, spaces of exchange become very important. However, the current structures do not support vibrant small scale economic opportunities. (See Map 20).

7.2.8 Problem Statement

The analysis revealed that, historically, the Lansdowne-Wetton Corridor is facing severe challenges. It is a degraded environment, because it has given very little consideration to its natural systems. Heavily car based movement systems are riddled with limited access routes and a fragmented public transportation system. It is a poorly performing urban environment, with a huge need for service facilities in the southeast portion of the region. Public spaces have no hierarchy or structure and are scattered throughout with low quality and unsafe spaces.

However, the purpose of the Lansdowne/Wetton urban Corridor framework is to increase urban integration, equity and accessibility. The urban Corridor approaches will attempt to bring discernible improvement to the lives of those who live there.

The next section will unpack this in detail.

7.3 Development Framework

This section of the chapter describes the development framework for the study area and the identification of the precinct site for further design attention. The analysis and design principles described previously were used to form the application of the overall framework, before unpacking the different layers

This section will firstly, give a brief overview of the development concept and then will unpack the different layers that make it up.

7.3.1 The Purpose

The purpose of this framework is to promote urban justice in the city of Cape Town by restructuring and intensifying the Lansdowne-Wetton Corridor. This draws on the desired performance qualities that are incorporated into the framework. This includes the meta-qualities sustainability and equity as well as the efficiency, integration, balance, choices, safety and security, urbanity, efficiency and sense of place.

Drawing on the urban Corridor approach and taking into account the constraints and information about the study area, the following spatially based ideas shape the framework. The structuring elements of the framework will be explained in detail later in the section.

i. Preserving the Natural Environment

The author is using the natural environment to inform where development may not go while introducing a hierarchy of green spaces and the linking of green corridors throughout the area; in order to promote its ecological integrity and introduce new parks, sports complex and urban agricultural opportunities.

ii. Promoting Equity of Access

The grid was identified as a structural concept to broadly promote equitable access that is central to making equitable, sustainable and integrated cities and towns (Dewar & Louw, n.d.). Equity does not mean all areas should be the same, but that all people should have relatively easy access to broadly the same opportunities, facilities, services, green spaces and public transportation (Pistorius, 2002).

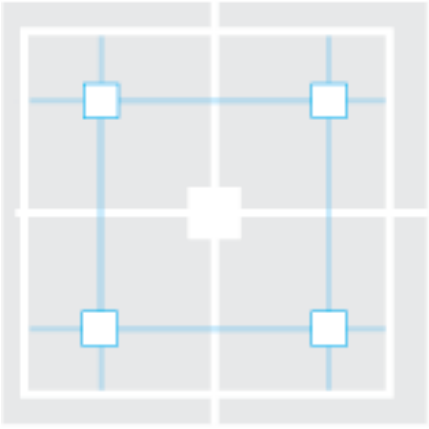


Figure 34 Points of higher accessibility (Source: Author).

To promote equitable access of urban opportunities and green spaces to all the residents, the grid pattern will be used as a structural device, to create a clear and a highly ordered system. It is an equitable approach because the lines that make up the grid are movement routes, which render the system multi–directional. They are not influenced politically or socially, in terms creating a higher order system according to accessibility. This system can accommodate a wide range of activities and demands

within the grid. The grid concept is a flexible mechanism and can change form and scale to suit the landscape on which it is imposed (Dewar & Louw, n.d.).

The superblocks (Fig 35) are the basic building blocks for this scale. These superblocks are based on a 300m by 300m block. They allow for variations of 20m and 10m roadways and these superblocks are made up of smaller 60 by 60m blocks. These superblocks that create a grid network, allow for a hierarchical cluster of activities throughout the site i.e. Using the land efficiently and effectively.

iii. Integrated Public Transportation System

Encouraging an integrated public transportation system, where each form of transport plays the role it is best suited to do, will require rethinking the current system and will include the downgrading of certain limited access routes. The extension of railway lines, added stations and increased densities along transportation routes. This will be discussed in detail later in this section.

However, a well-functioning integrated public transportation system will improve accessibility and mobility for the residents. It can also facilitate the integration of the study area into the larger metropolitan area and break past fragmented and segregated structures.

iv. Reintroduce Place Making Principles

The reintroduction of place making principles within the area is important because the analysis revealed that there is a lack of the feeling of a 'place' within the study area. This is attributed to many issues namely; severe lack of quality urban and green spaces. Given the size of the study area, selected areas will be identified for further detailed design, such as the precinct in Chapter 8.

7.3.2 Urban Corridor Concept

The purpose of the framework is manifested through the urban Corridor approach, which was thoroughly discussed in Chapter 5. "It is an approach that seeks to promote intensity, stimulates a mix of activities, promotes small business, and encourages public transportation and NMT movement, while pursuing urban integration and the improvement of equity and convenience" (Dewar, 2011: 185). The promotion of Corridor development cannot be seen as a panacea for a wide range of development problems, but should rather focus on the process or a way of thinking (Dewar & Todeschini, 2004).

The advantage of making Corridor development a focus of planning attention is that it promotes the purpose of the framework and includes increased levels of accessibility, equity of access, linear developments, and a wide range of activities and promotes integration of the site and surrounding structures.

As seen in Figure 36, the urban Corridor represents a broad band of 1, 5 kilometres of mixed use activities that are intensified along the Corridor spine (Le Grange et al., 2000). Although the Corridor is not solely concerned with transportation, different public transportation modes occur along it. Relatively high residential densities are a prerequisite for achieving adequate thresholds and housing infill becomes an important part of Corridor planning. These high densities are a precondition to support public transport, retail and commercial activities and markets; ideally the higher densities should be around the primary routes.

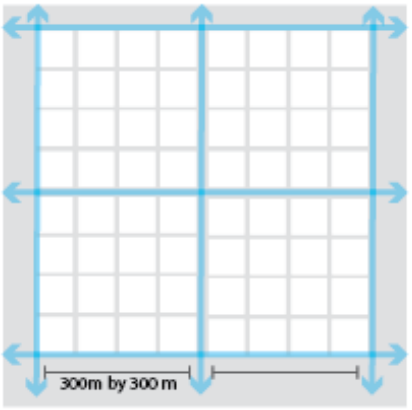


Figure 35: Conceptual grid and makeup of the superblock (Source: Author).

Figure 36 shows that accessibility along the corridor is not equal. The public is informed by the interconnections of the movement systems and the activities that cluster around the points of access. Corridors initially develop as 'beads on a string', which tend to grow towards each other over time (Dewar, 2011).

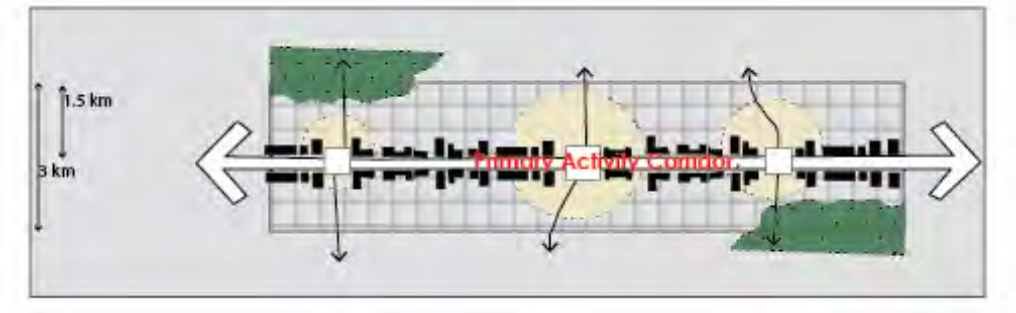


Figure 36: The corridor concept (Source: Botha, 2015).

The ultimate purpose of the study is to improve the lives of the local and neighbouring residents through an active and constant search for opportunities within the Corridor. The following sections will unpack the different elements that of the framework; open space system, movement systems, public open spaces, public facilities, indicative land uses, proposed densities and conditions requiring special spatial design attention.

7.3.3 Open Space Systems

The regional open space system is used as a basis to inform the development framework in terms of where development may or may not go. This will entail identifying the different roles and the spatial implication of open spaces in cities. This was explored from four perspectives; open space as a component of nature, open space as urban space, open space as an element of urban structure and the different functional roles open space plays in a complex urban environment.

Due to the complexities of such a process and the purpose of this framework, it will focus on open space systems as a component of nature (green systems) and open space as an element of urban structure.

Green Systems

The study area is surrounded by a rich variety of natural systems, spectacular view lines, agricultural land and wetlands. However, they are largely degraded fragmented and poor performing areas. The promotion of successful green spaces can contribute to the sense of place (Gini loci) of an area. The community needs to experience the value of an area for them to value it, and this can be done by aligning the values of the communities and public spaces by using the performance qualities discussed (Dewar & Louw, n.d.). The public open spaces must be multi-functional. They need to maintain the integral integrity of the systems. This means that they cannot function in linear fashion only, by providing green open spaces that are not only accessible but of high quality, allows for the reintroduction of place making principles into the area.

The idea of promoting ecological integrity and a better distribution of green spaces for the site will use the same concept (Chapter 6) that identified three key aspects. Firstly a hierarchy of green spaces is required for a well-functioning system and secondly, finding balance between the three basic landscape qualities; wilderness, rural and urban (Dewar & Kiepiel, 2010) and thirdly, linking the hierarchy of green spaces through linear and stepping stone Corridors (Sicerec, 2015).

The biophysical analysis resulted in an informant map of where development may or may not go, to reduce the footprint of settlements and protect the local resources (Dewar & Kiepiel, 2010). The green system aims not only to promote ecological integrity to conserve and protect the natural environment, but also to promote equitable access to quality green spaces for all people. This also requires self-maintained spaces and multipurpose areas that are frequently used and enjoyed (Dewar & Louw, n.d.).

Map 21 shows a hierarchy of green systems; regional parks, ecological Corridors, district parks, sport complexes, local parks and pocket parks.

Below a brief description of some of these spaces are given.

Passive and Active Recreation Spaces

The passive recreational spaces take the form of regional parks, district parks, local parks, pocket parks and blue sites (wetland areas). The active recreational spaces take the form of large and small sport fields, school kick about and sports complexes. The active recreational spaces are clustered within the facilities or in close proximity to schools and with easy access to public transport. The hierarchy of these spaces can be seen in Map 21 as well as the proposed ecological Corridors, connecting these spaces.

