Tygerberg

Integrated district spatial development framework and environmental management framework

Vol. 1: Baseline and Analysis Report

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CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

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1 INTRODUCTION

This District SDF is a review of the 2012 District Spatial Plan (DSP) and provides up to date spatial planning guidance for one (1) of eight (8) planning Districts in the City. This process follows the City's commitment to review the District Plans periodically on a ten (10) year basis or when a need arises due to, inter alia, changing trends in the natural environment, built environment, population trends/composition and/or in the legislative environment.

1.1 Structure of the District SDF Suite of Documents

At this stage the SDF suite of documents and the respective main subordinate categories are illustrated in the diagram below.

Figure 1: Structure of the DSDF

1.2 Baseline and Analysis Report

The purpose of the Baseline and Analysis Report (BaAR) is to identify the development parameters that will inform the spatial development framework intended to manage the future growth of the Districts in a manner that is sustainable, resilient, equitable and contextually appropriate.

The formulation of the baseline and analysis report uses a spatial layering approach to extract the **constraints** and **opportunities** for the respective structuring elements

under investigation in each district. This is required to identify appropriate spatial interventions to **mitigate** against constraints and **enhance** opportunities in order to build integrated and resilient communities. The intent is to enable environments that support the natural, social, physical, and economic integration of people into the existing urban fabric and establish quality living environments for all – refer to Figure 2 below.

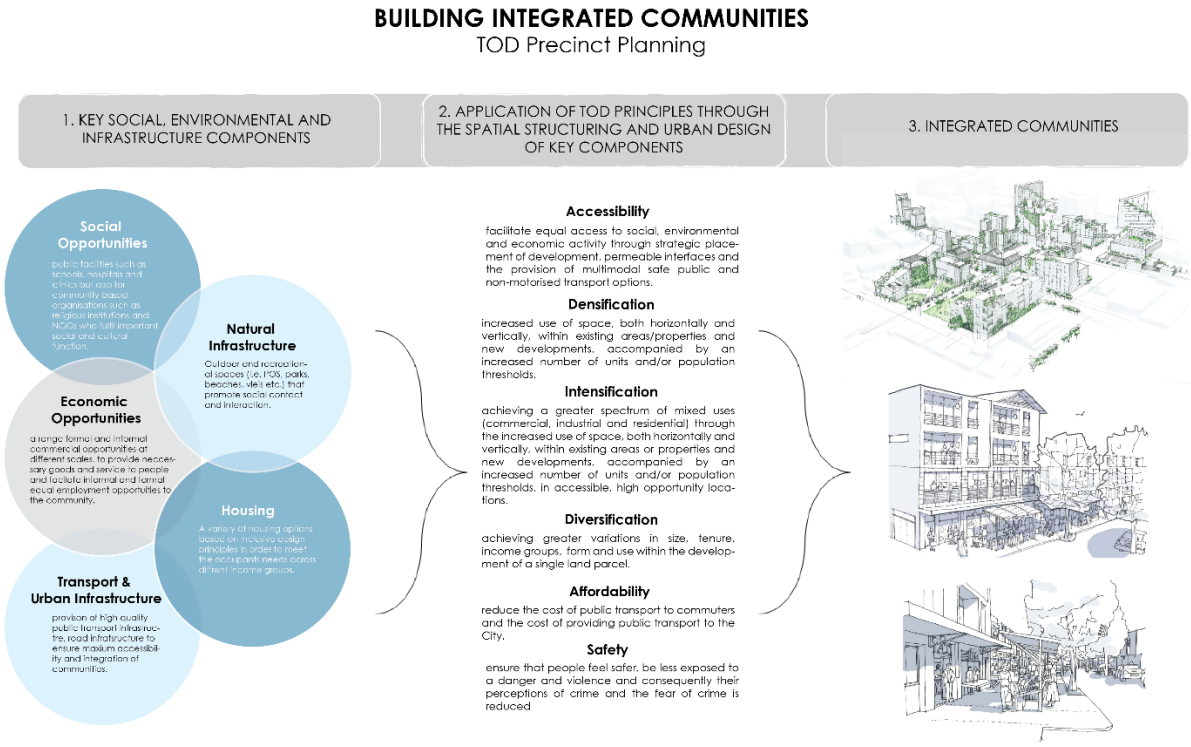


Figure 2: Building integrated communities

The narratives for the respective layers in the baseline and analysis report have been structured using the following approach, by answering the three main questions below:

1. **What is there and what are the trends?** This entails a brief description of the status quo, showing the trends since 2012, i.e. projects built, pressures, constraints and the opportunities;

2. **What does this mean and what are the implications?** This entails an indication of the implications of the above constraints or opportunities for spatial planning (District SDF), i.e. where are is available, physical space and where is more needed. Where are land use guidelines or policies, or interventions, e.g. physical projects, needed;

3. **How is this linked to other elements/layers?** This is the synthesis, that has not been completed, but explores the interrelationship between the constraints and the opportunities as they relate to the various layers analysed as they all work together to form the basis for plan making, using an analysis informs plan making approach.

1.3 The Structure of the Baseline and Analysis Report

As explained above, under Paragraph 1.8, the Baseline and Analysis Report is divided into the following main sections that aim to respond to at least the following questions for the respective sections:

1.3.1 State of the Population:

a. What is the current socio-economic profile of the population?
b. What is current and forecasted growth of the population per district? This is required to identify the projected impact of future growth on the natural and urban environment, and how best to plan for said growth.

1.3.2 State of the Environment:

a. This will serve as the baseline for the EMF for the District;
b. Are there areas of ecological and environmental significance which must be conserved/protected from urban development, and where are they located?
c. Are there areas of cultural significance which must be conserved and protected from inappropriate development which negatively impacts the heritage qualities and value of the area, and where are they located (i.e. the HPOZ and proposed HPOZ)?
d. What are the bio-physical features of the district that may constrain any form of future development (i.e. rivers, wetland, topography etc.)?
e. Which areas require appropriate development guidelines in relation to interfaces with the natural environment in order to mitigate negative impact?
f. Which areas are appropriate for environmental and heritage exemptions or designations (in terms of NEMA and NHRA)?

1.3.3 State of the Built Environment:

a. What and where are the current development trends and pressures in the district?
b. What is the current state of supply and demand for transport and urban infrastructure, social and recreational facilities and housing to enable more integrated and resilient communities?
c. What areas currently have capacity for intensification of land use and which areas require upgrades to the current transport, social, recreational, urban infrastructure to enable further intensification of land use?
d. What is the current state of transport accessibility and mobility in each district of the city (internally and externally)? This will help identify areas appropriate for intensification (densification and diversification).

e. What is the extent of underutilised and/or vacant land in the district?

1.3.4 State of the Economy and Property market:

a. What is the state of employment/unemployment?
b. What are the best-performing industries, that offer competitive advantages?
c. What are the best-performing property markets in the district and which areas offer the most property market potential?

1.3.5 Risk and resilience:

a. What are the risks to the future sustainability of the City and its citizens?
b. What and where are the setback or proximity parameters that may impact on future development?
c. How can spatial development promote social inclusion, physical connectivity and equitable travel to optimise carbon emission reductions?
d. What is the level of vulnerability and resilience of current areas in the district?

1.4 Key informants and limitations of the Baseline and Analysis Report

Whilst every attempt has been and will be made to ensure the information in the BaAR document is accurate it cannot be guaranteed that it is up to date at all times. This is because the information is subject to the availability of information, the time period for when it is available and valid and the credibility of the source. Given the aforementioned and the fact that the District SDF and its implementation period is only for ten years the approach has not been to ensure that every statistic is 100% accurate and undeniably the most recent. However, the authors have opted to rather use the general trends relating to the statistics and not the absolute numbers and will draw the main issues and opportunities for the formulation of proposals and guidelines.

A: STATE OF THE POPULATION

2 DEMOGRAPHICS

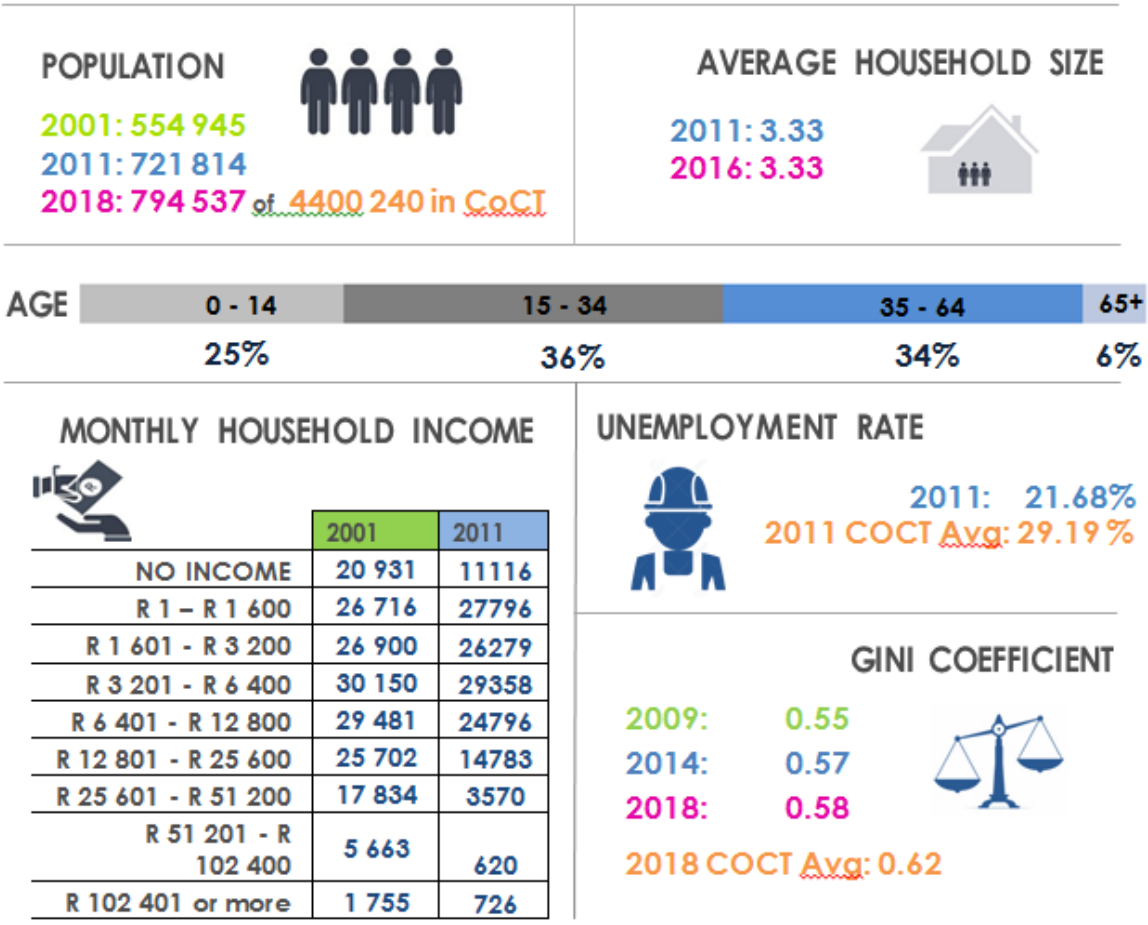
2.1 Overview

The population in Tygerberg almost doubled between 2001 and 2011, with an annual population growth rate around 1.23%. Remarkably, despite this rapid increase the unemployment rate remained relatively constant.

The household growth rate in the district was slightly faster than the population growth rate, which indicates a slight trend in the district of decreasing household sizes. While we can expect demand from households splitting into smaller units, not only from increasing populations, this is not a strong force in comparison to the rest of the City.

Overall, about three quarters of the population in Tygerberg live in formal housing, while less than a quarter live in informal housing, including stand alone and back yard shacks. Areas of informality are clustered mainly in Bonteheuwel, Bishop Lavis, parts of Belhar, Delft and Kalkfontein. These areas, also among those which have relatively lower average household incomes in the district, make them more vulnerable to stresses and shocks.

At 0.58, Tygerberg has a slightly lower Gini-coefficient than the Cape Town average of 0.62 and the national average of 0.63. However, South Africa has one of the highest levels of income inequality as indicated by its Gini-Coefficient, in the world. Thus despite being below the local average this is still a key issue in the district.



	2001	2011
NO INCOME	20 931	11116
R 1 – R 1 600	26 716	27796
R 1 601 - R 3 200	26 900	26279
R 3 201 - R 6 400	30 150	29358
R 6 401 - R 12 800	29 481	24796
R 12 801 - R 25 600	25 702	14783
R 25 601 - R 51 200	17 834	3570
R 51 201 - R 102 400	5 663	620
R 102 401 or more	1 755	726

Figure 3: Summary of demographics in Tygerberg

2.2 Population

2.2.1 Growth

The population of the Tygerberg District was estimated to be 794537 at the end of 2018. The district is the second most populous in the City and its percentage share of the total population has increased since 2011.

The districts population has seen an average annual growth rate of just over 1.44% between 2011 and 2018. The rate of growth in the district decreased significantly from 3.01% between 2001 and 2011(See Table 1 and Figure 4 below). The high growth rate between 2001- 2011 may inter alia be attributed to developments in areas such as Delft (N2 Gateway Project). While the district experienced a higher average growth rate compared to the city-wide average of 2.93 % between 2001 and 2011, between 2011 and 2016 the Tygerberg district experienced a lower average annual growth rate of 1.23 % compared to the metro average of 2.32 %. This trend is illustrated in Figure 4 and could be attributed to less people coming into the district, i.e. new subsidised housing developments accommodated households residing already in the district.

Table 1: Population trends

District	2001	Average annual growth rate 2001-2011	2011	Average annual growth rate 2011-2018	2018
Tygerberg	554 945	3.01%	721 814	1.44%	794 537
Metro Average	2 893 399	2.93%	3 740 026	2.32%	4 400240

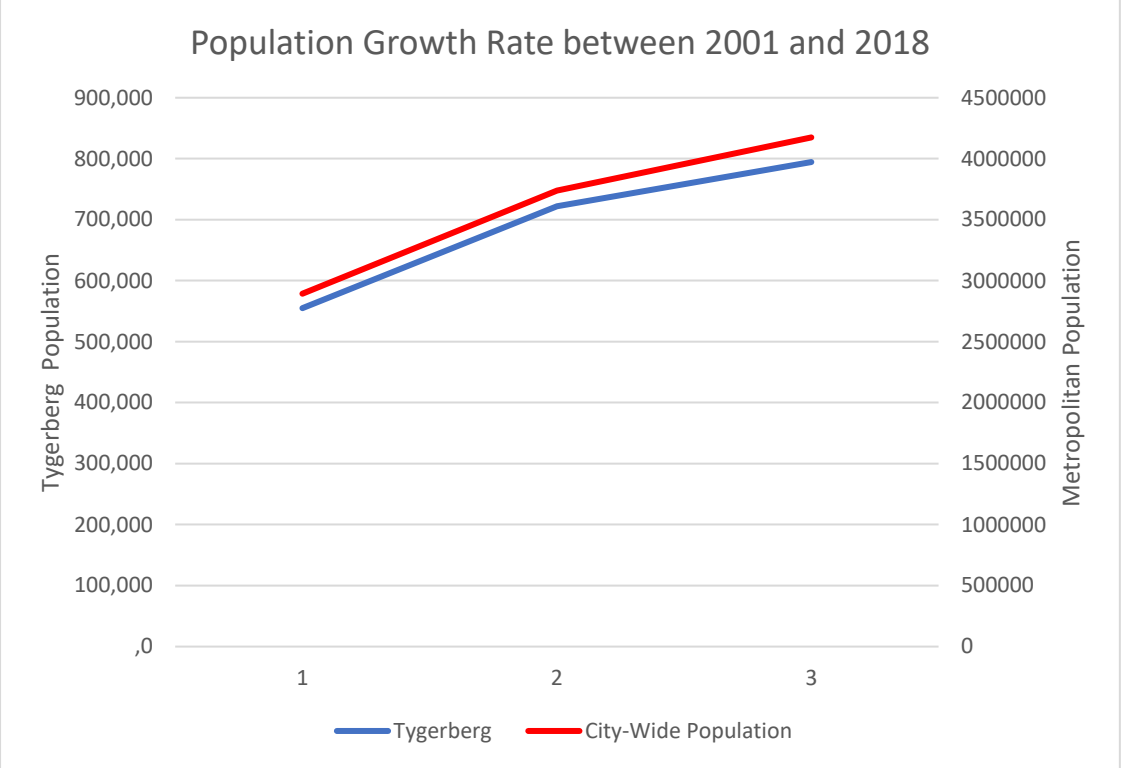


Figure 4: Change in population growth rates

2.2.2 Spatial Distribution

The highest concentration of population in the district is located mostly south of Voortrekker Road in areas such as Elsies River, Bishop Lavis, Bonteheuwel, Kalksteenfontein, Delft as well as areas in Kuilsriver, west of Van Riebeeck Road in the Kalkfontein area as can be seen in the accompanying map depicting population growth between 2011 and 2018.

Lower concentrations of people are primarily found north of the N1 freeway and include inter alia neighbourhoods such as Welgelegen, Panorama, Plattekloof, Monte Vista, Baronetcy estate, Burgundy estate, etc. as well as older neighbourhoods in the Bellville Area such as Oak Glen. Other low concentrations are found east of Van Riebeeck Road in areas such as Soneike, Amandelrug and Amandelsig, St Dumas and Zevenwacht.

When comparing the above analysis to the estimated 2018 population densities, per subplace, for the district, it reflects that areas such as Bonteheuwel, Bishop Lavis, Delft and Kalkfontein (Kuils River) have the highest population densities.

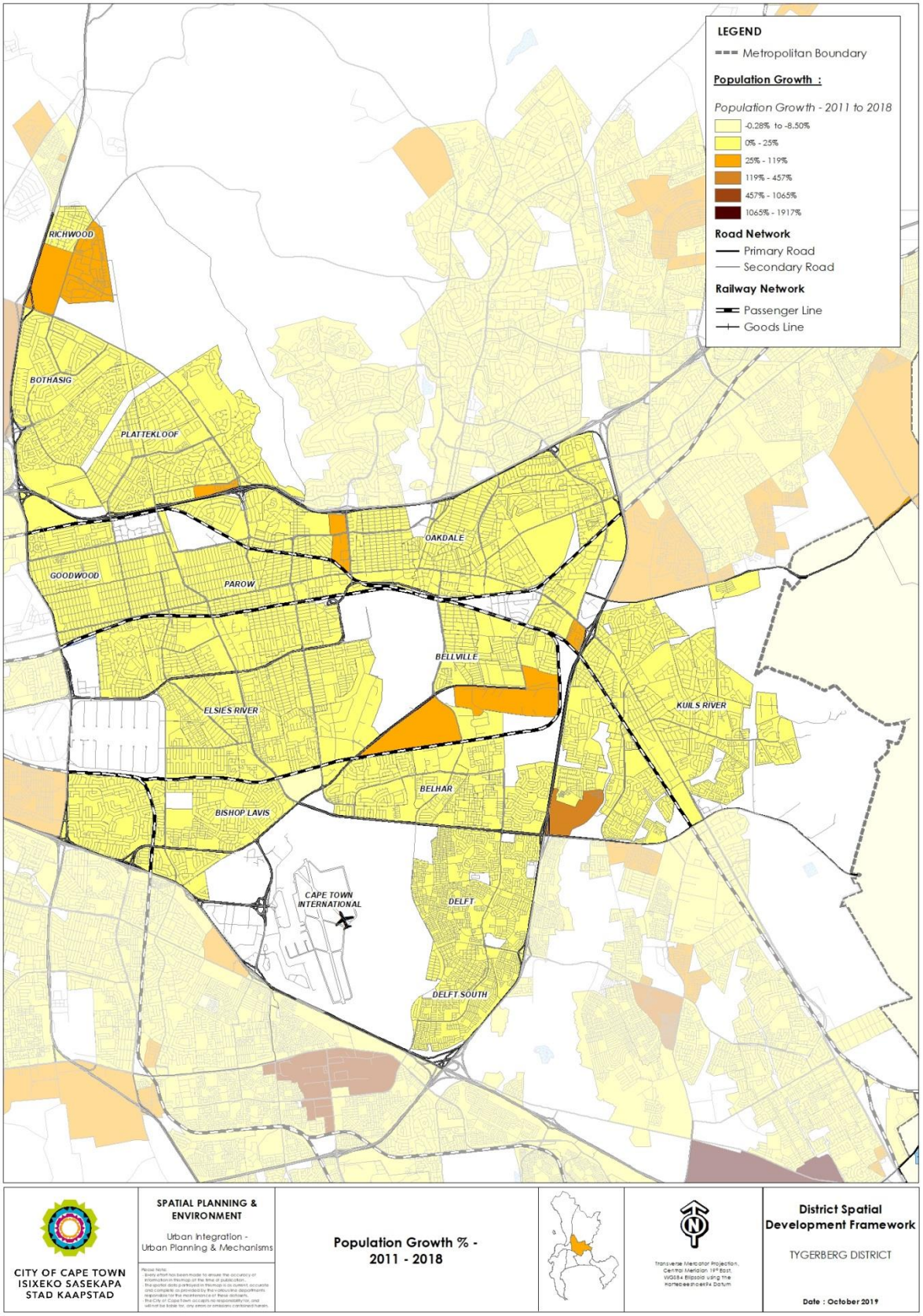


Figure 5: Population growth by sub-place between 2011 and 2018

The population growth in the district can be regarded as being uniform, to a large extent, as can be seen in the accompanying map in Figure 5 above, depicting population growth between 2011 and 2018 (projection).

The areas that have experienced a greater population growth between 2011 and 2018 include the extension to Plattekloof, i.e Baronetcy estate, and further to the west the Burgundy estate, the Haasendal area in Kuils River and the Kalkfontein area.

With regard to densities within the district, the areas of Delft, Bonteheuwel, Elsies and Bishop Lavis reflect the highest densities per subplace. The map in Figure 6 below depicts the Gross Population Densities[1] of the Tygerberg District (2018 projection).

[1] Gross population density is calculated per Census subplace area. It is calculated as the number of people per square kilometre within a subplace.

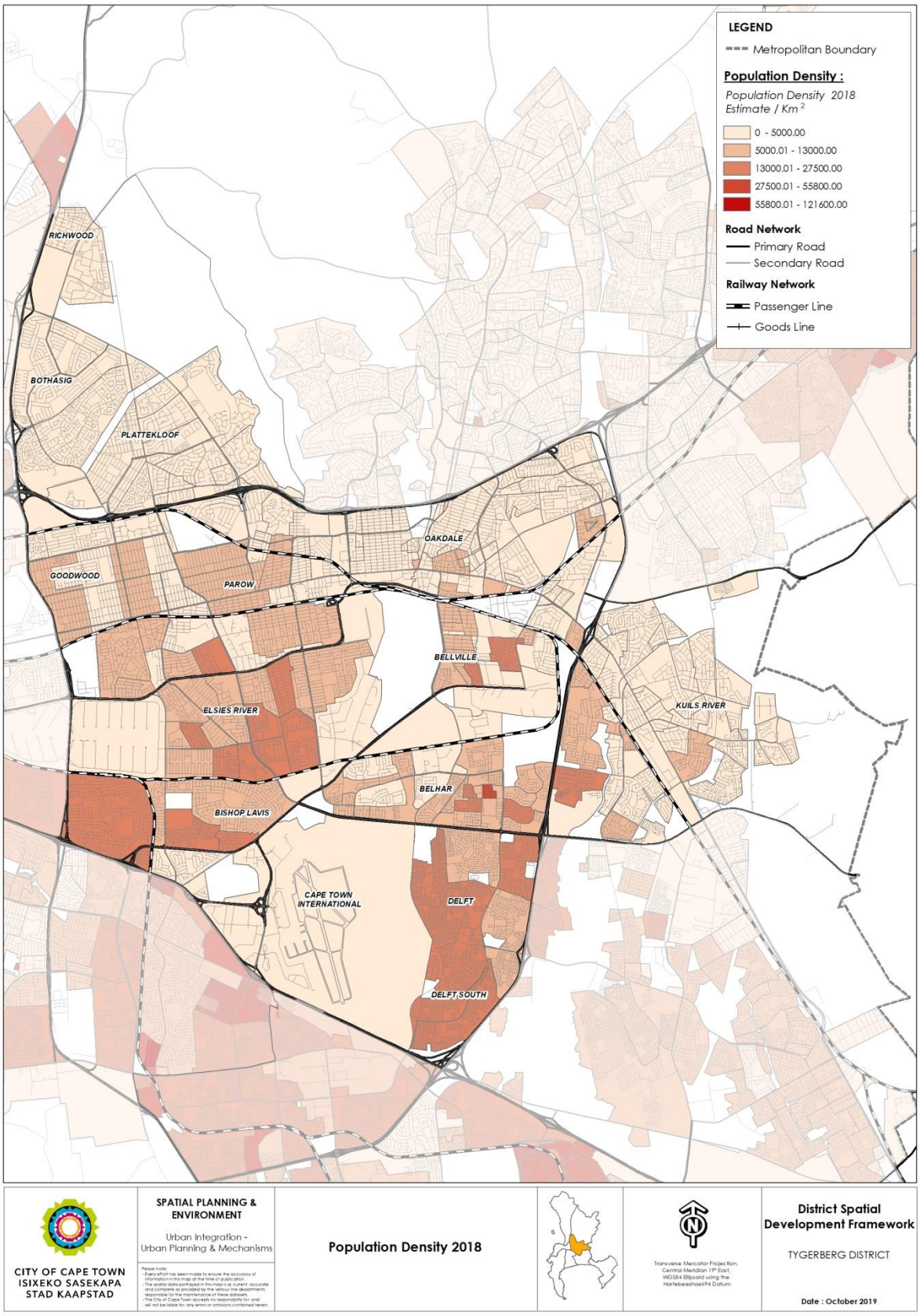


Figure 6: Gross population density by sub-place

Note on Population and Household Estimates:

The estimated dwelling units and population by census sub-place to 2018 should serve as a reasonable estimate only. Assumptions regarding fertility, mortality, migration and the prevalence patterns and future spread of HIV and AIDS were not made. Population and household data is from multiple sources including Census 2011; Aerial Photography Counts 2011; Estimated Growth in Formal Dwelling Units and Population from October 2011 to end December 2017; the Solid Waste 2017 Count and CGIS 2018 roof count. While every effort has been made to ensure duplication does not occur, these sources have different categories and use a variety of methods to obtain these counts. These figures are illustrative of broad trends only. Second and third Dwellings (Formal) are included in the formal estimates. Informal Backyard dwellings are only partially accounted for.

To avoid distortion of density-related data, sub-places with fewer than 20 households in the 2011 Census data are also excluded.

2.2.3 Population Structure

An overview of the population structure of the Tygerberg District is provided in Table 2 below: Note that this section uses the 2011 Census data which may be regarded as outdated to some degree.

Table 2: Age distribution of population (2011 Census)

	0 - 14		15 - 34		35 - 64		65 +		Dependency Ratio
	Number	%	Number	%	Number	%	Number	%	
Tygerberg	177 543	24.60	258 384	35.80	241 977	33.52	43 884	6.08	44.25
City of Cape Town Metro Average	928 302	24.82	1414 230	37.81	1189 971	31.82	207 474	5.55	42.90

2.2.3.1 Age Distribution

The population pyramid for the district is shown in the Figure below to highlight the structure of the population in Tygerberg.

A high percentage of the population in the Tygerberg District falls within the age categories between 15 and 30 years, defining Tygerberg to have a predominantly youthful population.

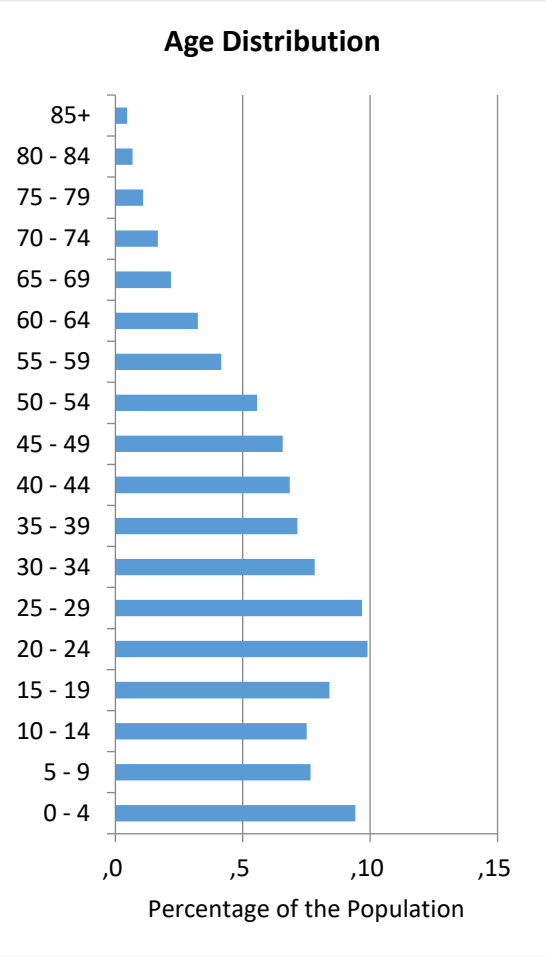


Figure 7: Population pyramid as per 2011 census

When comparing the District to the Metro Average in Table 2, Tygerberg District has a very similar age distribution to the City of Cape Town as a whole.

The dependency ratio (a measure of the number of people in the potential labour force in relation to those in the "dependent groups," that consists of the youth and aged) for the Tygerberg District is at 44.25.

In comparison to the Metro average, this value is higher as shown in the above Table. Furthermore, Tygerberg District has the third highest Dependency Ration in comparison to all other Districts of Cape Town, further emphasizing the youthful population structure that the District holds.

Between 2001 and 2011 the Tygerberg District saw an increase in the percentage of the population in the labour force age category (15 – 64), while the percentage of youth and aged in the district both decreased.

2.2.3.2 *Education (aged 20+)*

The Tygerberg District has very similar levels of education to the Metro City averages as displayed in Figure 8 and Table 3 below. Approximately 14 % of adults in the district have completed some form of higher education and only 1.53 % of the population has had no form of schooling.

Table 3: 2011 census education statistics

	No Schooling		Matric		Higher Education	
	2001	2011	2001	2011	2001	2011
Tygerberg District		1.53 %		30.27 %		13.96 %
City of Cape Town Average	4.2 %	1.8 %	25.4 %	30.2 %	12.6 %	16.2 %

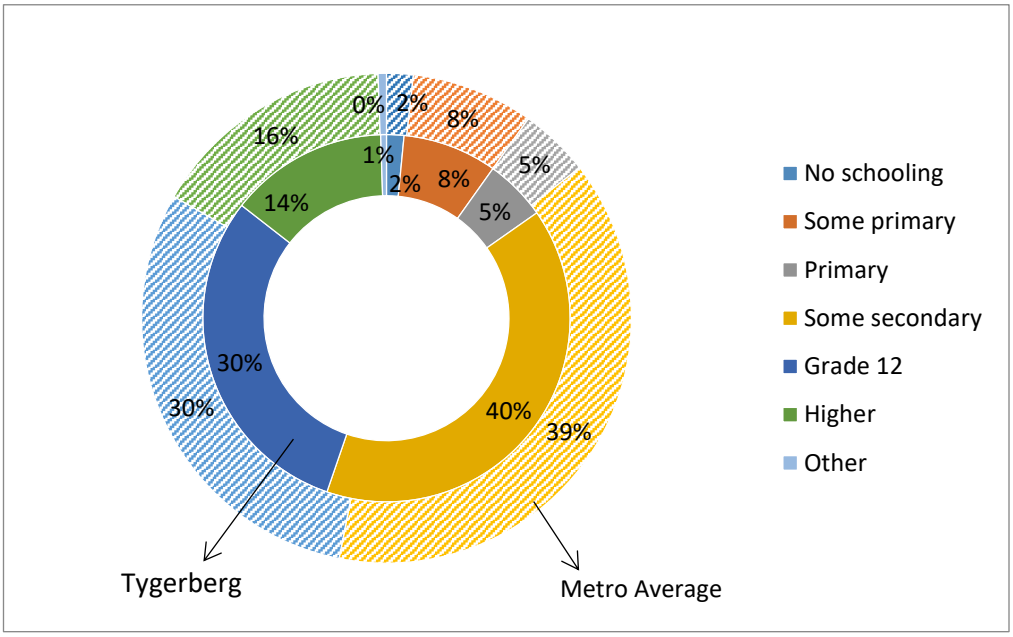


Figure 8: Graph of education statistics

2.3 Households

The following section provides an overview of the households in the Tygerberg District. The definition of a household is a group of persons who live together and provide themselves jointly with food or other essentials for living, or a single person who lives alone (Census 2011).

The number of Households in the Tygerberg District was estimated to be 200 343 at the end of 2016. The district contains the second highest number of households in the city. The average household size for the district was 2.90 in 2016.

2.3.1 District Trends

The number of households increased by 3.25 % between 2001 and 2011 and a further 1.98 % between 2011 and 2018, as shown in Table 4. The average annual rate of household growth has decreased substantially between 2011 and 2018, by more than a percent when compared to the rate of growth between 2001 and 2011. The decrease in number of households may be attributed to a slower pace of residential development in the district, that includes the level of delivery of more affordable/ subsidised units. In both periods, the average annual growth rate of household value has been higher than the population growth rate of the district for the equivalent periods.

Concurrently, the average household size decreased in both periods. The rate of decrease in household size increased significantly between 2011 and 2018 in the District.

Matching the city-wide trends, the effects of the increases in population in the Tygerberg District are further intensified by the increase in the number of households and decrease in the average household size. The reason(s) for the decrease in household size is difficult to determine from the information at hand.

Table 4: Household growth

		2001	Average annual growth rate 2001-2011	2011	Average annual growth rate 2011-2018	2018
Households	Tygerberg	139 754	3.25%	185 173	1.98%	210846
	Cape Town Total	776 781	3.76%	1 068 573	3.29%	1315015
Average Household Size	Tygerberg	3.97		3.90		
	Cape Town Average	3.72	- 0.60%	3.50	-0.62%	3.39

2.3.2 Spatial Distribution

Within the Tygerberg District, the distribution of households closely mimics the distribution of population, which is expected. Throughout the district, there is a range of household sizes. The only area that has shown a noticeable increase in households for the period 2011- 2018, is the Kalkfontein area in Kuils River.

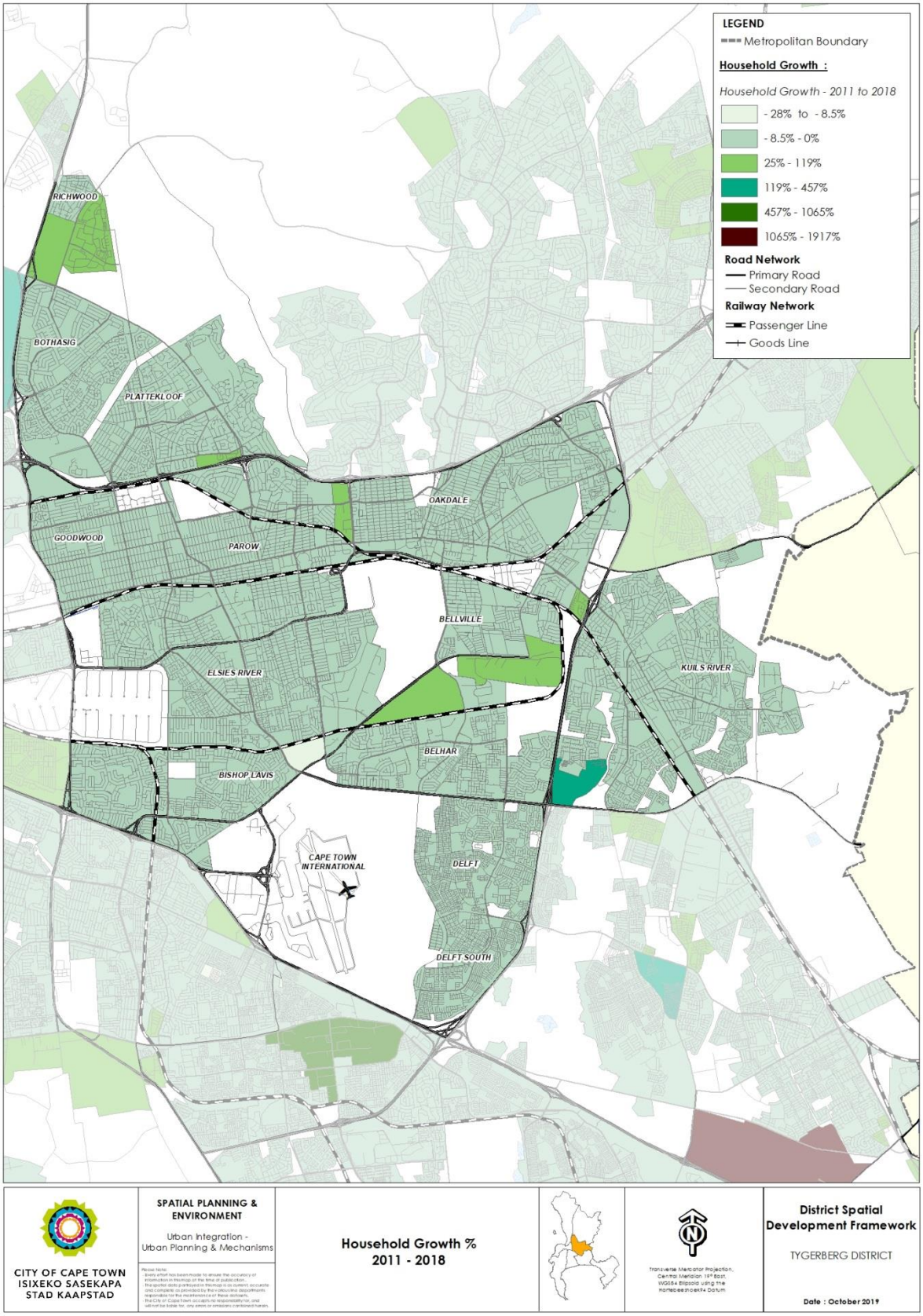


Figure 9: Household growth rate between 2011 - 2018

2.4 Employment

In 2011, 70% or 500 382 people of the Tygerberg District's population were of working age (15 to 64 years). Of the working age population, approximately two thirds is made up the 314 700 persons that form part of the strong labour force, with the remaining third classified as 'Not Economically Active'.