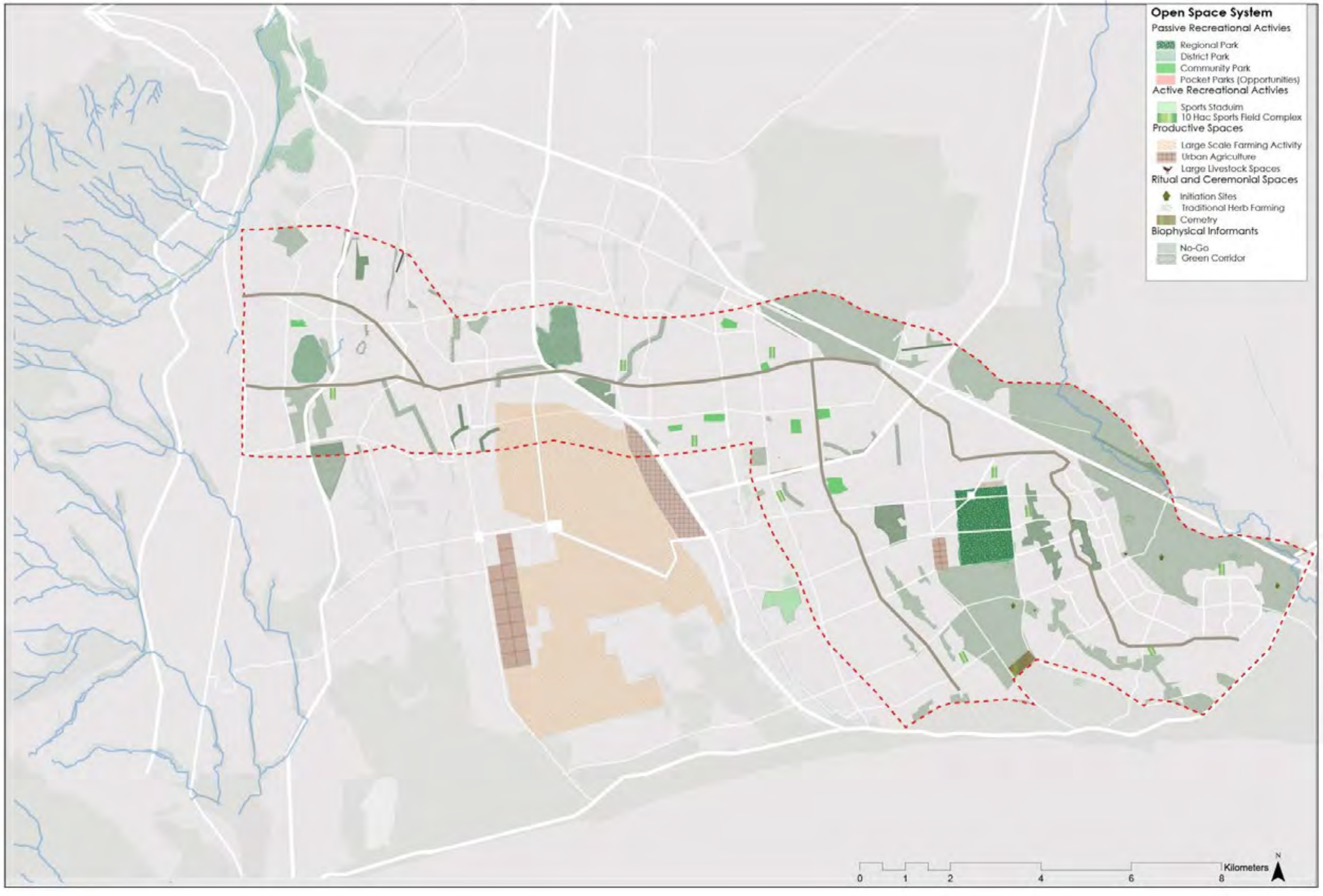
Productive Spaces

Productive spaces are spaces within the framework that allow for activities that reproduce a certain value, agricultural or monetary value. The productive spaces consist of agricultural rooms, or smaller urban agriculture farming operations throughout the precinct. It also entails the safe and hygienic keeping of livestock in urban areas. This is a prevalent issue in Khayelitsha, where the livestock are roaming the streets and public spaces, where they have caused accidents and contributed to unhygienic spaces (CoCT, 2010). Therefore, allocated spaces where livestock can be kept is important within the framework. Other productive spaces such as manufacturing, trade and small scale markets are considered within the framework and will be clustered in close proximity to public transport interchanges or identified nodes.

Ritual and Ceremonial Spaces

The history and the culture of the different communities needs to be accepted and celebrated. It is important for the development framework to identify culturally significant places. The framework will identify areas for initiation, cultural ceremonies, and ritual and herb gardens for the collection of certain plant species.

The use of cemeteries needs to be considered within the framework because of the cultural significance of death. In the Xhosa culture, people may only be buried and not cremated. Therefore, design guidelines and special precautionary measures need to be taken to enhance the safety and maintenance of such areas. A deeper study will need to be done for alternative and sustainable cemetery designs; which goes beyond the scope of this project.



Map 21: Proposed green systems of the study area (Source: Author).

7.3.4 Movement Systems

The movement system analysis revealed a lack of depth in the hierarchy throughout the study area. Therefore, the framework defines a hierarchy of movement within the Corridor with the intention of integrating currently isolated areas. This will be done through the downgrading of selected limited access routes. The concept of a greater hierarchy system will be strengthened through the use of an integrated public transportation system.

A central part of the proposal is to create a logical system of public transport interchange points. The different modal combinations that are envisaged are rail, BRT, urban bus, NMT and mini-bus taxis.

This conceptual pattern was adapted to the realities on the ground, by identifying existing routes, optimal interchanges and the intersection of continuous routes. The advantage of this concept is that it facilitates the integration of various modes of public transport and enables the different modes to be used on different routes. It also allows people to transfer to other modes and change direction, to facilitate movement into different directions (Dewar & Louw, n.d.).

Transport Interchanges

The transportation interchanges are an important function within the study area. Not only do they provide interaction between different modes of transportation but they also encourage the movement of people, providing good platforms for activities. This makes for environments conducive to formal and informal trade. The design of these interchanges needs to encourage a mixture of transportation modes, as well as facilities for formal and specifically informal traders. (Map 22)

An integrated public transportation system requires an interdependent system where each mode of transport plays the best role that it is suited to do (Dewar & Todeschini, 2016).

Primary Route: Rail

Rail is the main structuring element because of its inflexibility. It should be provided by 16km intervals, with railway stations about 1.5-2km apart from each other (CoCT, 2016).

Secondary Tier: BRT

The BRT system should close the rail system with frequent and rapid services along major routes, aiming to fill the gaps and complement the mobility system. These services should be provided by 8km intervals (CoCT, 2012).

The urban bus system runs along different routes, with the focus of longer hauls between stations.

Tertiary Routes: Mini-bus Taxis and NMT

The mini-bus and NMT routes feed the BRT and rail services. These services should be provided at 4km intersections and operate along activity routes in districts or local scales (CoCT, 2012).

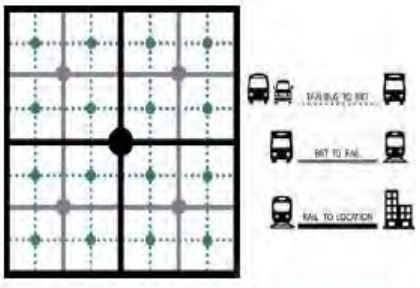
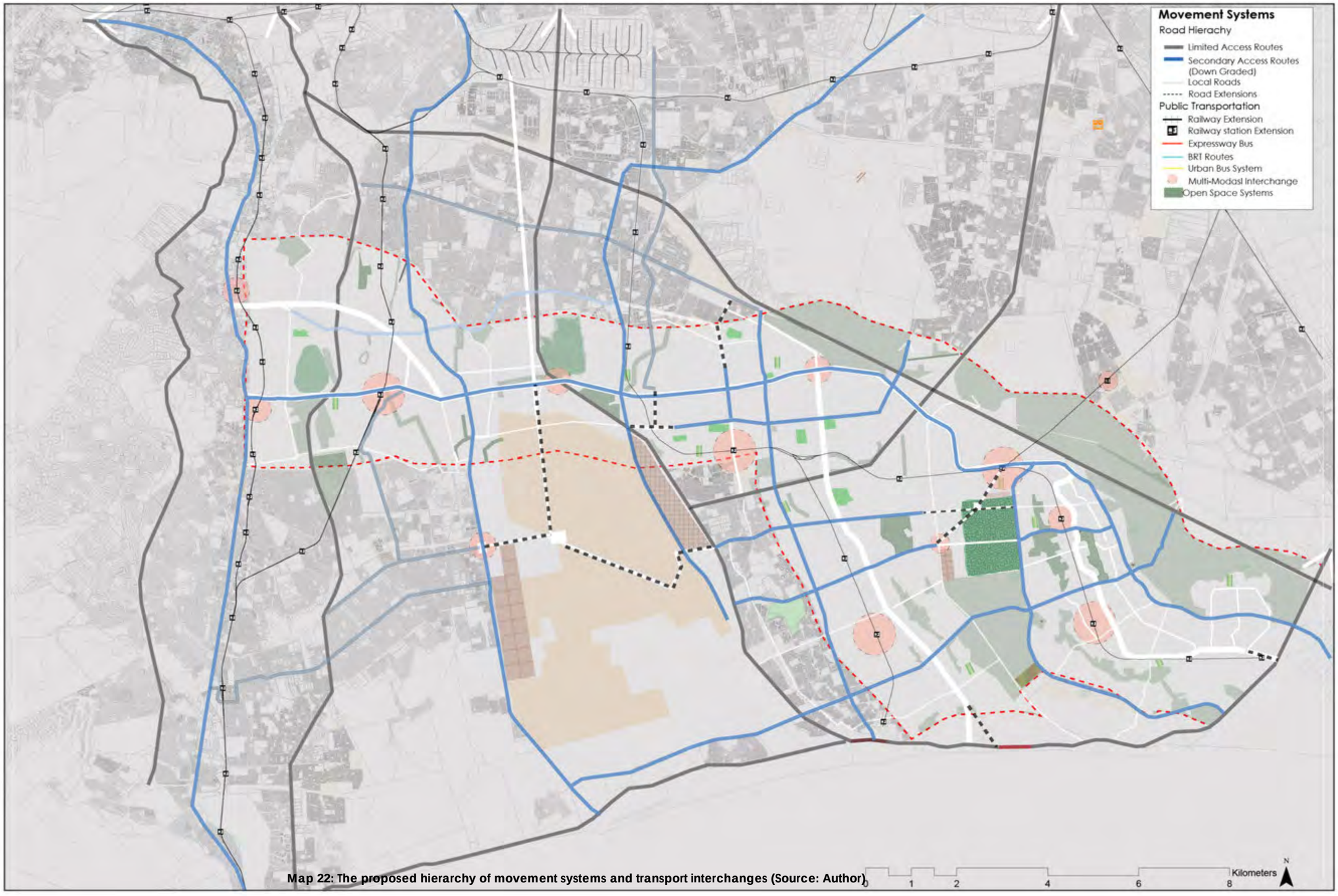


Figure 37: The proposed integrated public transportation system (Source: Botha, 2015).



Map 22: The proposed hierarchy of movement systems and transport interchanges (Source: Author)

7.3.5 Public Open Spaces

Public open spaces are where people meet and socialise in urban areas. It is an important primary structuring element. Public spaces are important in high density areas and particularly for low income (poorer) residents whose houses do not cater for their daily needs. Public spaces become extensions of the household and a safe space where people from different background s and income groups can socialise. These spaces usually accommodate a range of activities and they require detailed designs.

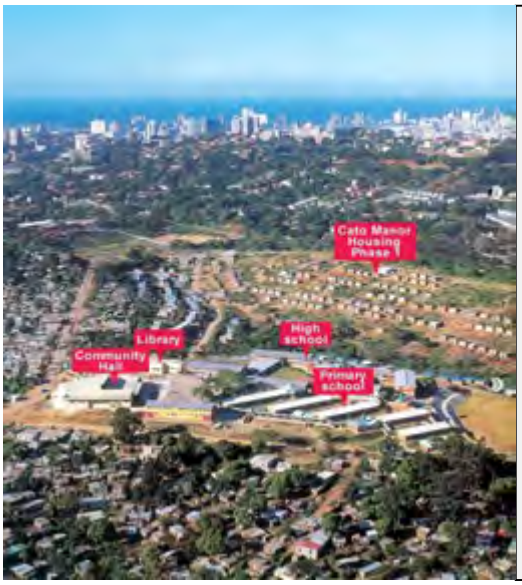
The development framework proposes a hierarchy of public spaces which are linked with movement routes (Map 22). Public spaces are located at the point of highest accessibility, according to their significance. The public facilities should be located in close proximity to these spaces (City of Cape Town, 1999).

7.3.6 Public Facilities

The analysis of the public services and facilities revealed that the study area generally and specifically the eastern part of the study areas are very under supplied. However, an alternative and more efficient approach to providing services is supported. This approach will become valuable with increasing population densities and the efficient use of the city's resources.

The analysis revealed emerging clusters of facilities. By directing further investment and development into the creation of shared clusters of facilities will maximise the potential and the efficient use of land. Multipurpose centres should be easily accessible and should provide a wide range of services such as education, health, social, recreation, economic and cultural activities into one area (CSIR, 2000). These clusters should be in close proximity to public transport interchanges and other public spaces.

Picture 5: The example of Cator Manor's cluster of facilities (Source: Iolproperty.co.za, 2016).



The Cato Manor Development Association (CMDA) is an example of an area that promoted the idea of a multipurpose centre by the clustering of community facilities into social facility precincts. It promoted the efficient use of limited resources, by integrating schools and combing certain social facilities. This used less land and reduced developmental and running costs (Furguson et al., 2004: 105).

These proposed clusters should form hierarchies of significance of special spaces throughout the framework and be located according to the appropriate movement systems.