It should also be noted that there is a relatively large percentage of the population that are 'Not Economically Active', and a very small percentage of the group is identified as 'discouraged work-seekers' (14 625 people in the District). With the district having a large number of students/scholars, homemakers and pensioners, this not economically active percentage can increase over time.

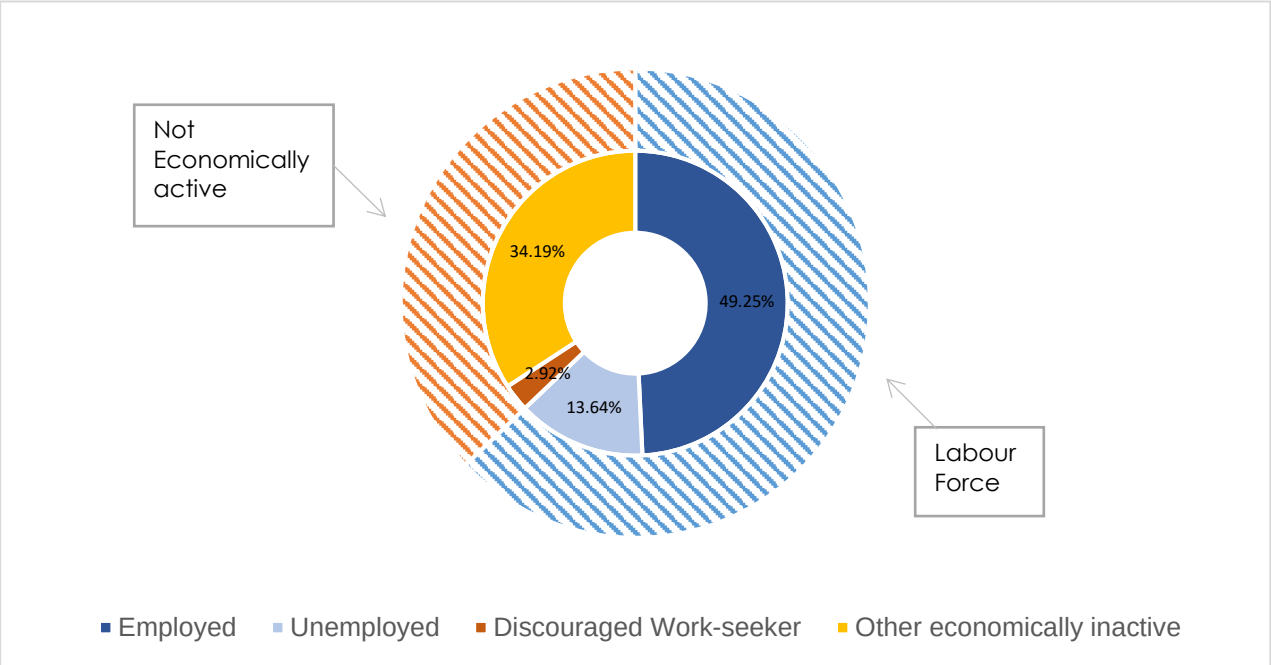


Figure 10: Overview of employment status as per 2011 census

2.4.1 Employment and Unemployment

Tygerberg District has a large employed labour force of 246 459 people that make up 49.3% of the population. Unemployed people comprised of the remaining 68 241people, formed 13.6% of the district's population.

This indicates that approximately 5 out of every 6 people that wished to be employed were successful. This is illustrated in the unemployment rate of 21.68 %, which is relatively low in comparison to the metro and national average.

The large proportion of 'Not Economically Active' people results in a relatively low labour force participation rate, of 62.89%, despite the vast majority of the labour force being employed.

2.4.2 Labour Absorption Rate

The labour absorption rate of 49.25 %, indicates that almost half of Tygerberg District's working age population was employed in 2011. Given the relatively high employment rate for the District, the labour absorption rate is lower than may have been expected. Again, this is due to a large proportion of "Other Not Economically Active" people.

Table 5: Tygerberg district labour force indicators(2011 census)

Tygerberg Planning District - Labour Force Indicators	2011
Population aged 15 to 64 years	**500 382**
Labour Force	**314 700**
Employed	246 459
Unemployed	68 241
Not Economically Active	**185 682**
Discouraged Work-seekers	14 625
Other not economically active	171 057
Rates %	
Unemployment rate	**21.68%**
Labour absorption rate	49.25%
Labour Force participation rate	62.89%

2.4.3 Trends

If one takes into account other factors such as household income distribution in the district, the biggest concern remains the need for economic development, i.e. employment creation, especially in areas in close proximity to areas of highest unemployment and lowest income.

2.4.4 Spatial Distribution of Employment

The Unemployment Rate is shown in the Figure 11 below for the various sub-places in the Tygerberg District in 2011.

- The areas with the highest unemployment rate are located to the south of the Bellville rail line;
- The areas with the highest unemployment rates, of approximately 40% and more are the newer parts of Delft and Freedom Farm informal settlement;
- Other areas in the district where the unemployment rate is noteworthy, are Bonteheuwel, Bishop Lavis, parts of Belhar and Kalkfontein.

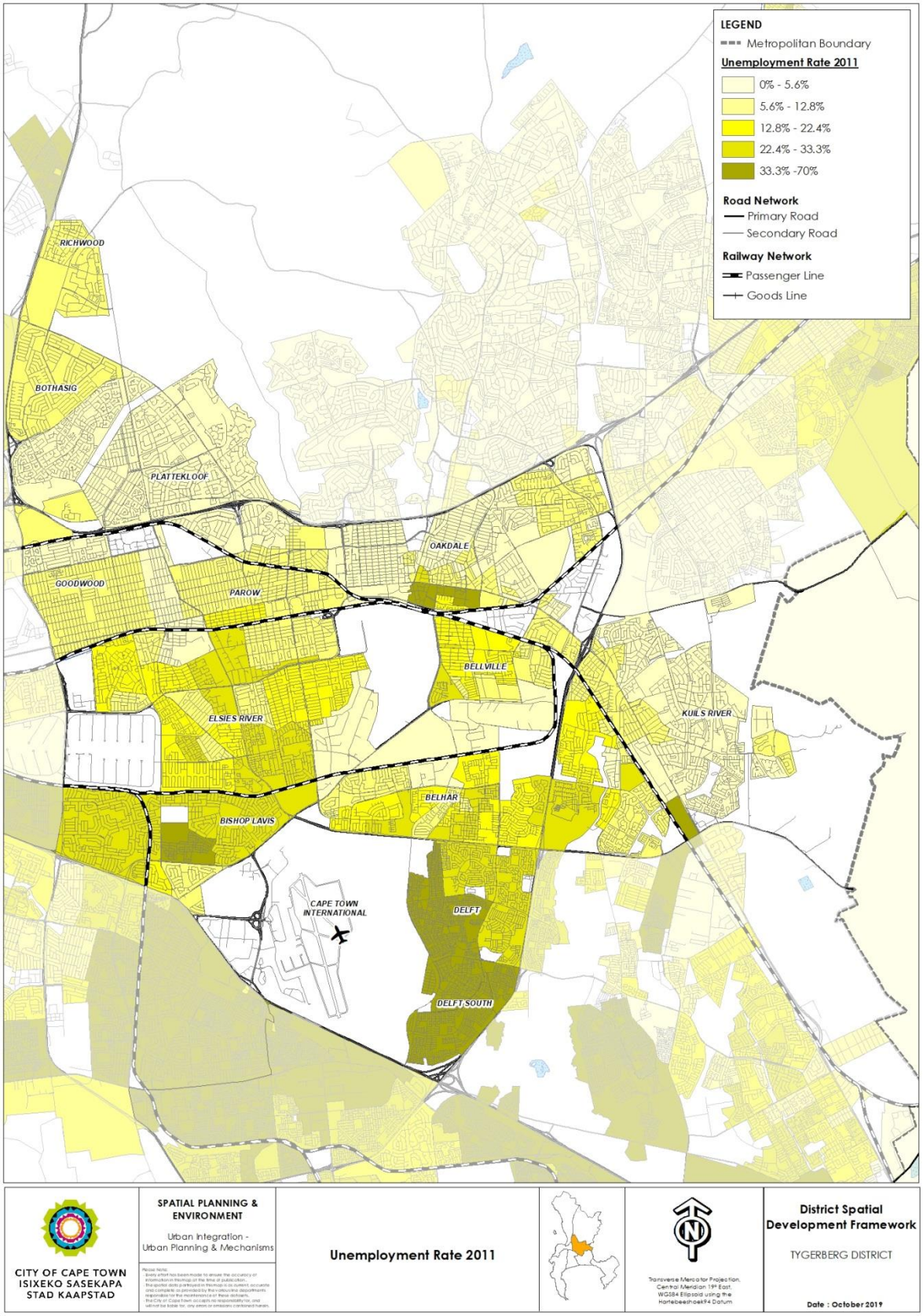


Figure 11: Unemployment rate as per 2011 census

2.5 Income (Households)

In 2001 and 2011 Tygerberg had a varying spread of income ranges, with above 20 000 households in every income bracket from R1 – R 1 600 per month to R6401 -R12 800 per month. Worryingly, approximately 10 000 households in 2001 receive no monthly income, and in 2011 this value doubles to over 20 000 household earning no income, which is a large number of households in the district.

On the other side of the spectrum, in 2001, there was a very small number of households that earned more than R 51 000 per month, but in 2011 this number significantly increased to about 5 000 and more households earning more than R 51 000 per month.

The largest number of households earn between R3 201 and R6 400 in both 2001 and 2011. These trends are visually represented in the Graph below showing how economically dynamic and active the Tygerberg district is.

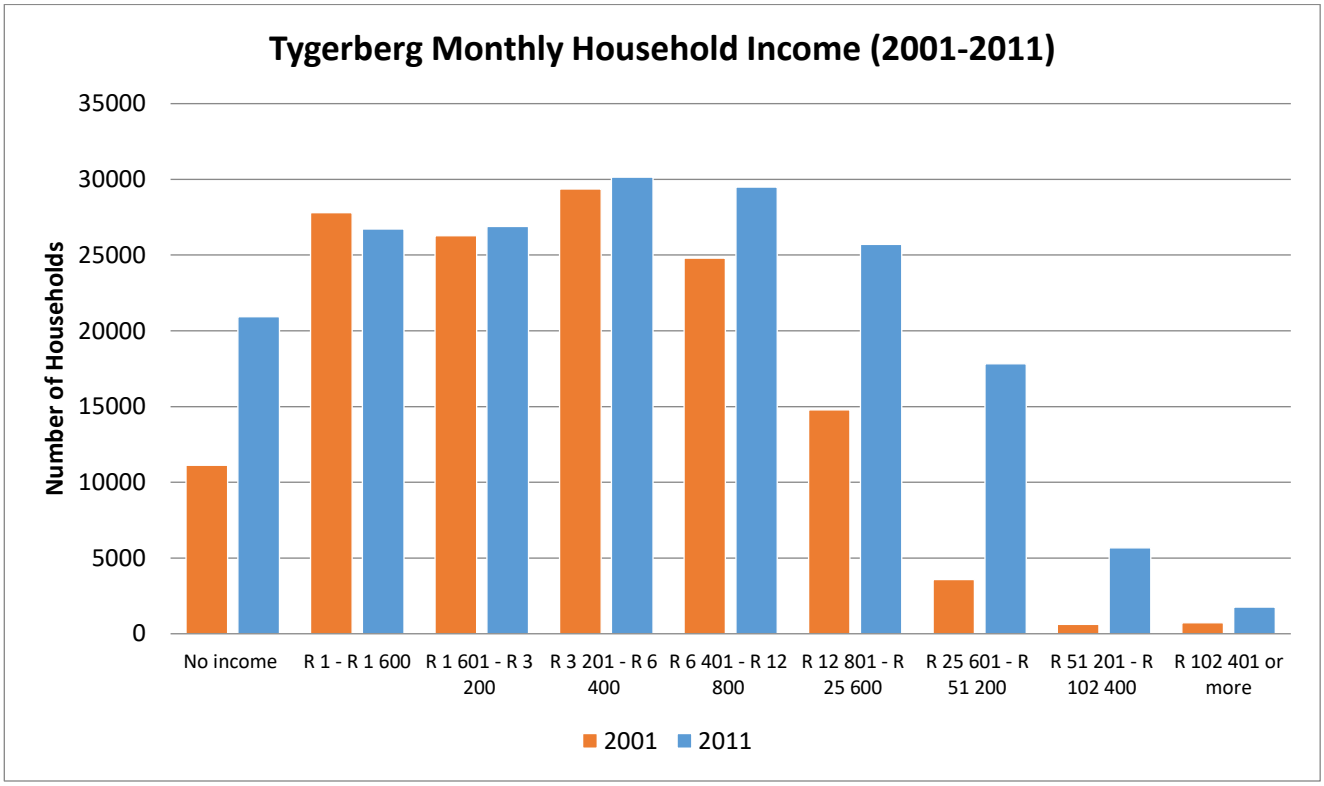


Figure 12: Monthly household income(2011 census)

2.5.1 Spatial Distribution of household incomes

The Median Household incomes per subplace are shown for the district in the map below.

- The Freedom Farm informal settlement has the lowest median household income in the district at R400- R800 per month;
- Areas such as Plattkeloof and Baronetcy estate and portions of Welgelegen and Panorama reprent the areas with the highest income in the district;
- The areas of Delft, Bonteheuwel, Bishop Lavis, portions of Elsies River and Kalkfontein also reprent areas with fairly low income, ranging from R800- R3200 per month.

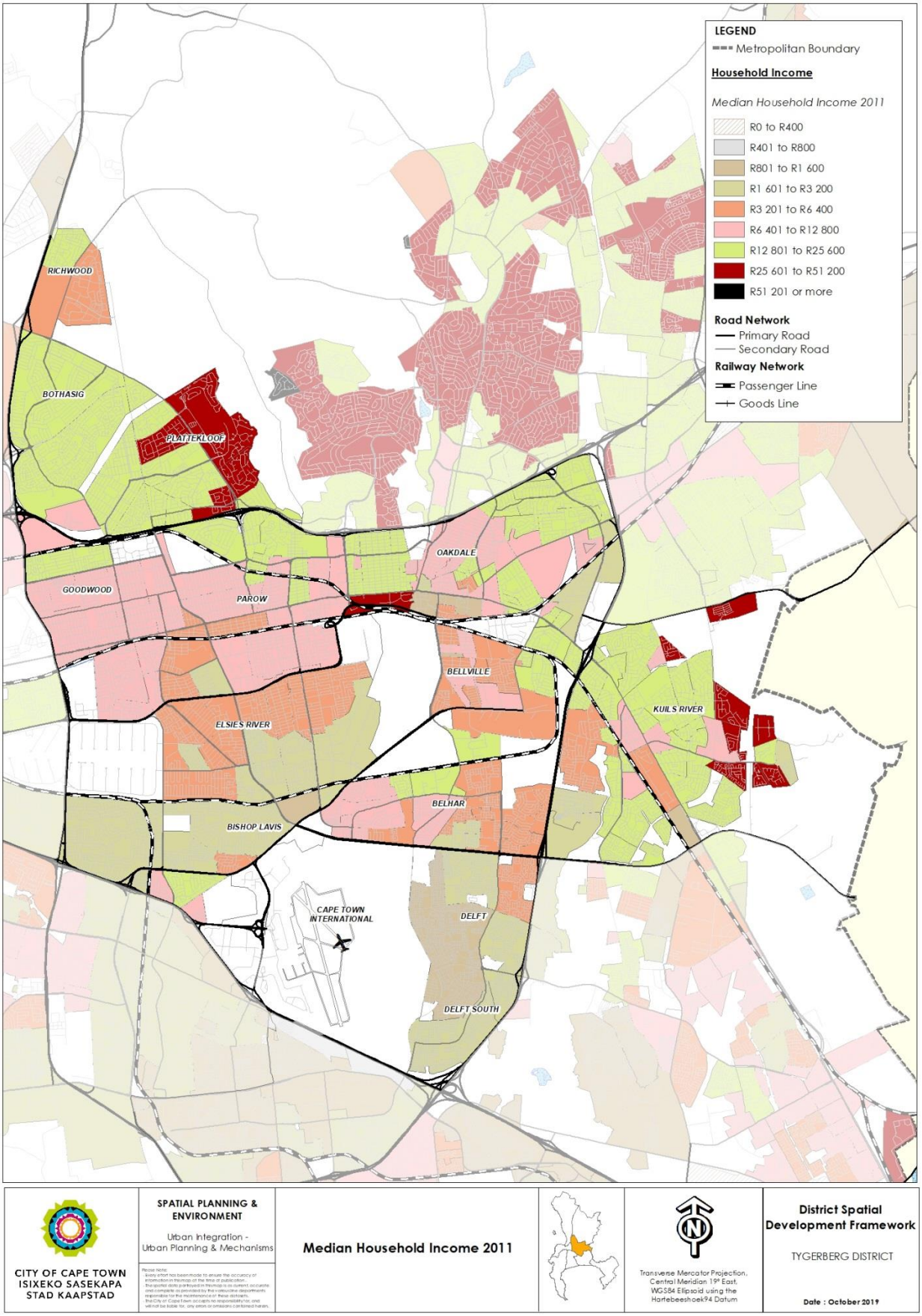


Figure 13: Median household income by sub-place(2011 census)

2.5.2 Income Inequality

The Gini coefficient is an income inequality measure. The coefficient ranges from 0, which represents "absolute equality", to 1, which represents "absolute inequality" (Statistics South Africa, 2014).

Out of all the districts, the South Peninsula had the lowest measure at 0,56 and Helderberg had the highest at 0,62. However, it is concerning to observe an increase in income inequality throughout the districts, mirroring the Metro's trend. This shows that income inequality is still a major challenge within the City of Cape Town.

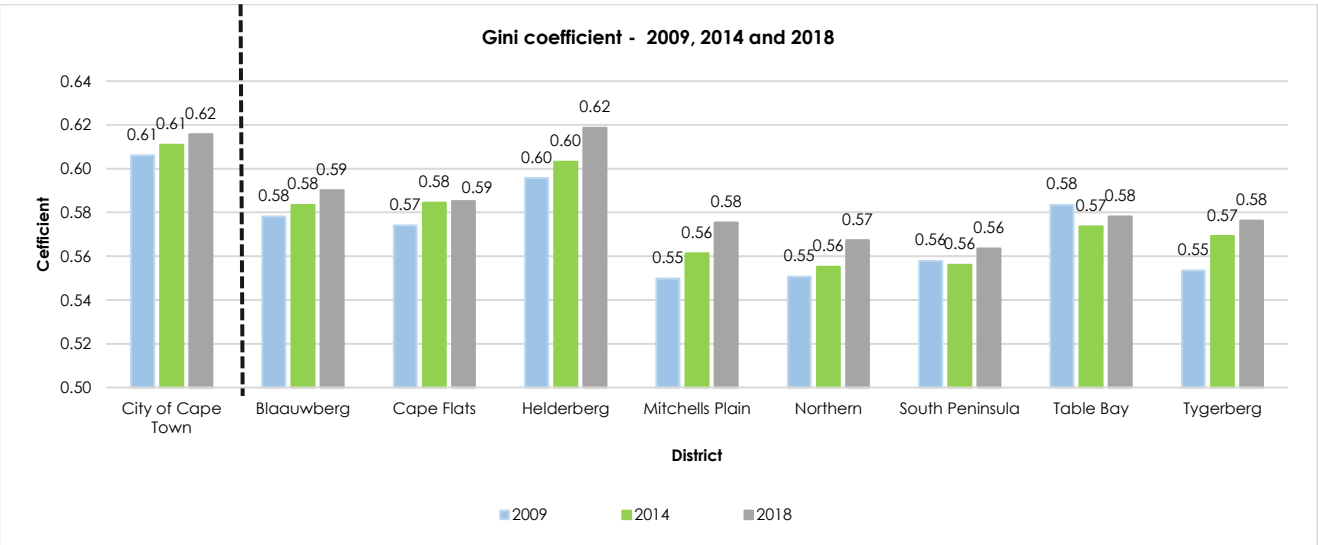


Figure 14: Gini coefficient: 2009, 2014 & 2018

The Tygerberg district has a Gini coefficient that is lower than the Cape Town average and it is one of the least unequal districts out of the eight in Cape Town. This is a positive attribute when compared to other districts in Cape Town. See Figure 14 and Table 6.

Table 6: Income inequality: 2009, 2014 & 2018

Districts	Gini Coefficient		
	2009	2014	2018
Tygerberg	0.55	0.57	0.58
City of Cape Town	0.61	0.61	0.62

In total, there are 1 302 946 households in Cape Town and a majority of them are situated in Mitchells Plain (30,9%) followed by Tygerberg (17,6%). Mitchells Plain is predominantly a residential area; thus it is no surprise it has the highest number of households. A majority of the population in this district has an annual household income between R18 000 and R42 000 (22,5%), whilst other districts recorded the highest percentage of households in upper income percentiles (R132 000 and above). Tygerberg has the largest share of households (28,2%) with an annual income between R132 000 and R360 000, while Blaauwberg,

Northern, Table Bay and South Peninsula districts all had their highest share of households in the R360 000 to R1 200 000 category.

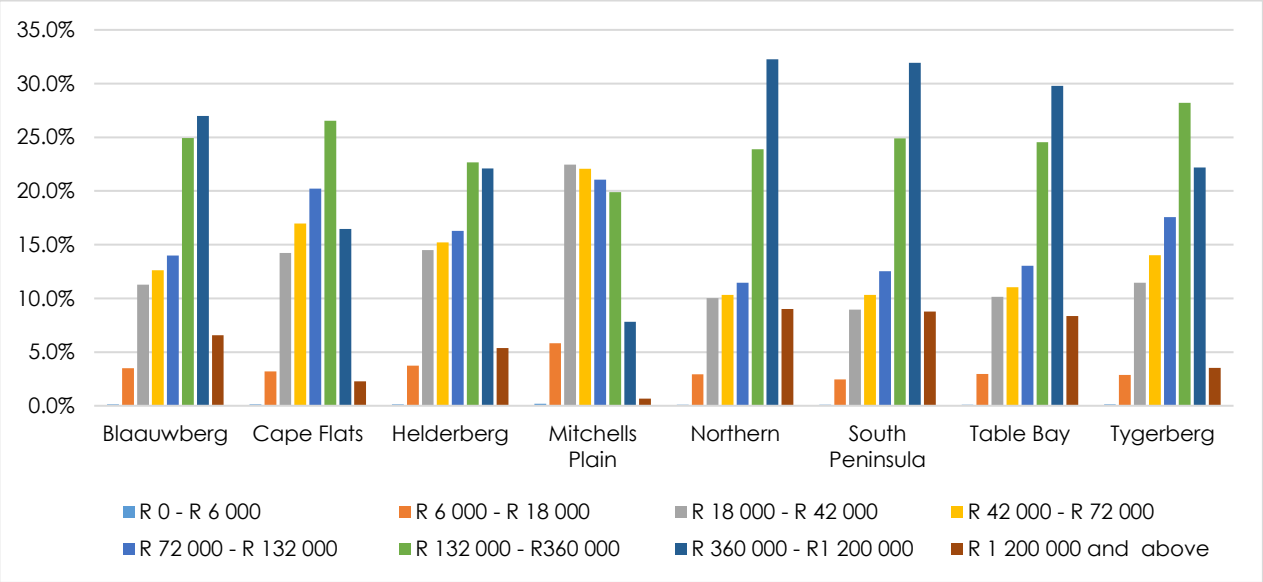


Figure 15: Number of households by income category, 2018 (Source: IHS Markit, 2019.)