The benefits of clustering public facilities are the more efficient use of services and utilities and increased convenience for residents (Dewar, 2012). These clusters allow many tasks to be completed in one journey and can decrease both monetary costs and time costs for residents. Multi-purpose facilities are also less likely to be vulnerable to falling into disrepair, because of them becoming special places for communities and because of the multiple stakeholders involved. The community and stakeholders' investment in and maintenance of such areas are better. (See Map 25)

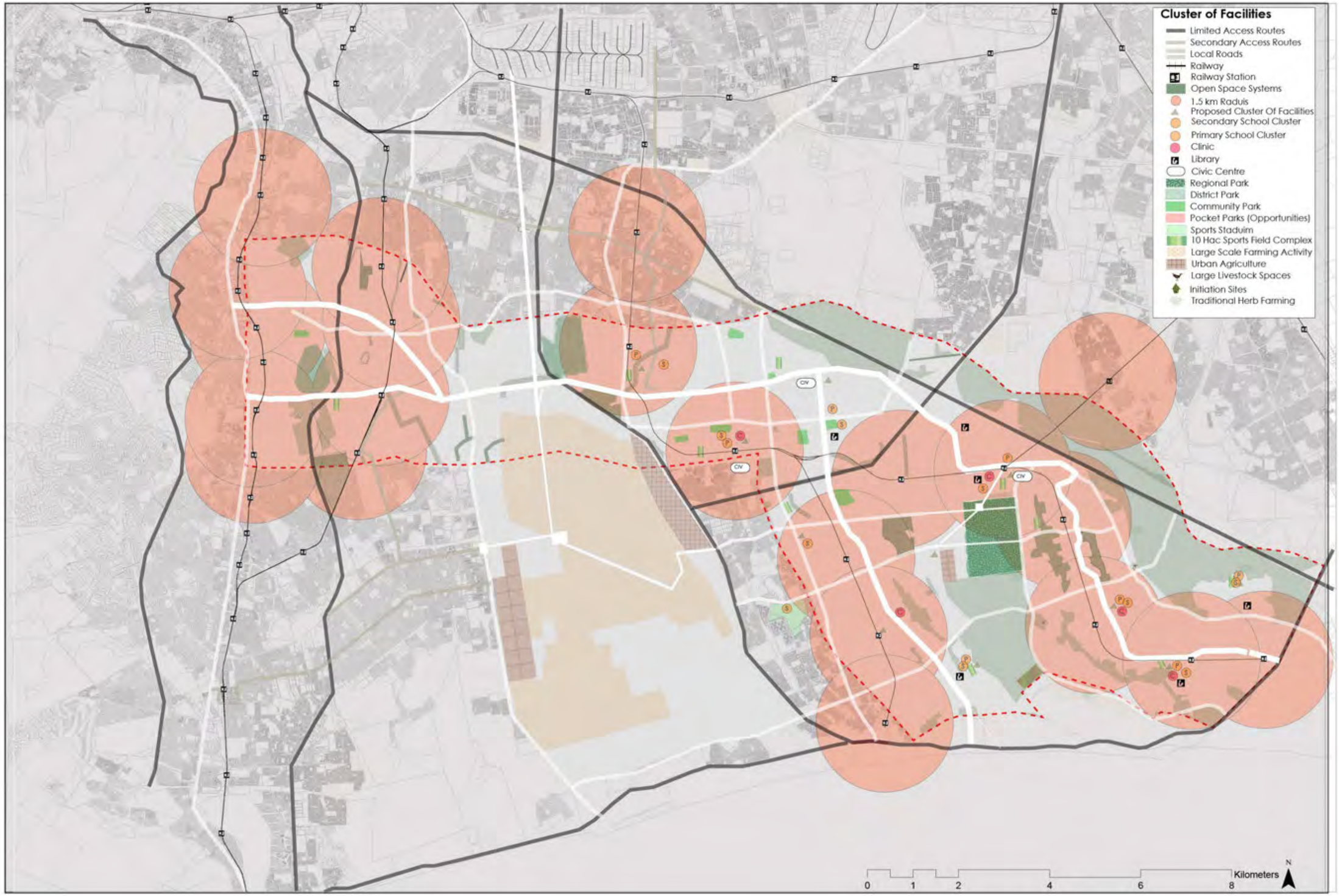
A very important factor of clustered facilities is the improved safety of facilities. Many of the neighbourhoods within the study areas struggle with high crime rates and vandalism. Clustering of facilities increases the movement of people and extends the time use, increasing the preconditions of safety, because there are eyes on the street.

7.3.7 Indicative Land Use

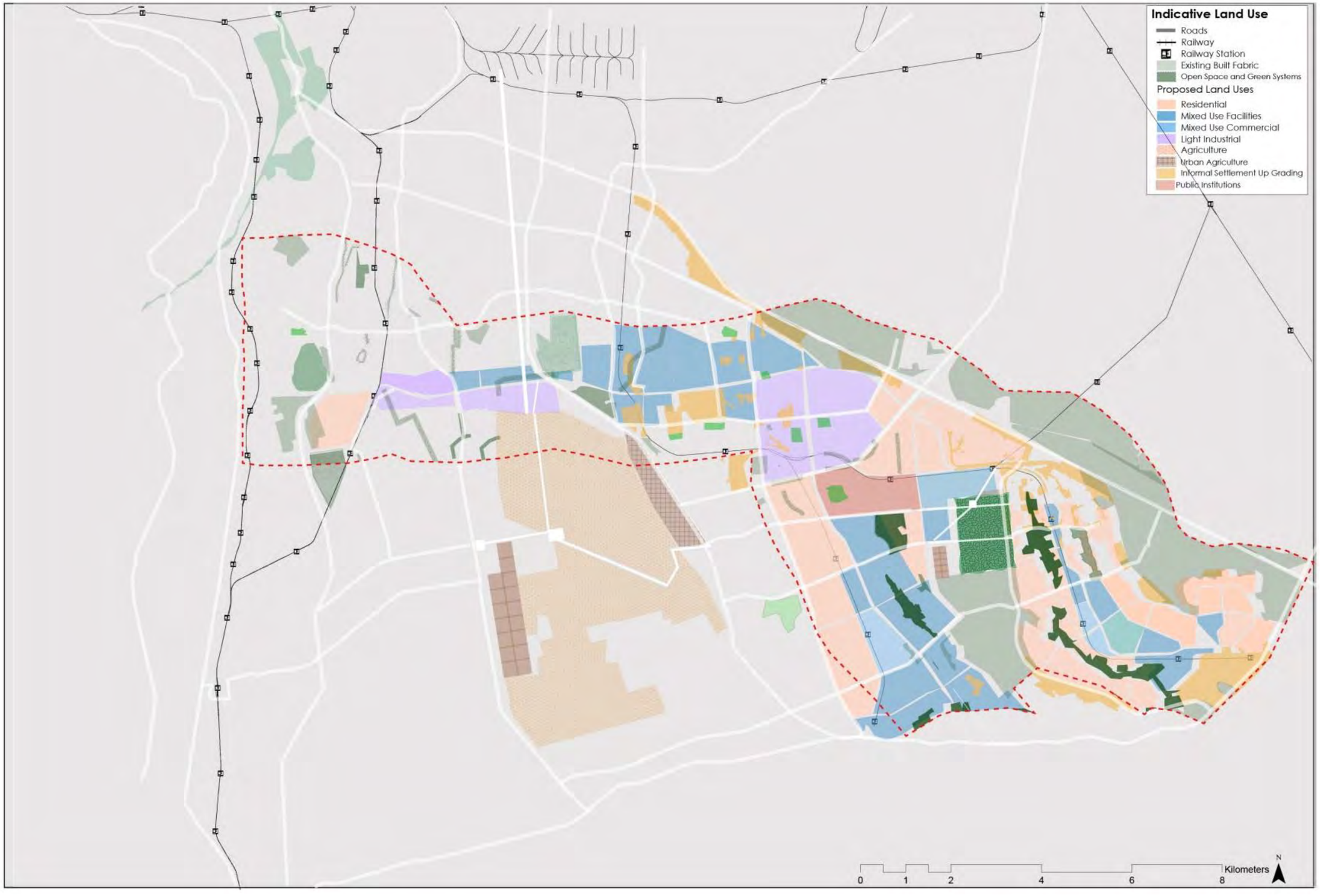
Map 26 shows an indicative proposed land use for the framework. This is a guideline for the Lansdowne-Wetton Corridor: it is not intended to impose where certain activities should be but rather to provide a guideline to which the activities can respond. Please Referred to Addendum A for a description of the land Uses. (See Map 26)

7.3.8 Proposed Densities

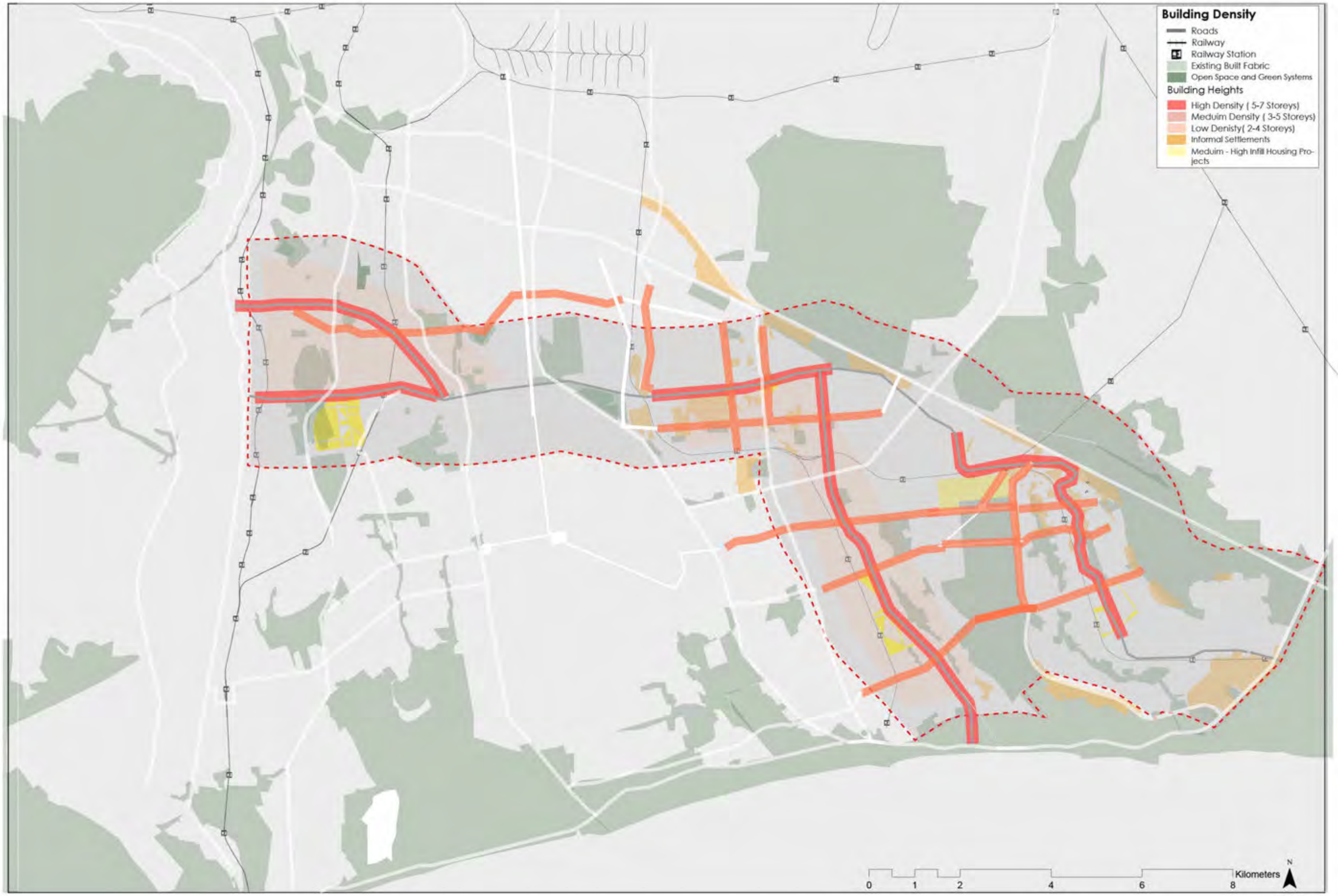
The proposed densities are shown in Map 27. The framework proposes higher densities along the urban Corridor spine and other identified activity routes or public spaces. This is essentially to promote the public transport systems and to encourage the emergence of small business both formal and informal.



Map 23: Proposed public open spaces and clusters of public facilities (Source: Author).



Map 24: Indicative land uses facilities (Source: Author).



Map 25: Proposed Densities (Source: Authors)

7.3.8 Conditions Requiring Special Design Attention for the Overall Corridor

Map 28 shows the proposed areas requiring design attention for the overall Corridor.

The elements requiring design are explained below; gateways, pinch points, activity strips, cross routes and interchanges.

Gateways are identified as significant entrances into the Corridor from a metropolitan or sub metropolitan point of view. They announce the existence of the entrance from different segments of the overall corridor experience (Le Grange & Dewar et al, 2004). It is important for gateways to become landmarks; a place where people gather and host a variety of different multi-functional activities.

Gateways are usually unique and therefore make it difficult to treat them in a generic manner. Given the scale, they are subject to further design; however broad guidelines will include building height restrictions, minimal setbacks, canopies of trees and strategic pedestrian pathways.

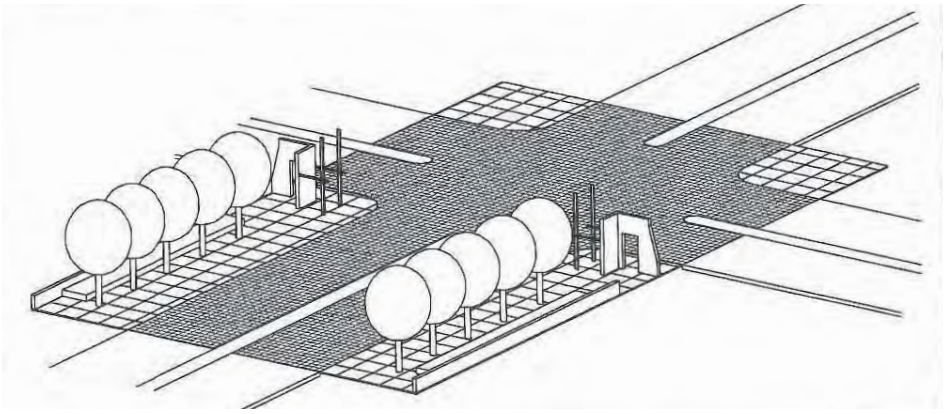


Figure 38: Proposed gateway plan (Source: Author, Le Grange & Dewar et al., 2004).

Pinch points refer to the narrowing of intersections and corner related actions that narrow the road space (Le Grange & Dewar et al., 2004). It is specially used within the study area to signify areas where pedestrian movement is prioritised, over vehicular traffic. This usually entails the slowdown of vehicular movement, and the widening of sidewalks, with the focus of creating a sense of place.

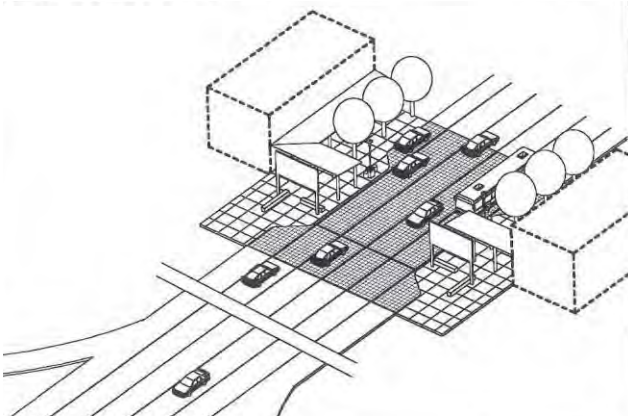


Figure 39: Typical plan of a pinch point (Source: Author, Le Grange & Dewar et al., 2004).

Activity strips refer to the linear zone of mixed use activities that are predominantly found along the primary Corridor spine and other smaller activity routes. They usually consist of mixed use activities and potential informal trading areas.

The multi-way boulevard proposes that the quality of space should be achieved wherever possible along the Lansdowne-Wetton Corridor spine. A proposed multi-way Corridor spine contains qualities of an arterial and a local street (Jacobs et al., 2002). It accommodates different modes of transport (car, bus, pedestrian and bicycle) and makes special provision for the edges through landscaping and through appropriate urban activities (Le Grange & Dewar et al., 2004).

Figure 40: This illustration indicates the warping of the multi-way boulevard concept in the context of the Lansdowne-Wetton Corridor public transportation system (Source: Author, Le Grange & Dewar et al., 2004).

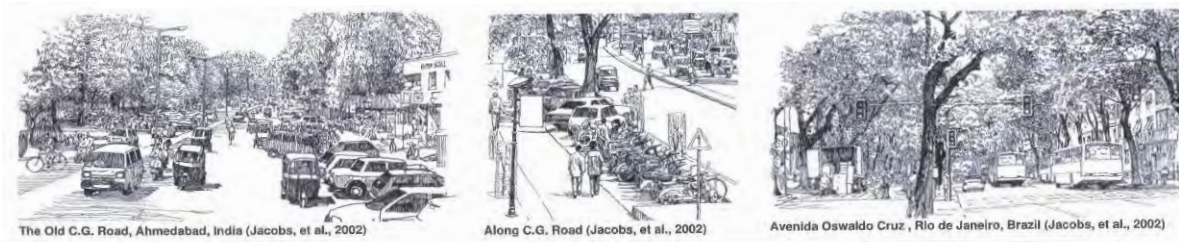


Figure 41: Precedents that were used to inspire the design; (from left to right) the old CG Road, Ahmedabad, India; Along C.G road India, Avendia Oswaldo Cruz, Rio de Janeiro Brazil (Source: Jacobs, et al., 2002).

Cross route spaces occur at the intersections of important routes. They have many roles (to announce the significance of higher order activities, social spaces etc.) but most importantly, they contribute to the legibility of the Corridor by orientating spaces (Le Grange & Dewar et al., 2004).

A series of **interchanges** are shown. These have metropolitan, sub-metropolitan and local significance. These interchanges are places where different modes of movement interconnect. They are important public spaces and have potential for economic activities (Le Grange & Dewar et al., 2004).

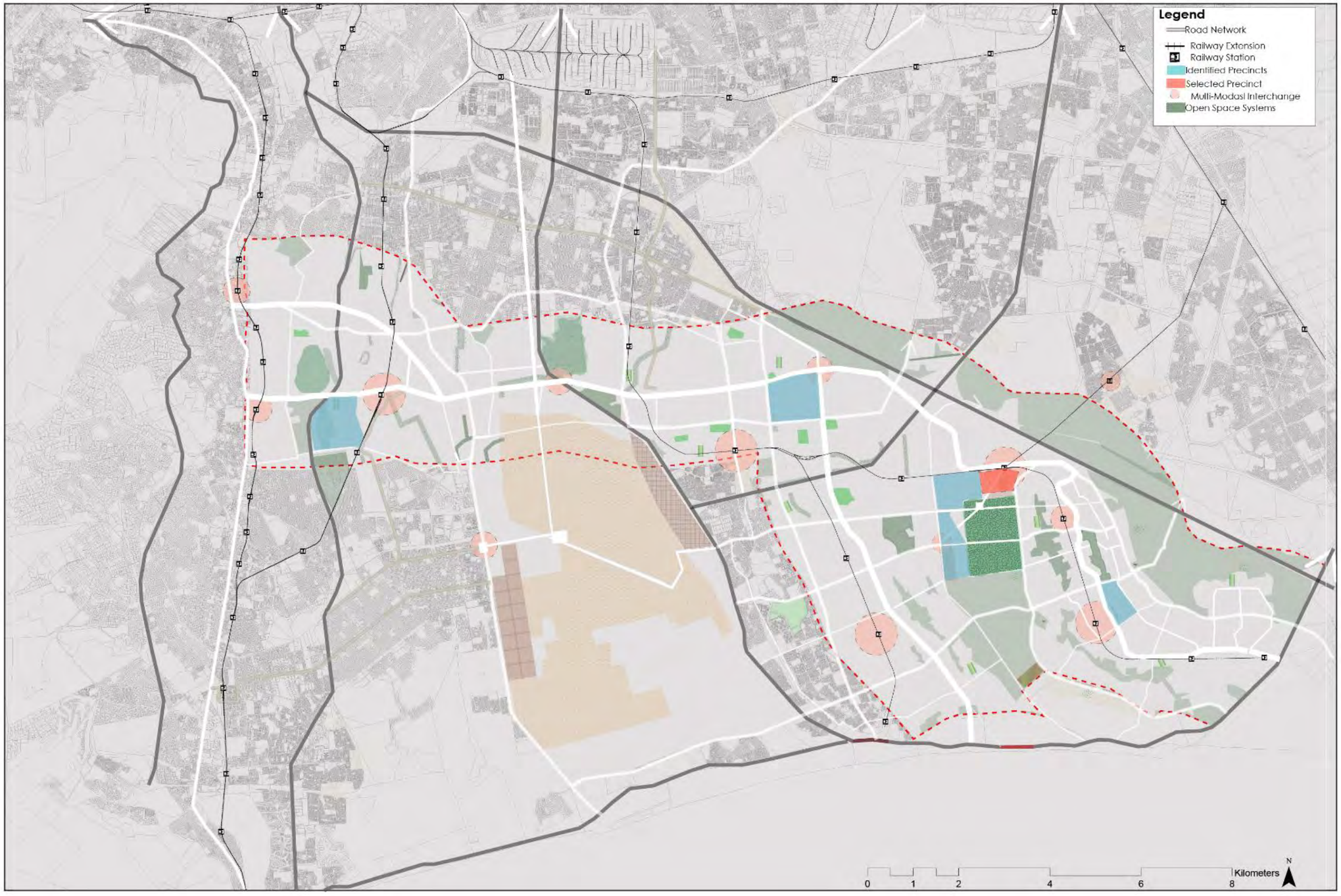
See Map 26.

8.1 ID Precincts

The scale of the development framework covers a very large area and therefore requires phasing to direct the growth and development of the framework. The study area has identified a number of precincts that require further design attention. The precinct area will be discussed in the next chapter.

See Map 27

Map 26: Areas that require special design attention (Source: Author).



Map 27: Identification of Precincts (Source: Author).

7.4 Conclusion

Cape Town's spatial pattern of low density sprawl, fragmentation and separation makes viable public transportation unachievable and denies large groups of its urban population access to urban opportunities, facilities and services (Dewar & Todeschini, 2017).

This chapter adopted the metropolitan framework concept that proposes that increase urban performance requires increased densities, as well as intensive and mixed use land uses, to promote public transport and to move towards an equitable and just city structure.

This was done through the promotion of the 'urban Corridor' and the study area was identified as an important project to unlock the larger metropolitan concept. The Lansdowne-Wetton Corridor was analysed through a series of layers, which in turn helped form the development of the framework.

The development framework proposed the protection and enhancement of the natural systems, quality public spaces and movement systems that downgraded the study areas limited access routes. It promoted the use of public transportation and NMT. The development framework proposed a wide range of different projects (housing, retail, NMT, recreation, commercial, etc.) and the scope thereof goes far beyond this study.

The identified precinct will be discussed in the next chapter with a focus on transit oriented development.