2.5.3 Socio-Economic Indicators

The Human Development Index (HDI) is a composite indicator reflecting education levels, health, and income. The HDI ranges from 0, "no human development", to 1 which indicates "high level of human development" (United Nations, 2018). Table 7 below demonstrates the unequal access to education, health, employment as well as other resources within the Metro, largely due to income gaps and location which limits access to opportunities.

Tygerberg has the third highest HDI's in comparison to the eight districts, well above the lowest in 2018, which was Mitchell's Plain/Khayelitsha with 0.66. Tygerberg's HDI has been steadily increasing from 2009 to 2018, at a similar pace than the City average. This is a positive indication for the District.

Table 7: Human Development Index (HDI) - 2009, 2014 and 2018(Source, HIS Markit, 2019)

Planning Districts	**Human Development Index (HDI)**		
	2009	**2014**	**2018**
Blaauwberg	0,75	0,78	0,79
Cape Flats	0,66	0,70	0,71
Helderberg	0,72	0,75	0,76
Mitchells Plain	0,61	0,65	0,66
Northern	0,76	0,79	0,80
South Peninsula	0,78	0,80	0,81
Table Bay	0,77	0,80	0,81
Tygerberg	**0,70**	**0,73**	**0,74**
CITY OF CAPE TOWN	0.70	0.73	0.74

B: STATE OF THE ENVIRONMENT

3 NATURAL AND HERITAGE ENVIRONMENT

The following section outlines the key environmental and heritage trends and spatial implications that have been identified for the District based on the Strategic Environmental Assessment, the City of Cape Town's State of the Environment Reports, the attributes for the district and other relevant policy documentation.

3.1 Status Quo, Trends and Patterns

3.1.1 Geology

Underlying rock formations of an area comprise the foundation of its physical environment. The geology of an area is shaped by hydrological and weathering processes, which create the topography of the area. The underlying geology also gives rise to various soil types, which influence the indigenous fauna and flora of an area, as well as human agricultural practices.

The geology of Tygerberg District is characterised by two geological units:

- Malmesbury Group shales, which outcrop on the foot slopes of the Tygerberg and Durbanville Hills in the northern portion of the district, and
- Sandveld Group sands, characteristic of the Cape Flats area, which cover the remainder of the district.

The Malmesbury Group, around 540 million years old, consists of dark grey mudstones and lighter coloured sandstones. Malmesbury Group rocks are not often exposed, as they weather quickly, and are mostly covered by soil or windblown sand (Compton, 2004). The slopes below Durbanville are covered with recent surface deposits including scree and ferricrete which cover the older rocks and semi-consolidated Quaternary deposits of the Sandveld Group.

The Sandveld Group is mainly represented by the Springfontyn Formation, which was developed through the deposition of windblown sand (an aeolian deposit), consisting of reddish to grey, unconsolidated quartzose aeolian sand and is most common in the northern and central portion of Tygerberg District, from Milnerton to Langa and Bellville (UCT Department of Geological Sciences). The south-eastern portion of the district, including Cape Town International Airport and Delft, is overlain with semi-consolidated aeolian sands of the Witzand Formation.

3.1.2 Topography

Geology determines topography by influencing the slopes and soils in an area. A number of different morphological units, classified on the basis of slope, rock type and surface material, are recognized within Tygerberg District.

The district is characterised by flat plains typical of the Cape Flats environment, which cover the southern portion of the district. The most significant topographical feature in the district is the Tygerberg Mountain, which runs in a north-south direction from the northern

extreme of the district to approximately the N1 at Plattekloof, with the district boundary following the ridge line. The highest point of the Tygerberg is 398m above sea level, just east of Plattekloof. A few of the foothills of the Durbanville hills penetrate into the north-eastern extreme of the district.

3.1.3 Soils

Soil is the uppermost layer of the ground. It is the product of mechanical and chemical weathering, determined by climate, the underlying material and the geological characteristics of an area. Soils have an important biological function in supporting plants and animals as well as an economic function in supporting agriculture.

The relatively simple geology underlying Tygerberg District has given rise to soils with little variation (see figure 16). The majority of the district is covered by predominantly deep podzols (Ga), which are bleached, apedal (structureless)sandy or loamy sand soils that contain a diagnostic subsoil ferrihumic horizon (podzol), enriched by the downward movement of organic carbon, iron and aluminium, which may become hardened or even cemented as a result.

The south-eastern quadrant of the district is covered in deep, calcareous, apedal (structureless) grey regic sands (Ha). These soils have a sandy texture and a low fertility status, typical of coastal plains.

The upper slopes of the Tygerberg Mountain are covered with red and yellow apedal soils with <15% clay content (Ah). These shallow, acidic, sandy soils derived from Table Mountain Group sandstone are structureless and generally nutrient poor, with poor water retention properties.

The lower slopes of the Tygerberg Mountain are covered in clayey plinthic catena (Ca). These mainly red or yellow, moderately to highly leached soils are mostly sandy to sandy clay loams and are underlain by a plinthic layer, a grey subsoil layer where iron and manganese accumulate, forming mottles that harden and even cement over time into form concretions. These soils are highly variable, with > 10% of the soil unit consisting of structured clay soils in this district. Shallow rocky soils are also common.

Tygerberg District contains a relatively small area of 'high agricultural potential1 land worthy of long-term protection' in the northern most part of the district, according to the City's Agricultural Land Review (CoCT, 2008a). This area forms part of the much larger Tygerberg Hills agricultural area that is mostly located in the Northern District.

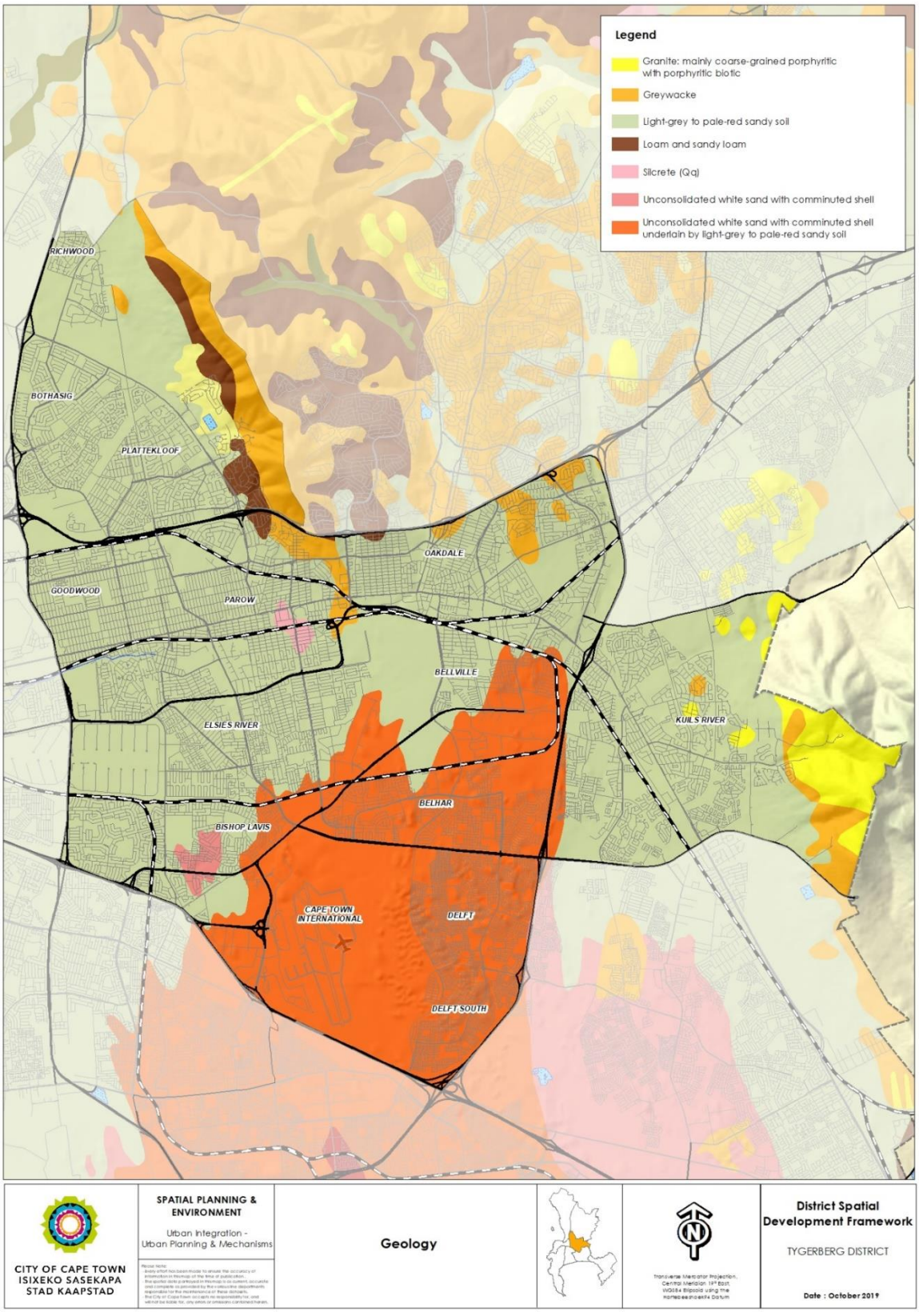


Figure 16: Geology

3.1.4 Biodiversity

3.1.4.1 Vegetation

The Tygerberg District is largely urbanised but contains some remaining fragments of two of South Africa's rarest vegetation types, namely sand fynbos and renosterveld, in the north-western section of the district. Both of these vegetation types are exceptionally high in species diversity, and have a high incidence of Vulnerable, Endangered and Critically Endangered Red List threatened species, as well as extinct plant species and many endemic faunal species. Biodiversity in the district is under threat from rapid and insensitive development and infestation by invasive alien vegetation.

One of the primary management priorities remain the conservation of remnants of sensitive and threatened vegetation types, particularly the Critically Endangered Cape Flats Sand Fynbos (in the lower-lying areas at the foot of the Tygerberg Hills), renosterveld (in the moderately undulating plains, valleys and lowlands of the Tygerberg Hills) and the Endangered Cape Flats Dunes Strandveld in the south-eastern portion of the district. The Tygerberg Hills is the most protected area where development should as such, not be considered. This includes inter alia areas of high biodiversity/ conservation value.

Table 8 compares the extent remaining of each vegetation type and the proportion of historical extent. It also indicates how much of this remaining vegetation is currently proclaimed or managed, as well as the ecosystem status of the existing indigenous vegetation. The ability to conserve the various vegetation types depends on a number of factors, including location of the remnants, land ownership and competing priorities.

Table 8: Conservation status of national vegetation(*CCT State of Environment Report 2018; CCT Biodiversity network report****)***

National Vegetation Type	Historic area in CCT (ha)	Area of Vegetation Remaining (ha)	% Remaining of Historical	% Historical Proclaimed/ managed	Ecosystem Status
**Cape Flats Sand Fynbos*	54 400	5 951	11.0	2.3	**Critically endangered**
Cape Flats Dune Strandveld	40 000	18 315	44.4	23.8	**Endangered**
*Swartland Shale Renosterveld	46 700	3 516	7.4	2.2	**Critically endangered**
*Swartland Silcrete Renosterveld	1 100	149	13.7	0.4	**Critically endangered**
**Indicates vegetation types that have insufficient habitat remaining to meet minimum national targets. Italicized and bolded vegetation types are endemic to Cape Town and can only be conserved within the city area.*					

To this end there are several proclaimed conservation areas in the Tygerberg district, which are briefly described below:

- The **Tygerberg Nature Reserve** is a 278 ha Local Authority Nature Reserve where some of the last remnants of Swartland Shale Renosterveld are protected. Approximately 460 different plant species occur in the Reserve, of which three are endemic to Tygerberg. Twelve species of plants that occur in the Reserve are threatened with extinction and 8 are endemic to Cape Town.