CHAPTER 8: PRECINCT DESIGN

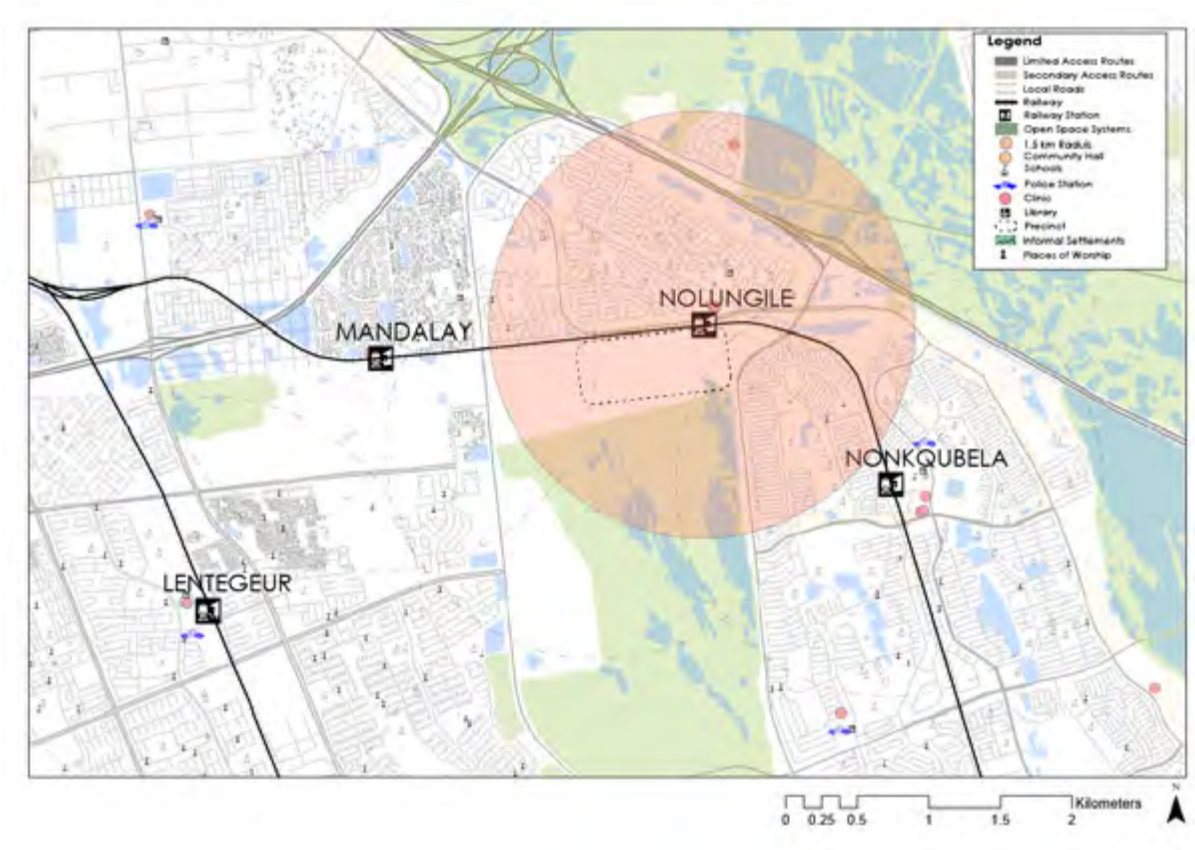
8.1 Introduction

This chapter puts forward a detailed design of the precinct that was identified within the development framework. The purpose of the detailed precinct plan is to use the planning principles that have been discussed throughout the dissertation and apply them to a precinct scale. This chapter discusses the location of the precinct, the urban fabric, design guidelines and controls.

8.1.1 Identification of the Precinct

The site is located in Khayelitsha, (Map 28) on vacant land opposite the Nolugile train station in the southeast section of the study area. It comprises seventy hectares, of which some areas have been identified as 'No-go' areas because of wetlands and ecologically sensitive Corridors.

Map 28: Location of the precinct (Source: Author).



The site was selected for further design detail and its potential as a TOD site within the study area. The Lansdowne-Wetton Corridor spine, as well as the Klipfontein corridor spine, is located on Govan Mbeki Road. It has great accessibility and is of key significance for the larger metropolitan region. It has an important role to play in the emergence of a multi-modal transportation interchange. With the potential for high densities, mix use, enhancing the natural systems, and has considerable economic and social potential within the South-eastern area of the metropolitan.

However, the site faces severe challenges. It is surrounded by a largely developed area that is accompanied by severe fragmented structures, poor spatial quality and a degraded natural environment, as well as inadequate shelter, services and utilities.

The precinct design seeks to establish a strong spatial framework that gives direction to the challenging and continuously changing urban environment. The aim is to indicate how urban justice can be promoted through transit orientated development, based on responsible design principles.

8.1.2 Transit Oriented Development

TOD's are ultimately nodal (UN-Habitat, 2009) and therefore can be used in conjunction with urban Corridors, to ensure the connections between nodes.

TOD is a mixed-use community within an average 500m walking distance of a transit stop, in a core commercial area. TOD's encourage the mix of residential, office, retail, open space, and public places. The focus on a walkable environment makes it convenient for residents and employees to travel by transit, bicycle, foot, or car, Calthorpe (1993).

The TOD model will be used in conjunction with the performance qualities of sustainability and equity, as well as the efficiency, integration, balance, choices, safety and security, urbanity, efficiency and a sense of place.

8.2 Precinct Plan

The grid was identified as a structural concept to broadly promote equitable access that is central to making equitable, sustainable and integrated spaces (Dewar & Louw, n.d.). It guides a hierarchy of public services and facilities and movement systems. This provides a degree of equity, accessibility and choice.

The first step in the precinct design process was to break down the superblocks in order to achieve a fine grained urban fabric as a platform. This grid represents the beginning and is warped to the context of the site, to create unique opportunities.

The five superblocks of the precinct were divided into 60m by 60m (Fig 41) walkable blocks, with 10m primary roads and 20m secondary activity roads (Pistorius, 2002). The pinwheel which creates a break in the systematic flow of movement through the area will also be incorporated as seen in Figure 42); to allow for a unique structural element, that forces movement to travel round, rather than through a particular feature.

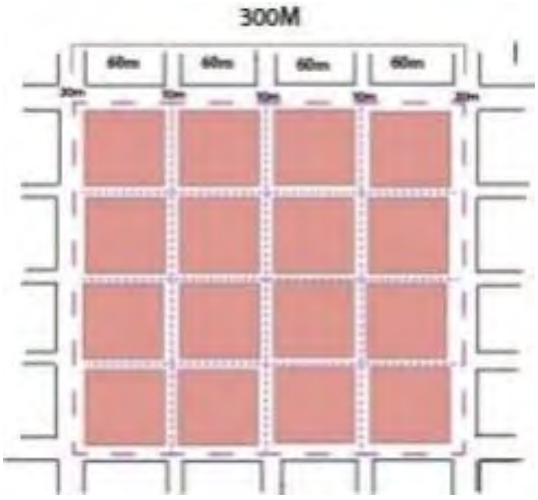


Figure 42: Breaking the superblock (Source: Author

Figure 43: Breaking the grid pattern with a pinwheel (Source: Author).

Map 29: Hard and Soft Open Spaces (Source: Author)

Map 30: Movement Systems (Source: Author)

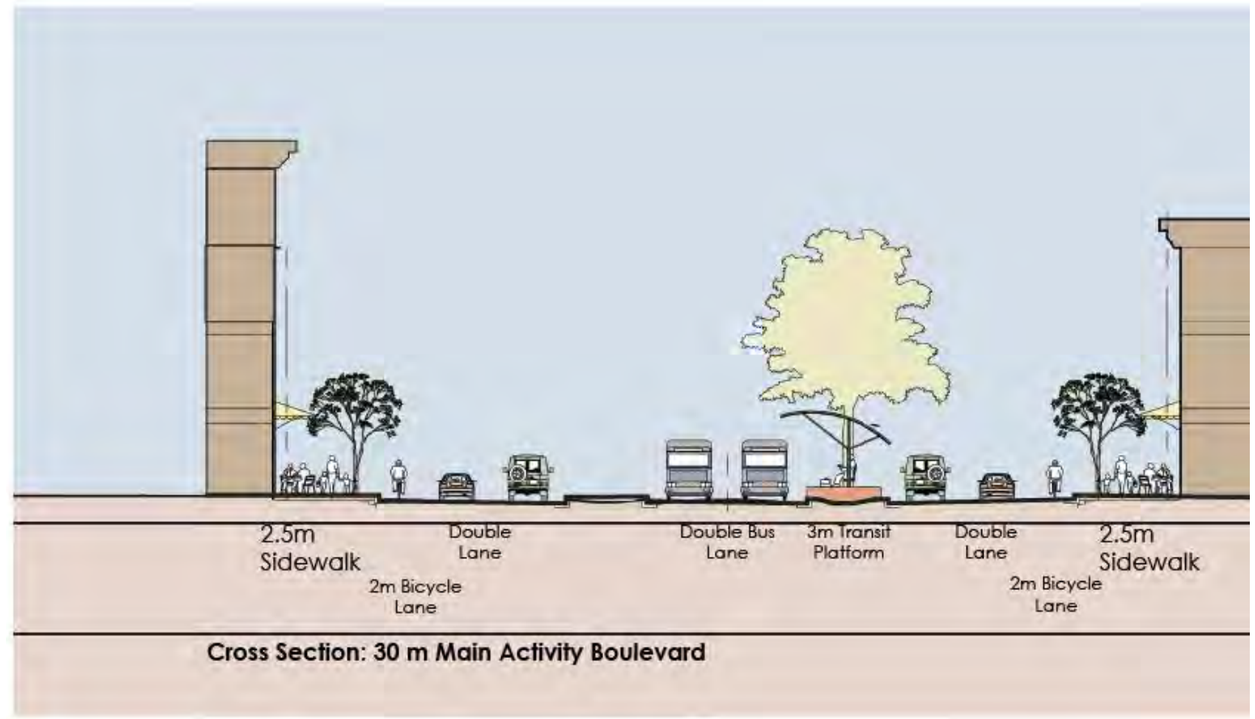


Figure 44: Proposed Road Sections (Source: Author, Adapted from Gundderson, 2012).

8.3 Programme

The land use budgets estimate the land required for movement, residential, commercial, light industrial and mixed use, and while incorporating the demands of the table below. The total amount allocated to housing and community facilities is 40%, 20% for movement systems and 40% for all other uses.

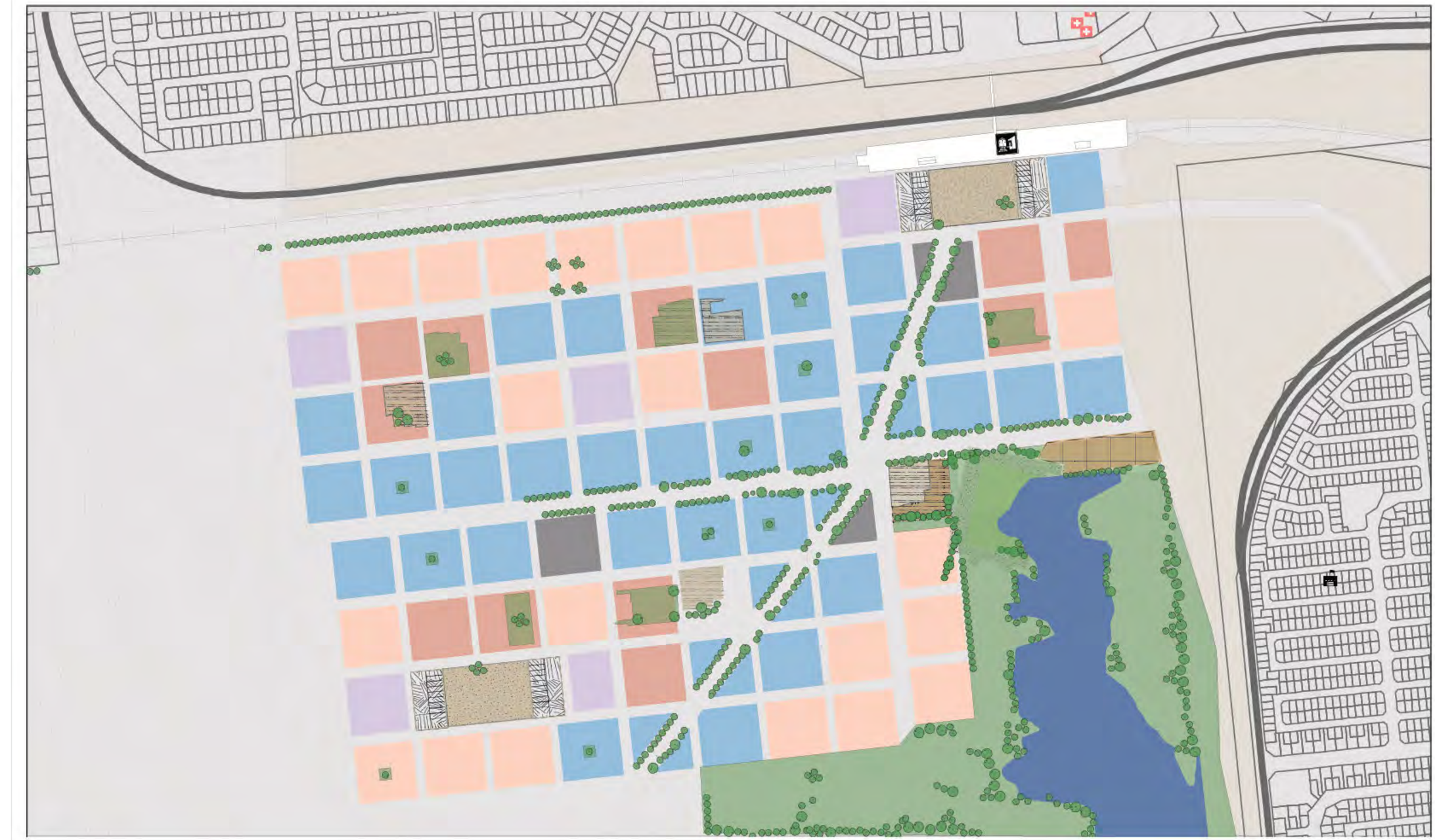
Table 2: The proposed land calculation for the precinct (Source: Author).

Land Use	Developable Size (HA)
Calculated area (ha)	60 Hac
Residential area (40%)	24 Hac
Institutional	1,2
Industrial (7%)	4,2 Hac
Commercial (15%)	9 Hac
Green systems (20%)	12 Hac
Movement (20%)	12 hac
Dwelling units (Minimum Size for family of 4 is 50m2))	4800 units: Single Dwelling (Approximately) 14400: Three storeys minimum.
Population at 4 people average household size	Minimum : 57600

The total developable portion of the site is 60 hectares. Given the proposed 144400 units based on an average household of four people the estimated population is 57600. The table below sets out the estimated public facilities and services provision. These include passive and active recreation, educational facilities, and health care facilities and social services facilities. It should be noted that the provision of these standards was done by using the CSIR standard, but the guideline for clustering and finding the most efficient use of land will be the foundational value. This clustering of facilities may include shared sports fields, libraries and other facilities, amongst other clusters.

Facility	Type	Dwelling unit	Population threshold	Access	Minimum size	Required
Passive recreation						
District park	Higher	5000	20 000	10km	5 ha	1
Community park	Middle	500	2000	1km -2 km	1 ha	20
Neighbourhood park	Lower	250	1000	500m	0.05 ha	56
Active recreation						
Sport stadium	Higher	25000du	100000	15km	3 ha	
Sport complex	Middle	15000du	60000	10km	1.5 ha	9
Sport field	Lower	1250 du	15000	2km	0.02- 2 ha	3
Education						
Tertiary education	Higher	37500 du	150 000	Variable	Variable	1
Secondary school	Middle	2500 du	10000	5km	3ha	8
Primary school	Middle r	1000 du	4000	1.5 km	2 ha	6
Pre-primary school	Lower	600 du	2400	750m	0.03-0.05 ha	10
Health						
Regional hospital	Higher	1125000 du	4500 000	200km	40 ha	
District hospital	Middle	112500 du	45000	30km	20 ha	
Local clinic	Lower	30 000 du	12000	3km	3 ha	2
Social facility						
Library	Higher	8750 du	3500	4km	0.1-2 ha	1
Community centre r	Middle	2500 du	10 000	2.5km	126	2
Place of worship	Lower	500 du	200	1.5km	632	9
Public facility						
Municipal office	Higher	12500 du	50000	2km	0.3 ha	1
Fire station	Middle	15000 du	60000	8-23min	1.2 ha	
Police station	Lower	6250 du	25000	1.5km	0.1 ha- 1 ha	1
Post office	Lower	2500 du	10 00	1.2km	0.1 ha	1

Table 3: Public facilities calculations (Source: Author, CSIR, 2012).



Map 31: Indicative land uses (Source: Author, GIS Technical Library UCT).

8.4 Character Areas

There are a few prominent character areas within the precinct plan. The vision of the precinct plan is to adhere to its performance qualities. The main focus is the development of quality public spaces and promoting integrated public transportation within the site. Therefore, an urban hierarchy within the site ranges from the intense cue of the boulevard, to market space, and transportation interchange to the less developed district park and agricultural spots. Below is a brief description and visual representation that will be used to depict the character areas. These areas have been carefully selected to adhere to their location and to suit the design of the buildings, active facades, land uses, building heights, parking and accessibility.

Market Square

The market square will be located outside the train station. This area focuses on creating a positive and well performing public space that promotes access to multiple public transportation modes (train, NMT, bus). It will also have spaces for diverse socio economic activities, such as informal retail shops and informal trading stalls. This market will enable people to generate income through a variety of small-scale services, retail and manufacturing activities (Behrens & Watson, 1996).

The square is within walking distance of the entire precinct and is easily accessible to the surrounding areas.

Figure 45: Green market square: Informal Trading, Active Frontages, Enclosed Space (Jarvis, 2011; Ineng, 2016)

Boulevard

A boulevard will run diagonally to the square. It will entail a mixture of building typologies, have beautiful landscaping, provide retail opportunities and focus on a mixture of public transportation modes, such as cycling and NMT lanes. This boulevard comprises a high quality public realm that is part of reintroducing a sense of place in the area, where pedestrians are given higher priorities. The landscaping and proposed trees will also provide a shield from the wind and will form part of the green linkages throughout the area.

The regional park

The regional park edges on the western border of the site. This edge will be an entry point into the park but will also provide agricultural activities. This will be along the secondary activity route and is in close proximity to the square. It will allow the community to use three 60 by 60m blocks of agricultural activities that will range from community gardens to larger scale community farming cooperatives. It will be surrounded by higher densities as well as the market square, that provides informal activities but most importantly the park will also provide spaces for a Saturday market. A small section of the park will also allow livestock activities, where people can keep their livestock while living in a three story apartment.

The Bath House

The public bath house originated from a communal need for cleanliness at a time where people did not have access to private bathing facilities. This will be used within the precinct site, the proposed residential area will be serviced with private basic facilities. The larger surrounding areas have limited access to proper basic facilities. Many areas use blue porter loos, and these have been seen as degrading and now there's a solution. The proposed bath house will be close to the market square and have easy access to public transportation modes. The bath house is not a solution to the broader problem but aims to provide dignified spaces for residents to use.

Khayelitsha sanitation and basic service facilities are currently severely under provided. This has resulted in chemical toilets. These are toilets that are not connected to a sewage system but instead have a small tank that contains chemicals to control the odour. These are commonly used for short-term solutions at building sites or at festivals, but now they have become permanent fixtures within the informal settlements. These toilets are degrading and usually do not provide a facility to wash your hands or for bathing (Babe, 2016).

Figure 46: Khayelitsha Sanitation and basic service overview (Author, Image from Babe, 2016)

8.5 Housing

This section briefly discusses the various housing typologies that will be available within the precinct. The variation of plot sizes is designed to provide a range of choices throughout the precinct, while the housing will comprise medium to higher density types of buildings. Below is a brief discussion on the different housing typologies that are appropriate for the precinct design, namely perimeter block housing and row housing.

Perimeter Block Housing

Perimeter block housing is usually found along the activity spine or close to public areas, nodes and areas that require high densities. Perimeter housing typology consists of wide plots and includes two to three apartment blocks and a central court. Perimeter block housing offers a high degree of privacy, where the communal open spaces (central court) are usually landscaped and provide the opportunity for a wide range of activities such as parking, hard and soft open spaces and community gardens.

These blocks are usually L, T and U shaped buildings, however the U shaped ones are the most commonly used. The configuration is about 6-8 plots per block, with about 3m setbacks with 3-4 story walk ups that do not require lifts.

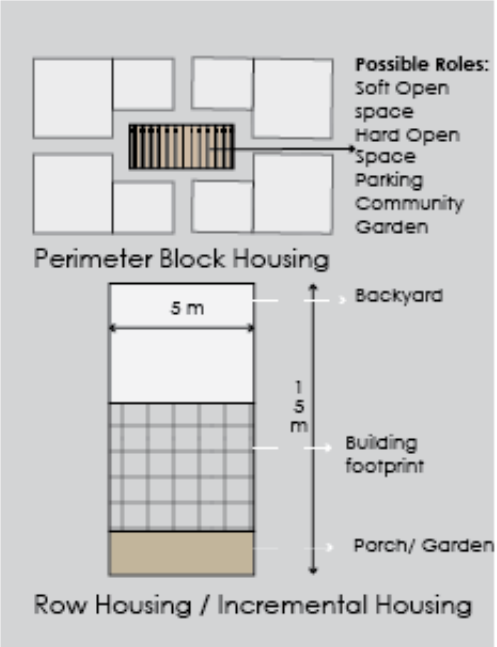


Figure 47: Housing Typology (Source: Author).

Row Housing

Row housing or terraced housing is another medium density building typology that will be used within the precinct. Row housing consists of lateral units that share a side wall, they usually run between 4-5 houses (24m) with a gap before the next row. The height and width may vary but in this instance, they will not be higher than five stories and will have a minimum width of 5m (Behrens & Watson, 1996). Row housing can either be street aligned with no setbacks or have a setback of about 5m. This 5m setback allows for transitional spaces, with a threshold of about 2,5m for front gardens and about 2,5m for a stoep (porch). According to Behrens and Watson (1996) in the case of reticulated services, narrow erf's increase the number of households and are therefore seen as the most cost efficient option as it minimises the cost of service provision per erf.

Informal Settlement Upgrading

The scale of the site and the complexity involving the process of upgrading informal settlements, goes beyond the scope of this project. However, the process should follow a site specific study, public participation and a bottom up approach. A brief description of important elements that should be considered is discussed below. These should be taken into consideration when developing the precinct:

Integrating the movement grid

Informal settlements are usually underserviced in terms of facilities and services. Therefore it is critical to provide a movement links facilities, services and public spaces. It also promotes the accommodation of basic utility services and emergency services. The utility services such as electricity, sewerage and water should follow the movement grid. This assists the process of providing basic services to settlements that are in the process of being upgraded and those in a close proximity. This also helps to ensure that local business and public spaces have access to the services. It also provides a choice to the household who want to opt –in or opt-out of the network of services, depending on their ability to pay (Dewar & Todeschini, 2004).

The emergency services should be easily accessible to all resident in terms of fire hydrants: a fire hose is approximately 165m in length and a grid should ideally be 130m by 130m to efficiently service an area (Dewar & Todeschini, 2004).

Large Open spaces

The importance of open spaces are important. They act as places for meeting, trading and become an escape from the intensity of an overcrowded setting. These spaces require further urban design and landscaping attention (Dewar & Louw, n.d).

Social Facilities

The necessary social facilities and services clusters should be located close to the public and open spaces. These facilities should be easily accessible to the settlements.

Map 32: Housing Typologies and Building Heights

8.2 The Urban Fabric

The design guidelines that are used to ensure the vision of the development framework is manifested within the precinct design. This section briefly discusses the planning principles of the development framework into a set of technical principles that can be applied to the precinct scale. Some may be repeated but will be applied at a smaller scale and therefore, will render greater detail.

The precinct proposes different building heights between three and five stories to define areas and maintain urban quality and legibility. It proposes uniform heights surrounding transport interchanges and public spaces to contribute to the concept of space.

Built to lines are defined as the distance between the erf and the building façade. It indicates where the construction of the building can occur. This regulatory tool ensures buildings frame the streets and public places in the best manner. It will be used throughout the precinct to guide development to ensure a positive performing space. It can also help define public and private spaces.

Figure 48: Corner Building (Source: DarSketches, 2015).

Street liners are thin buildings that line the edge of a street and enclose the space. These will be used to control privacy within the precinct. They are usually used within row housing and the setback of these building is not more than 5m to allow for private public thresholds. This reinforced the idea of choice throughout the precinct.

The intersection of streets and the corners they form have always been a special feature in urban centres (Pistorius, 2002). They create a junction that is very accessible and allows for very social and effective economic interactions to occur. In the precinct, the corner buildings are very significant and should be used to define and intensify the corner as a visual element through different typologies. These varieties of corner buildings serve to enrich the visual outcome and complicity and variety of the urban environment.

Mixed use buildings will also be predominantly found throughout the precinct design and is therefore an important point to discuss. Mixed use buildings generally contain residential and commercial facilities. They contribute towards the density, safety and versatility of the urban space, where safety is critical.

Figure 49: Mixed Use Building (Source: ArchDaily, 2016; Author).

Transitional Spaces

The transitional spaces are between the street and the private space. These zones are found with many different building types, they usually have a 'stoep'/porch/veranda, or a low wall. This creates an enclosure which defines a semi-private space while maintaining contact with the street. In double to five storey buildings these balconies are also defined as transitional zones between the public and the private realms. They may seem detached from ground activities but they are still able to watch them. There are multiple ways of creating transitional spaces but the significance thereof, for the precinct is the high degree of visual connection between the private and public realm, the individual and the community. It improves safety by always having 'eyes on the street'.

CHAPTER 9: IMPLEMENTATION

This section puts forward the key elements that are necessary to implement the development strategy. This chapter outlines how to turn the theoretical framework design and long-term vision for the city of Cape Town into a reality. A comprehensive implementation framework is beyond the scope of this study. This chapter will discuss briefly the important elements by focusing on the implementation process.