- The **Cape Flats Nature Reserve** is a private reserve under the management of the University of the Western Cape (UWC). The 32 ha Reserve, located on the UWC campus, was created to conserve patches of Cape Flats Dune Strandveld and Cape Flats Sand Fynbos, but is also used for environmental education and research. There are over 220 indigenous plant species in the Reserve.
- A 25 ha area at Symphony Way near Delft is an area with high biodiversity conservation value currently not under active management, but protected from development by a condition of the environmental authorisation of the N2 Gateway housing project. However, this condition is in the process of being removed, in order to provide space for human settlement development. An off-set area has been identified as a replacement for the loss of biodiversity.
- Another biodiversity area is located in the Haasendal area, but still does not have formal protection status.

3.1.4.2 Fauna

Very little is known about the fine scale distribution of fauna within the CoCT, and species lists are generally available only for isolated sites such as proclaimed nature reserves. There is thus little quantitative data available for each district.

3.1.4.3 Fish

Five indigenous freshwater fish species are currently recognized as occurring within the boundaries of the CoCT. However, the one species, Cape Galaxias (Galaxias zebratus), has been shown to comprise of at least 13 species across the Western Cape. It appears that there are at least two species within the CoCT. Both these taxa have not been formally described as yet and the conservation status has yet to be assessed. Galaxias are found in flowing or standing water across the City and can be expected to occur in any suitable habitat in the district.

The Data Deficient Cape Kurper (Sandelia capensis) is found throughout much of the Cape Floral Kingdom. The latest taxonomic evidence has shown that what was previously always thought to be one species represents a species complex of at least 5 taxa. The distributions and conservation status of each of these species needs to be confirmed. Most remaining populations are in the upper reaches of streams and in dams in the mountain catchment areas. The presence of Cape Kurper in the district is therefore unlikely.

3.1.4.4 Mammals

Of the 83 species of indigenous mammals found or presumed to occur within the CoCT, 12 species (excluding marine mammals) are considered Threatened. There are six species of bat that could possibly occur within the district and which are considered Near Threatened. Very little is known about the distribution of bats within the CoCT. Any bat roosting sites identified within or near any proposed development would require a specialist report which would assess the significance of any potential impacts.

The single record of the Vulnerable White-tailed Mouse (Mystromys albicaudatus) within the district was from a skull found in an owl pellet in the Parow Caravan Park. This mouse was probably caught locally but subsequent surveys of the nearby Tygerberg Nature Reserve have failed to confirm this species presence. The species is relatively common on

the Blaauwberg Hill in the neighbouring Blaauwberg District where it is found in Cape Flats Dune Strandveld and Cape Flats Sand Fynbos.

Honey Badger (Mellivora capensis) is still present at low densities in the Blaauwberg and Northern Districts to the north of Tygerberg District. These animals have massive home ranges and no single CoCT reserve could conserve a population of this species. Substantial ecological corridors or agricultural areas would be critical in ensuring that this species persists within the City. Within Tygerberg District however, Honey Badgers could only be expected to frequent the Tygerberg Nature Reserve and open agricultural areas in the northern parts of the district.

With regard to the remaining larger terrestrial mammals which still occur within the district, all were assigned the status of Least Concern. This indicates that the species are currently not threatened nationally, but on a local City or district scale the species may be very close to becoming locally extinct. Their future survival in the district depends on the availability of larger natural open space to ensure that viable populations exist and persist. The ecological corridors linking important natural areas are essential for the continued survival of many mammal species.

3.1.4.5 Avifauna

Of the 404 bird species recorded within the City of Cape Town, 28 species are listed as being threatened. Numerous threatened species found in the CoCT are closely associated with the coast and are therefore not recorded in the landlocked Tygerberg District.

Several threatened bird species recorded within the CoCT are associated with extensive wetlands. These include the Near Threatened Lesser Flamingos (P. minor). Little suitable habitat exists in the district and the presence of these wetland species here is unlikely. However, these species may utilize some of the larger farm dams or storm water ponds in the district on occasion.

3.1.4.6 Amphibian Fauna

Of the 27 species of amphibian which occur within the CoCT, 10 are allocated threatened status. Two species, the Critically Endangered Table Mountain Ghost Frog (Heleophryne rosei) and the Near Threatened Cape Peninsula Moss Frog (Arthroleptella lightfooti) are endemic the Cape Peninsula and these constitute the only endemic vertebrates to the CoCT.

Within Tygerberg District, only one threatened amphibian species is known to occur. The Near Threatened Cape Rain Frog (Breviceps gibbosus) occurs in most areas of natural vegetation and even in gardens within the district. This frog is not associated with wetlands.

Amphibians are vulnerable to disturbance as they are sensitive to environmental factors such as water pollution and/or altered water regimes. The input of storm water into wetlands can have a significant negative influence on biodiversity. The effects of storm water entering wetlands of conservation significance would require a specialist report which would assess the significance of any potential impacts.

3.1.4.7 Reptile Fauna

Eight of the 61 species of reptile found or suspected to occur within the CoCT eight are considered to have Red List Threatened Species status. The conservation assessment of South African reptiles is currently underway so the status of some of the species found in the CoCT may change. The Vulnerable Cape Sand Snake (Psammophis leightoni) may occur within the Sand Fynbos in the northern and western edge of the district in areas such as Plattekloof Natural Heritage Site.

3.1.5 Hydrology

Tygerberg District lies within the winter rainfall region of the Western Cape. The district records 760 mm of mean annual precipitation and 1 400 mm of mean annual evaporation (River Health Programme, 2005). The district contains only one significant river and has no large wetland areas.

3.1.5.1 Rivers and Estuaries

The *Elsieskraal* is the only significant river flowing through the district. It originates in the Northern District, where it drains the Tygerberg Mountains and flows through agricultural areas used for wine farming. The river continues into the Table Bay District, where it flows into the Black River.

The *Jakkelsvlei* flows along the southern and eastern border of Epping Industrial. A very small portion of the *Kuils River* and its associated Bottelary River also falls within Tygerberg District along its north-eastern border with the Northern District, and through the Kuilsrivier and Sarepta areas.

The rivers in the district are in a poor condition. They flow through fairly densely urbanised and/or industrial areas. About 65% of the entire Elsieskraal is canalised. In its upper reaches within the district, the river runs in an earth channel and becomes canalised downstream of Voortrekker Road, from where it follows the railway line for the remainder of its course within the district. Canalisation leads to habitat loss and severely reduces the river's ecosystem functioning and ability to attenuate floods. The river receives runoff from roads, roofs and other impermeable surfaces and is thus prone to rapid increases in discharge volumes after rain. It is also dominated by alien fish (carp, catfish and tilapia). The Jakkelsvlei River is also fully canalised (River Health Programme, 2005).

As a result, the health of the Elsieskraal has been classified as fair to poor by the River Health Programme (classification is Natural, Good, Fair, Poor, Unacceptable: River Health Programme, 2005). The river suffers particularly from poor condition of its invertebrate communities, with the habitat, riparian vegetation, fish community and water quality all being at fair levels3 (River Health Programme, 2005).

River corridors (green corridors along rivers) also play an important role in ground water recharge.

3.1.5.2 Wetlands

The district contains some wetland areas at the Cape Town International Airport and on the eastern border of the district. It also has a number of farm dams and stormwater ponds.

3.1.5.3 Groundwater

The district has various aquifers storing groundwater. Aquifers are typically classified into three types, two of which occur in the district. These are fractured aquifers, intergranular aquifers and fractured and intergranular aquifers4 (DWAF, 2000) (the latter does not occur in the district).

Most of the district is located on an *intergranular aquifer* within the Witsand and Springfontyn formations of the Sandveld Group that are found in almost the entire district). The Sandveld aquifer is essentially a coastal aquifer, extending along the West Coast from False Bay to Saldanha. The Sandveld aquifer is essentially a coastal aquifer that extends along the West Coast from False Bay to Saldanha. The aquifer is most productive in the south at False Bay in Cape Flats and Khayelitsha/Mitchells Plan Districts and becomes gradually less productive as it extends north into Table Bay and Tygerberg Districts. The southern portion of Tygerberg District falls within the moderate yield category of the aquifer, with a median yield of 0.5-2.0 litres per second (ℓ/s). This reduces to a low median yield of 0.1 to 0.5 ℓ/s in the central part of the district (DWAF, 2000).

Along its northern border, the district is underlain by a *fractured aquifer* and deposits of the Malmesbury Group. This aquifer has moderate median yields of 0.5-2.0 ℓ/s (DWAF, 2000).

Groundwater quality in most of the district is moderate, with the electrical conductivity5 of groundwater ranging from 70-300 milli Siemens per meter (mS/m). Groundwater quality is worse in the north-western corner of the district, where conductivity increases to 300-1 000 mS/m (DWAF, 2000).

Due to the aquifers' proximity to the sea and frequent extension to below sea level, coastal aquifers are vulnerable to saline water intrusion, especially if there is excessive abstraction or mismanagement of groundwater. Careful control of abstraction rates is thus important to preserve the quality of the groundwater (DWAF, 2000).

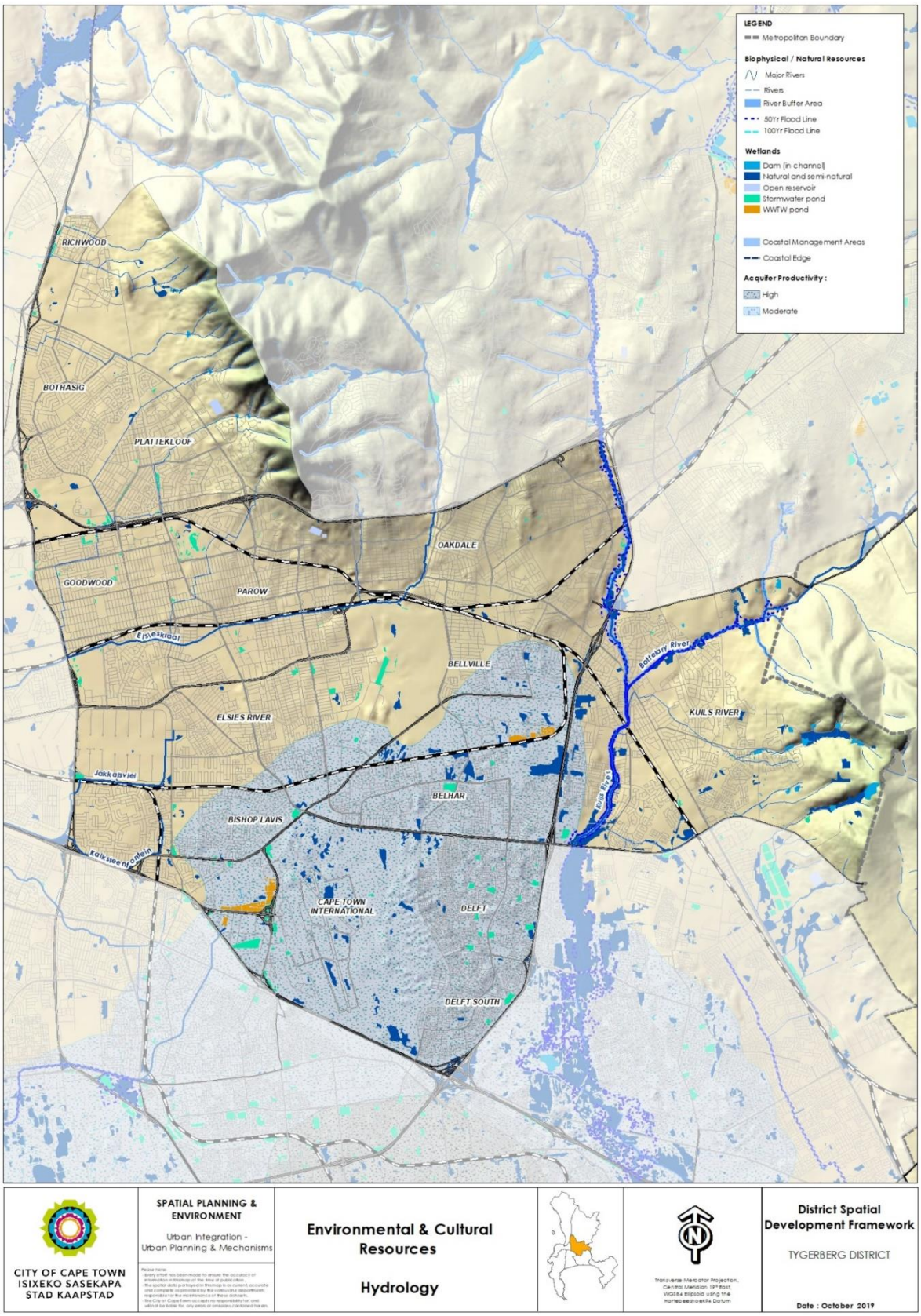


Figure 17: Hydrology

3.1.6 Agriculture and Mineral Resources

Agricultural land contributes significantly to the province and country's Gross Domestic Product. The Tygerberg borders farms such as the historic Zevenwacht Wine Estate. Smallholdings and even smaller cadastral units are surrounding the Zevenwacht Link Road. Consideration will need to be given to the future of this rural area to ensure a sustainable balance between areas identified for urban development and protection of the agricultural land and in particular attention given to the type of development considered and the interface that is created with the agricultural landscape.