9.1 Institutional Arrangement

For the effective implementation of a project of this scale this requires a steering committee and a technical team. The scale is huge and therefore it will consist of many different projects over a long period of time.

The purpose of a steering community is to keep an eye on the totality of the project. It should consist of local and provincial representatives and private company individuals. Money for budgeting will be controlled by the steering committee to keep the project ethical and non-political. The steering committee needs to be involved on the site as well as with publicity. Publicity is important for the project, to involve the community. It is also the steering committee's role to inform, educate and provide feedback for the people who will be affected.

The technical team is a dedicated inter-disciplinary team which must be set up to manage the implementation of the framework. This team must consist of representatives from the government, private developers, the community, planners, architects, environmentalists, legal experts, economists, landscape architects and sociologists.

9.2 Phasing

In order to unpack the implementation process, there needs to be an acknowledgment of resource constraints and an understanding that all of the elements of the framework cannot start at once, but needs to occur incrementally. This section briefly discusses the different phases of the precinct plan.

1) Direct the Building

The study area covers a large piece of land and it is owned by different entities. Therefore, the land ownership needs to be transferred to one single entity. In certain cases joint ownership may be required but it will be dealt with on a case by case basis. This process can be very time consuming due to the required public participation but it is critical for the project's success.

Prior to the development proposals, a statutory process must be undertaken. This process involves receiving approval from different legal and policy regulators, each with its own individual time frame. Some application requires an EIA (Environmental Impact Assessment) and, land use and zoning applications and this needs to be considered when planning time frames.

2) Incremental Services Network

This phase entails the production of the required infrastructure in order to determine the capacity of the existing service infrastructure. The basic infrastructure includes roads, water, electricity, and storm water and sewerage services. The phasing of the infrastructure should be built out from the grid and superblocks for the most effective and efficient implementation.

3) Encourage Public-Private Partnerships

Relationships and partnerships between the different stakeholders are critical to the implementation of the framework. The promotion of public/private partnerships are encouraged throughout the phasing of the project.

4) Public Works Programme

The public works programme is a government initiative that is aimed at poverty and income relief through temporary job opportunities (EPWP, 2013). The use of public works programmes will be prioritised.

5) Land Release

After the land has been consolidated and the basic infrastructure has been implanted, the smaller land parcels can be released to the market. These land parcels must be released at different times and a document must be prepared with the study area vision that each developer must adhere to. This document will not only include the vision but also technical information and design guidelines which developers need to adhere to (GAPP, Urban solutions, 2004).

6) Monitoring and Review

To ensure responsible and effective management of the development frameworks ongoing assessments, monitoring and review needs to be done, to ensure effective implementation. This is to assist the proposed integrated approach and to allow for a flexible and adaptive framework that responds to change. It is important for the development framework to be monitored to identify poor performing areas as well as good performing areas.

It is also an important process for the steering community to provide feedback to local communities and other partnerships.

9.3 Conclusion

Seeking urban justice through transit orientated development within the Lansdowne-Wetton Corridor requires not only a development framework, but the efficient and effective implantation thereof. The scope of this study does not allow for a detailed implementation plan, but this chapter does briefly outline the important processes of the implementation plan and highlights the importance of integrative governance and for the stakeholders involved.

The study area does not adhere to the municipality administrative borders and falls under the Cape Flats district, Philippi Horticultural area and the Mitchells

Plain/Khayelitsha district plans. A troublesome barrier within the implementation phase is the fragmented system that is prevalent within South African regulatory systems and municipalities. SPLUMA which is discussed in Chapter 4 does address this issue, which aims to integrate the regulatory and policy integration of the different departments within the municipality and governance systems. However, potential barriers must be noted to act proactively within the implementation phase. Continuous monitoring and review is also critical for improving potential areas continuously that are lacking and also in order to strengthen and potentially reuse key performing areas. It is also critical in providing feedback to communities and key stakeholders.

CHAPTER 10: CONCLUSION

South African cities and towns have been performing poorly, with sprawling, fragmented and segregated structures, all contributing to unsustainable and unjust city practices. The City of Cape Town is no exception. The rapid and continuous low-density development in the City of Cape Town is a menacing prospect, affecting the long-term sustainability, and its densification opportunities.

These unsustainable development patterns, vehicle focused movement systems as well as the drive of private developers is resulting in development that maintains and even exacerbates a socially and economically deeply divided city. More importantly, Cape Town is facing a rapidly increasing population, and current urban development patterns that are reinforcing previous social injustices and inequalities. The City's urban form and structure is characterised by dispersed development patterns and inequitable access costs for many of its users, which can be ascribed to segregated modernist and apartheid style planning approaches. This has resulted in the development of poorer residential communities, away from employment and economic opportunities, making the cost of providing public transport unsustainable.

Even though the stated intent of the City of Cape Town is to encourage densification in priority zones and urban civic upgrade areas, as well as to support multi-storey forms and locations of subsidised housing, very little of this has been implemented. The resulting urban sprawl, and low densities is impacting on the implementation of sustainable public transport, as well as on the City's ability and resources to restructure unsustainable development practices in its current spatial form.

This dissertation emphasized the importance of the urban Corridor, and transit orientated development, as structural approaches to restructure Cape Town's current city form and structure. The aim of this study was to implement ideas and proposals that can break current resource intensive activities, vehicular focused developments, and polarised social and economic investment opportunities in Cape Town.

The Lansdowne-Wetton Corridor was identified as a vital element in a potential restructuring process; to intensify and promote mixed use, and to provide social and economic opportunities to a largely marginalized area of the city.

The design method was used to form the recommendations developed in this dissertation. The design methodology is a process that involves continuous cyclical refinement of the need, programme, design formulation, concept, and context in a range of scales. It stemmed out of 'a need' to improve the human and environmental requirements for the city of Cape Town. By addressing the 'need', this dissertation aimed to improve the lives of the individuals and groups while protecting and enhancing its natural systems. This dissertation was largely formed by the starting point or the 'lowest common denominator', in other words, people moving about on foot, particularly those who have limited access to personal resources or sophisticated technologies. As this group comprises the majority of public transport users, their plight

was used as a basis aimed towards the development of design proposals that contribute towards the building of an equitable and sustainable city.

The approach used was the "package of plans approach", which was identified as an alternative to the master plan approach (Wilkinson, 1994). This approach allowed for more flexibility, and change throughout the process. A flexible system approach was used, which incorporated different design layers, starting with the broader metropolitan conceptual design, thence dropping to site scale and environs to result in a detailed precinct design. Great emphasis was placed on the promotion of a responsive, sustainable, resilient and adaptable city, which can function in a dynamic and competitive environment. This requires an innovative model to address the challenges that the city is facing at micro and macro scales. It will also require the entrenchment of a culture of long-term planning; using data and evidence to inform decision-making and building an adaptable system that is solutions oriented and operates according to a clear strategic framework, priorities and vision for the city.

The metropolitan analysis was used to restructure the primary elements (green systems, movement systems and higher public institutions) conceptually, in order to determine a new logic for Cape Town's urban system. The site scale was concerned with the natural, structural and local context of the site and its surroundings. It followed a systematic approach; analysing the biophysical elements, built environment, design informants, landscape character, and public spaces. This scale was used to engage with the issues of the site, the degraded natural systems, dominant limited access routes, segregated neighbourhoods, a dysfunctional public transportation system, vehicular driven setting, a hostile landscape, limited and low-quality facilities. A development framework was used to address these issues, by providing an alternative future for the Corridor, while integrating the site into the adjoining areas and the larger metropolitan area.

The major constraints that were experienced during this process were the challenging biophysical areas, with previously small scale interventions that did not acknowledge the larger areas, resulting in inadequate flood prevention measures, limited protection of critical endangered biodiversity and a degraded landscape character. The site was predominantly focused on vehicular movement, which resulted in limited safe NMT routes, dysfunctional integrated public transportation systems and limited access routes, which resulted in dividing the urban fabric. Another constraint was limited access to economic opportunities, quality public spaces and good and vibrant performing public spaces.

However, the Lansdowne-Wetton Corridor presented the opportunity as an important element in restructuring the metropolitan framework to a more equitable and sustainable future, but also to provide equal access to economic and social opportunities, good public transportation, and a liveable environment to largely marginalised communities.

The focus was to present proposals for changing, developing, and stimulating a built form for the Corridor, which would present movement patterns of people and goods

in a manner that creates urban efficiencies, social equity and economic growth. It is also aimed at addressing inefficiencies in the urban form of the Corridor. The recommendations resulted in the preservation, and enhancement of the natural systems and recapturing its historic landscape character. The limited access routes will be downgraded and will promote public transportation and NMT routes by promoting transit orientated development.

This will be achieved through the provision of access to different public transportation modes, mixed use activities, quality facilities and a creative performing environment. To enhance the impact and feasibility of this Corridor, a precinct on a site close to the Nolugile transition was identified as a catalytic site, to initiate the implementation of a development framework. This required further urban design attention.

The study concludes that past urban planning practices have not changed considerably over the past twenty years, as modernism and apartheid city structures remain virtually intact. Vehicular focused infrastructure investments and private developers are still dominating development patterns, which results in continuously inefficient movement structures and urban inequality.

The development framework proposed in this study is an attempt to present an example of an alternative to Cape Town's current development patterns, which are continuing to perpetuate inefficient, unjust and unsustainable city structures. The aim of this study was to implement ideas and proposals that could restructure and break current resource intensive activities, vehicular focused developments and polarised social and economic investment opportunities in Cape Town, with the focus on the Lansdowne-Wetton Corridor. This is done through the prioritisation of the natural environment as a structuring element, to guide urban development, and to propose where development should or should not be directed.

The design proposal promotes the idea of an integrated public transportation system which includes a new station and a new rail link to Bellville CBD, as well as the restructuring of the current BRT and urban bus routes, to close the transportation network. It promotes a positive development oriented environment through the introduction of resilience, sustainability, efficiency, equity, integration, balance, choices, safety, security, urbanity, efficiency and a sense of place. It also addresses developmental requirements by introducing stronger initiatives to redress past injustices and to promote inclusivity and public led investment decisions in order to overcome social and cultural polarization.

The design proposal also promotes the idea of a positive performing environment, walkways and efficient public transportation, which can result in the promotion of small scale entrepreneurial activities by providing for access to quality facilities through the more efficient movement of people.

Lastly, the design proposal shows that by increasing accessibility to economic and social opportunities for all of Cape Town's residents, via access to public transportation and quality services and facilities, social and economic mobility can

be enhanced. This can also reduce direct and indirect costs for households and employers to participate in the economy and it can result in improved entrepreneurship, economic growth, and investment.

REFERENCES

Abercrombie, P. 1944. *Greater London Plan*. London: Ministry of Housing and Local Government.

Allen, A. 2009. Sustainable Cities or Sustainable Urbanisation? *Palette UCL's Journal of Sustainable Cities,* 1: 2.

Arbury, J. 2005. From Urban Sprawl to Compact City–An Analysis of Urban Growth Management in Auckland. Unpublished Thesis, Auckland University, Auckland.

Autler, G. and Belzer, D. 2002. Transit Orientated Development: Moving from Rhetoric to Reality. The Brooking Institution Centre on Urban Metropolitan Policy. (Unpublished).

Babe, A. 2016. *There's a Message for City Planners in Cape Town Plumbing Poll*. [Online] Nextcity.org. Available at: https://nextcity.org/features/view/khayelitsha-cape-town-toilets-plumbing-poverty-data-collection [Accessed 20 Oct. 2016].

Banerjee, T. and Baer, W. 1984. Introduction In Beyond the Neighbourhood Unit: Residential Environments and Public Policy. New York: Plenum Press. p. 1-11.

Behrens, R. and Watson, V. 1996. Making Urban Places: Principles and Guidelines for Layout Planning. Urban Problems Research Unit, University of Cape Town. (Unpublished).

Botha, M. 2015. Development of the Northern Growth Corridor in Cape Town: Towards a More Sustainable City. Masters Dissertation, University of Cape Town.

Burdett, R. and Rode, P. 2007. The Urban Age Project. In Burdett R & Sudjic, D. (Eds), *The Endless City. The Urban Age Project by the London School of Economics and Deutsche Banks Alfred Herrhausen Society.* London: Phaidon Press.

Burgess, R. and Jenks, M. Eds. 2002. *Compact Cities: Sustainable Urban Forms for Developing Countries*. Place: Routledge.

Burgess, R., 2000. The compact city debate: A global perspective. *Compact cities: Sustainable urban forms for developing countries*, pp.9-24.

Burton, E. 2000. The Compact City: Just Or Just Compact? A preliminary analysis. *Urban studies,* 37(11): 1969-2006.

Calthorpe, P. 1993. *The Next American Metropolis: Ecology, Community and the American Dream.* New York: Princeton Architectural Press.

Cape Town Municipality. *PRASA Rail Network*. Cape Town: Municipality, 2012. Print.

Cato Manor Development Association. 2016. *CMDA - Overview.* [Online] Cmda.org.za. Available at: http://www.cmda.org.za/overview.htm [Accessed 10 Aug. 2016].

Cereda, V. 2009. The Compact City and Densification Strategies: The Case of Gothenburg. Master's Thesis, Bleking Institute of Technology. Sweden

City of Cape Town. 1999. *City of Cape Town Municipal Spatial Development Framework.* Cape Town. Cape Town: province of Western Cape.

City of Cape Town. 2012. *City of Cape Town Municipal Spatial Development Framework.* Cape Town. Cape Town: province of Western Cape.

City of Cape Town. 2016. *City of Cape Town Built Environment Performance Plan 2015/ 2016*. Cape Town: City of Cape Town. Cape Town: province of Western Cape.

City of Cape Town. State of Cape Town.20. Cape Town: province of Western Cape.

Collard, R.C, Dempsey, J. and Sundberg. J. 2015. 'A Manifesto for Abundant Futures'. *Journals of the Association of American Geographers*, 105:2, pp. 322 – 330.
Crimestatssa.com. 2016. Crime Stats SA - Crime Stats Simplified. [Online] Available at: http://www.crimestatssa.com/topten.php [Accessed 1 Sep. 2016].

Dalbert, C. 1997. *Coping With an Unjust Fate: The Case of Structural Unemployment*. Social Justice Research, 10(2), pp.175-189.

Daws, D. 2016. *Engineering News Housing backlog at 2.1m, says Minister Sisulu*. [Online] Available at: http://www.engineeringnews.co.za/article/housing-backlog-at-21m-says-minister-sisulu-2016-04-22 [Accessed 3 July 2016].

Dewar, D and Uytenbogaardt, R. S. 1991. *South African cities: A manifesto for change*. Cape Town: Urban Problems Research Unit, University of Cape Town.

Dewar, D. and Louw, P. n.d. Seeking Qualities of Urbanity through Design. (Unpublished manuscript).

Dewar, D. and Todeschini, F. 2004. *Rethinking Urban Transport after Modernism*. Aldershot, Hants, England: Ashgate Publishing.

Dewar, D. and Uytenbogaardt, R. 1995. *Creating Vibrant Urban Places To Live.* Cape Town: Head start Developments, New Housing Company (NewCo).

Dieleman, F. and Wegener, M. 2004. Compact City and Urban Sprawl. *Built Environment*, 30(4), 308-323.

Dimitrova, G and Mandov, K. 2016. *Global Trends of Urbanization - MORPHOCODE*. [Online] Morphocode.com. Available at: http://morphocode.com/global-trends-urbanisation/ [Accessed 3 Sep 2016].

Elsheshtawy, Y., Jacobs, A.B., Macdonald, E. and Rofe, Y., 2004. *The Boulevard Book: History, Evolution, Design of Multiway Boulevards.* http://www.jstor.org/stable/43031070?seq=1#page_scan_tab_contents [Accessed 18 Sep. 2016].

Epwp.gov.za. (2013). Welcome to EPWP. [Online] Available at: http://www.epwp.gov.za/ [Accessed 13 Oct. 2016].

Ewn.co.za. (2016). *Cape flood victims have nowhere to go.* [Online] Available at: http://ewn.co.za/2013/08/19/Cape-flood-victims-have-nowhere-to-go [Accessed 13 Jun. 2016].

Fainstein, S and Campbell, S. 2000. *Readings in Planning Theory.* Malden, MA: Blackwell.

Fincher, R. and Iveson, K. 2012. Justice and Injustice in the City. *Geographical Research*, *50*(3),.231-241.

Fujita, K. 2009. Urban Justice and Sustainability. Francis and Taylor: 377-385.

GABS. 2016. *Golden Arrow Bus Services • Cape Town's Favourite Bus since 1861 - Golden Arrow Bus Services, the Bus for Us*. [Online] Gabs.co.za. Available at: http://www.gabs.co.za/ [Accessed 6 Aug. 2016].

GAPP, Urban Solutions. 2004. Newtown North Urban Design Framework. Prepared for Johannesburg Development Agency. (Unpublished).

Gasson, B. 2007. *Nature, Cities and Impact Assessment: P A Conceptual Framework*. School of Architecture, Planning and Geometrics. University of Cape Town. Lord Charles, Somerset West. 5-7 November.

Gaston, K.J., 2010. *Urban Ecology*. Cambridge: Cambridge University Press.

Geddes, P. 1949. *Cities in Evolution.* [Online] Avaialble at: http://203.200.22.249:8080/jspui/handle/2014/4063 [Accessed 10 Sep. 2016].

Geography.name. 2016. *Apartheid/Post-Apartheid*. [Online] Available at: http://geography.name/apartheidpost-apartheid/ [Accessed 19 Jun. 2016].

Globalpartnership.org. 2016. *Global Partnership for Education*. [Online] Available at: http://www.globalpartnership.org/education [Accessed 5 Sep. 2016].

Horn, A. 2009. The Life and Death of Urban Growth Management in the Gauteng Province. Masters Dissertation, University of Pretoria.

Jacobs, A.B., 1993. Great streets. *ACCESS Magazine*, *1*(3).

Jacobson, J. and Forsyth, A. 2008. Seven American TODs: Good Practices for Urban Design in Transit-Oriented Development Projects. *Journal of Transport and Land Use*, 1(2).

Landsman, K and Ntobela, N. 2006. Opening Up Spaces for the Urban Poor in the Urban Form: Trends, Challenges and Their Implications for Access To Urban Land. Urban Landmark Position Paper 7. Paper Prepared For *The Urban Land Mark Seminar*, November 2006, Mulderdrift.

Lawson, L. 2009. 'The Neighbourhood Unit: Physical Design or Physical Determinism?' *Journal of Planning History,* 2009 (8): 111.

Le Grange, L., Dewar, D., and Louw, P. 2004. A Spatial and Design Concept for the Klipfontein Corridor. Prepared for the Department of Public Works, PG: WC, 2004. (Unpublished).

Msomi, S. 2016. *Overview of the Spatial Planning and Land Use Management Act, 2013 ("SPLUMA") and Its Regulations | Lexology*. [Online] Lexology.com. Available at: http://www.lexology.com/library/detail.aspx?g=dc21b3d0-c543-42f9-b93c-ec389b52e976 [Accessed 4 Sep. 2016].

Mumford, L., 1953. *Roots of Contemporary American Architecture.*

Nicholson, Z. 2014. *70 Years to Eradicate Cape Town Housing Backlog:* Cape Times. [Online] Available at: http://www.iolproperty.co.za/roller/news/entry/70_years_to_eradicate_cape [Accessed 5 Aug. 2016].

Nordberg-Schulz, C. 1980. *Genius Loci: Towards a Phenomenology of Architecture.* New York: Rizzoli.

Parnell, S. and Mabin, A. 1995. Rethinking Urban South Africa. *Journal of Southern African Studies*, *21*(1), pp.39-61.

Perry, C. 1998. *The Neighbourhood Unit (1929).* London: Routledge. (Reprinted 1998).

Pieterse, E. 2010. *Counter-Currents: Experiments in Sustainability in the Cape Town Region.* Auckland Park, South Africa: Jacana Media.

Pistorius, P. 2002. *Texture and Memory: The Urbanism of District Six.* Second ed. Cape Town: Cape Technikon.

Priemus, H and Zonneveld, W, 2003. What are corridors and what are the issues? Introduction to special issues: the governance of corridors. *Journal of transport Geography*, Volume 11, Issue 3, September 2003, Pages 167-177.

Robinson, J., 1996. *The Power of Apartheid: state, power, and space in South African cities*. Butterworth-Heinemann.

Ross, P. and Cabannes, Y. 2012. 21st Century Garden Cities Of To-Morrow - How To Become A Garden City. Letchworth Garden City: New Garden City Movement.
Sahistory.org.za. 2016. *South African History Online | towards a peoples history*. [Online] Available at: http://www.sahistory.org.za [Accessed 17 Aug. 2016].

Salat, S., Labbé, F., Nowacki, C. and Walker, G. 2011. *Cities and Forms*. [Paris]: CSTB Urban Morphology Laboratory.

Southwood, B. 2007. *City Squares in Cape Town's Townships - Public Space as an Instrument of Urban Transformation: The Origins, Objectives and Implementation Of The City Of Cape Town's Dignified Places Programme* [Online] Available at: http://www.resilientcity.org/index.cfm?id=11449 [Accessed 1 July 2016].

Sustainable Urban Futures. (2016). *Cities and Climate Change – Sustainable Urban Futures*. [Online] Urban.ias.unu.edu. Available at: http://urban.ias.unu.edu/index.php/cities-and-climate-change/ [Accessed 1 Sep. 2016].

Sutton. M. 2016. 21 *Key Cities Where Cycling is growing its Modal Share.* Accessed 19 August 2016.https://cyclingindustry.news/five-key-cities-where-cycling-is-taking-modal-share-from-cars/

Swilling, M. and Davison, A. 2010. *Sustaining Cape Town.* Stellenbosch, South Africa: Sun Media.

Tree Hugger. 2016. *Climate Change Impact World Map Unveiled*. [Online] Available at: http://www.treehugger.com/corporate-responsibility/climate-change-impact-world-map-unveiled.html [Accessed 3 Sep. 2016].

Un.org. 2016. *Water scarcity | International Decade for Action 'Water for Life' 2005-2015*. [Online] Available at: http://www.un.org/waterforlifedecade/scarcity.shtml [Accessed 1 Sep. 2016].

UNHabitat. 2016. *Climate Change – UN-Habitat*. [Online] Unhabitat.org. Available at: http://unhabitat.org/urban-themes/climate-change/ [Accessed 1 Sep. 2016].

United Nations. 2014. *World Urbanization Prospects: Highlights*. Department of Economic and Social Affairs. New York.

Van Grunsven, L. 2003. *Compact Cities: Sustainable Urban Forms for Developing Countries,* Mike Jenks and Rod Burgess (Eds.). Journal of Housing and the Built Environment, 18(4), pp.387-391.

Warnich, S. Verster, B. 2005. The Answer Is: Corridor Development, But What Is The Question? *Proceedings of the 24th Southern African Transport Conference.* Pretoria, South Africa, 11-13July 2005. Transformation Technologies cc.

Watson, V. 2009. 'The Planned City Sweeps The Poor Away…' Urban Planning and 21st Century Urbanisation. *Progress in Planning*, 72(3), Pp.151-193.

Wilkinson, P. 1994. *The 'Package of Plans' Process: An Innovative Approach to the Planning of Major Urban Redevelopment Projects in Cape Town, South Africa*. Cape Town. South Africa.

Yeang, L.D. 2000. *Urban Design Compendium.* Online] Available at: ttp://cfg.homesandcommunities. co.uk/sites/default/files/book/udc/ community-engagement/1110_udc1_final_artwork_ 120306-optimized.pdf [Accessed 13 October 2016].

APPENDIX A

Residential

The residential land includes a variety of affordable housing and tenure options. It is important to meet housing and social rental housing needs; to ensure that it is an inclusive residential market and to create diversity and choice. These housing typologies can range between three to four storey walk ups, with higher densities along the Corridor spine.

Mixed Use

The mixed use zones are important because they provide a variety of activities that include commercial, residential, business as well as different public facilities. The mixed use areas along the Corridor spine will have retail and commercial activity on the lower level and residential units above.

Institutional

This refers to any public facility; it can entail education, health, social and service facilities. Following the proposed concept these are usually located in accessible areas, close to public transportation routes.

Public Open Spaces

A hierarchy of public open space is found throughout the area, following the principles discussed in the metropolitan concept, ranging between metropolitan, sub-metropolitan and local scales.

Light Industrial

The light industrial areas include non-noxious activities. They are indicatively used to promote the growth of small scale manufacturing and small businesses.

Agriculture

The protection of agricultural land is vital for food security and therefore such areas are classified as no–go areas within the framework.

Informal Settlement Upgrading

This refers to existing informal settlements that should be upgraded. This will be done incrementally.