3.1.7 Air Quality

The right to clean air is a basic human right. The quality of air is a key factor affecting the health of a city as air pollution represents a major health risk to residents.
Three main types of air pollutants are measured and reported on by the City of Cape Town, as follows:

- Nitrogen dioxide (NO2)
- Sulphur dioxide (SO2)
- Particulate matter (PM10)

In general, NO2 levels have decreased over the past 12 years. They are generally within the guidelines standard. SO2 levels have maintained low trends over the past 12 years, keeping within the guideline standards with discrepancies occurring every few years. However, PM10 levels are more problematic and have considerably increased at most sites over the years.
The City's Air Quality Management Plan outlines processes to monitor and manage air pollution. Management actions include greening, community awareness and enforcing the City's air quality by law.

3.1.8 Green Infrastructure

Green Infrastructure can be defined as "a strategically planned, designed and manged network of natural open spaces and 'engineered' ecological systems which provide ecological, community and infrastructure services.
In addition to further motivating for the protection of existing natural assets such as biodiversity and the coast, green infrastructure recognises the role and importance of a range of urban green spaces or parts of the urban system, including but not limited to gardens, trees, parks and storm water infiltration areas.
The City is in the process of identifying and mapping a green infrastructure network, (GIN) identifying and ranking green infrastructure services, the opportunities they present and benefits they provide.

3.1.9 Heritage and Cultural Management

The historical narrative of the establishment and development of Cape Town as a settlement and the City it is today, is reflected in its diverse cultural heritage and the wide range of heritage resources. These give us our sense of identity and should be preserved and conserved for future generations.

The Tygerberg District has been extensively transformed by urbanisation. Three broad trends can be identified in the pattern of urban expansion: post World War II; Apartheid Era town planning and accelerated urban expansion of the late 20th century onwards.

The Cape Town International Airport is a defining feature and dominates the south-eastern part of the district.

3.1.9.1 Historical development (of the district)

The Tygerberg District has been much transformed in the 20th century, with little evident of its historical origins. Very little remains of the late 17th and early 18 century farms that were established along the old road to Paarl and towards Stellenbosch. These old farms were largely obliterated by fast urban growth, starting in the early 20th century and accelerating in the post-World War II period and late 20th century.

3.1.9.2 Rural cultural landscapes

The early farms in this district were clustered along the Tygerberg Hills in the north, and the Kuils River in the east. Plattekloof (granted to JD de Beer in 1699), De Grendel (originally de Grendel van Plattekloof, granted in 1720 to Klaas Meijboom) and Bosmansdam (originally Roosboom, granted in 1714 to Kruywagen) form part of what is now referred to as the Durbanville Hills Cultural landscape.

Of the early farms granted in the Kuils River area (De Kuijlen to Olaf Berg in 1704; Langewerwacht to Jean de Normandie le Rouw in 1721 and Saxenburgh to Jochiem Sax in 1704) only Langeverwacht (now Zevenwacht) and Saxenburgh remain as agricultural in character. The eastern most part of the Tygerberg district falls within the Bottelary Hills cultural landscape.

Both these cultural landscapes fall across district boundaries, and in the case of the Kuils River farms, across municipal boundaries.

3.1.9.3 Urban cultural landscapes

The Tygerberg District does not have any areas that have been identified for investigation for conservation in terms of its historical urban landscapes. Often the urban nodes are considerably older than what the present configuration of the built form would suggest. Plattekloof had its origins in the late 19th/early 20th century, followed by Elsies River, Bellville and Goodwood. Bothasig, Bonteheuwel and Bishop Lavis dating to the early Apartheid town planning era, and later by Delft, Belhar, Panorama etc. Much of this District's built form is older than 60 years, but not particularly conservation worthy.

The intangible heritage of Cape Town includes the narrative of the Forced Removals, sites of struggle history and the living cultural practices of residents which include traditional access to sites and/or places and heritage practices. One of the challenges in the long term planning of the City is the recognition of intangible/living heritage and the provision of social facilities or spaces/places to accommodate cultural events and practices.

3.1.9.4 Heritage management

"The National Heritage Resources Act (NHRA, Act 25 of 1999) introduces an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels; and to empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations…to provide for the protection and management of conservation-worthy places and areas by local authorities…"

The National Heritage Resources Act, Act 25 of 1999 (NHRA) identifies a three tier system for the management of heritage resources and prescribes the criteria for assessing heritage resources. SAHRA, in consultation with the Minister and MEC of every province must publish regulations distinguishing between at least three grading categories.

- The South African Heritage Resources Agency (SAHRA) is responsible for the identification and management of Grade I heritage resources and the co-ordination and monitoring of the management of the national estate in the Republic.
- Heritage Western Cape (HWC) is responsible for the identification and management of Grade II heritage resources.
- The local authority (in this case the City of Cape Town) is responsible for the identification and management of Grade III heritage resources and heritage resources which are deemed to fall within their competence in terms of the NHRA.

Heritage resources within the City of Cape Town are managed both under the **NHRA** and the **Municipal Planning By-law (MPBL).** While the management of Grade III heritage resources are currently undertaken by HWC, the NHRA prescribes that Grade III heritage resources must be carried out by the local authority where it is competent to do so.

In 2013, the City of Cape Town was the first local authority to apply for competence in terms of the NHRA, and to have its competence successfully reviewed. One of the criteria for maintaining competence in terms of the NHRA is having an effective tool for managing heritage at local level. The Heritage Protection Overlay Zoning (HPOZ) is the tool within the Development Management Scheme of the MPBL for the protection of heritage places and spaces, the HPOZ is designed to align with the requirements in the NHRA for managing heritage resources formally protected in terms of the Heritage Register (S30) and Heritage Areas (S31).

The following two sections outline the two parallel streams of heritage management:

a) National Heritage Resources Act, Act 25 of 1999

The NHRA comprises two levels of protection: Formal Protections and General Protections. The general protections include buildings older than 60 years (S34); archaeological and palaeontological sites (S35); and burial grounds older than 100 years and graves of victims of conflict (S36). The City must ensure that all decision-making is informed and compliant with national legislation.

A list of places and spaces formally protected under the NHRA is included in Table 10 below.

Formal Protections

- Section 27: Provincial Heritage Sites: These are heritage sites have been formally protected in terms of Section 27 of the NHRA. While many were declared under the previous National Monuments Act (1969) they are Provincial Heritage Sites under the NHRA and are managed by HWC. These are places that are of exceptional heritage significance and are relevant across the Western Cape region.

- Section 30: Provincial Heritage Register: The Provincial Heritage Register is the formal protection in terms of the NHRA for individual local heritage resources (Grade III). HWC maintains the Heritage Register, which is a list of all the formally protected (Grade II) heritage sites as well as any other Grade III heritage resources. Sites are only placed on the Heritage Register once they have been gazetted in the Provincial Gazette.

- Section 31: The Heritage Area is the protection mechanism for geographical areas or places of environmental or cultural interest. HWC or The City (provided it has retained heritage competency) may, by notice in the *Provincial Gazette*, designate any area or land to be a Heritage Area on the grounds of its environmental or cultural interest, or the presence of heritage resources.

General Protections

- S34: Buildings/structures older than 60 years
  In terms of Section 34 of the NHRA a permit is required from HWC for alterations or demolition of any structure or part of a structure that is older than 60 years.

  The City maintains a digital heritage inventory of all buildings older than 60 years.

  Not all buildings that are older than 60 years are conservation worthy. The NHRA makes provision for lifting the requirements for S34 approvals within a defined geographical area on condition that the relevant heritage authority (HWC) is satisfied that heritage resources within that defined geographical area have been adequately provided for in terms of the formal protections of the Act. The formal protection for Grade III heritage resources is the Heritage Register (S30) and Heritage Areas (S31).

- S35: Archaeological and palaeontological sites
  In terms of Section 35 of the NHRA all archaeological objects are the property of the State and a permit is required (from HWC) to destroy, damage, excavate, alter, deface or otherwise disturb any archaeological site.

  In the undeveloped areas within and immediately abutting the Cape Town International Airport fossilised bone dating to the Quaternary[2] period has been recorded.

[2] This is the period in the geological history of the world that covers the last 2 million years.

Isolated archaeological tools dating to the Earlier Stone Age have been observed in the agricultural areas immediately abutting this District. These tools are evidence of early human ancestors and indicate the antiquity of human occupation (2-3 million years ago) in this district. Historical records confirm that this area too formed part of the seasonal migration of the Khoekhoe herders.

There is very little potential for finding intact archaeological and palaeontological sites in this district, given the extensive transformation of the landscape by urbanisation. There is some potential for uncovering archaeological sites pertaining to the 18th and 19th century. Plattekloof farm for example was still intact as an archaeological site until the early 2000s. The conservation of an archaeological reserve which included the conservation of the old stone werf wall, site of the historical home (which burnt to the ground in the early 1900s) and an outbuilding popularly referred to as the slave lodge were recommended in the plans for the redevelopment of the site.

b) Municipal Planning By-Law

The City of Cape makes provision for the consideration of heritage in its general process and criteria for deciding applications under S99 of the MPBL. In addition to this, it provides for the further protection of heritage through its Heritage Protection Overlay zoning in the Development Management Scheme.

3.1.9.5 Scenic Drives Overlay Zoning

The development of a scenic drives network aimed to link the diverse parts of the Cape Town Metro through the promotion of the scenic qualities and tourism potential along the existing road network.

The following criteria are used to identify a scenic route:

- Outstanding scenic qualities in terms of views (cultural or natural landscapes)
- Scenic qualities with a strong sense of place
- Range of scenic qualities
- High natural or cultural landscape qualities
- Links between major scenic, historical (or recreational) points of interest

The Tygerberg District has one identified scenic route. This route is characterized by its panoramic views of the City (Table Mountain and Table Bay) as well as views across the Cape Flats. The route eastwards provides views of the Tygerberg and the Boland Mountains.

Table 9: Scenic routes

Category	Route	Policy/land use controls
S2	N1: Jakes Gerwel to Kuils River Road	Visual Quality: This route provides panoramic view of all the mountains in Cape Town

Guidelines for the management of these routes are contained in the City's Scenic Drives Network Management Plan.

Table 10: Formally protected heritage sites(excluding memorials)

Provincial Heritage site	**Address**	**Description**
Meijboom vault	Meyboom Ave, Plattekloof	Burial vault associated with Plattekloof farm. Includes surrounding open space, as well as an enclosed Victorian cemetery also associated with the farm and the Meijboom family.
Cape Flats Nature Reserve	UWC campus, Robert Sobukwe way, Bellville	More than 20 hectares of nature reserve provides a haven for rare and typical flora and fauna of the Cape Flats. The reserve is a unique conservation project, and offers opportunity for research into diseases and the propagation of the Cape flora.
XII-milestone & oil lamp and old cannon	Corner Voortrekker Road and Durban Road, Bellville	Historic objects relating to the old route linking Cape Town to Paarl and beyond. Associational links to the Hardekraaltjie outspan.
XV Milestone	Kuils River	This elongated sandstone milestone, with the Roman numerals XV thereon, presumably dates from the late eighteenth or early nineteenth century and was previously situated on the road between Bellville and Kuils River.
Zevenwacht homestead	Off Langverwacht Road, Kuils River	Late 18th century farmstead. Good architectural example. Contextual significance as part of a continuing agricultural cultural landscape associated with the foothills of Kanonkop. Association with the Bottelary Cultural Landscape which extends into the adjoining Stellenbosch Municipality.
REGISTER	**Address**	**Description**
39- 41 Goodwood Street	Goodwood	
61 Fitzroy Street	Goodwood	
65 Fitzroy Street	Goodwood	

Note: The plan below may contain sites indicated on the biodiversity network, that already obtained land use approvals or where implementation has been initiated.

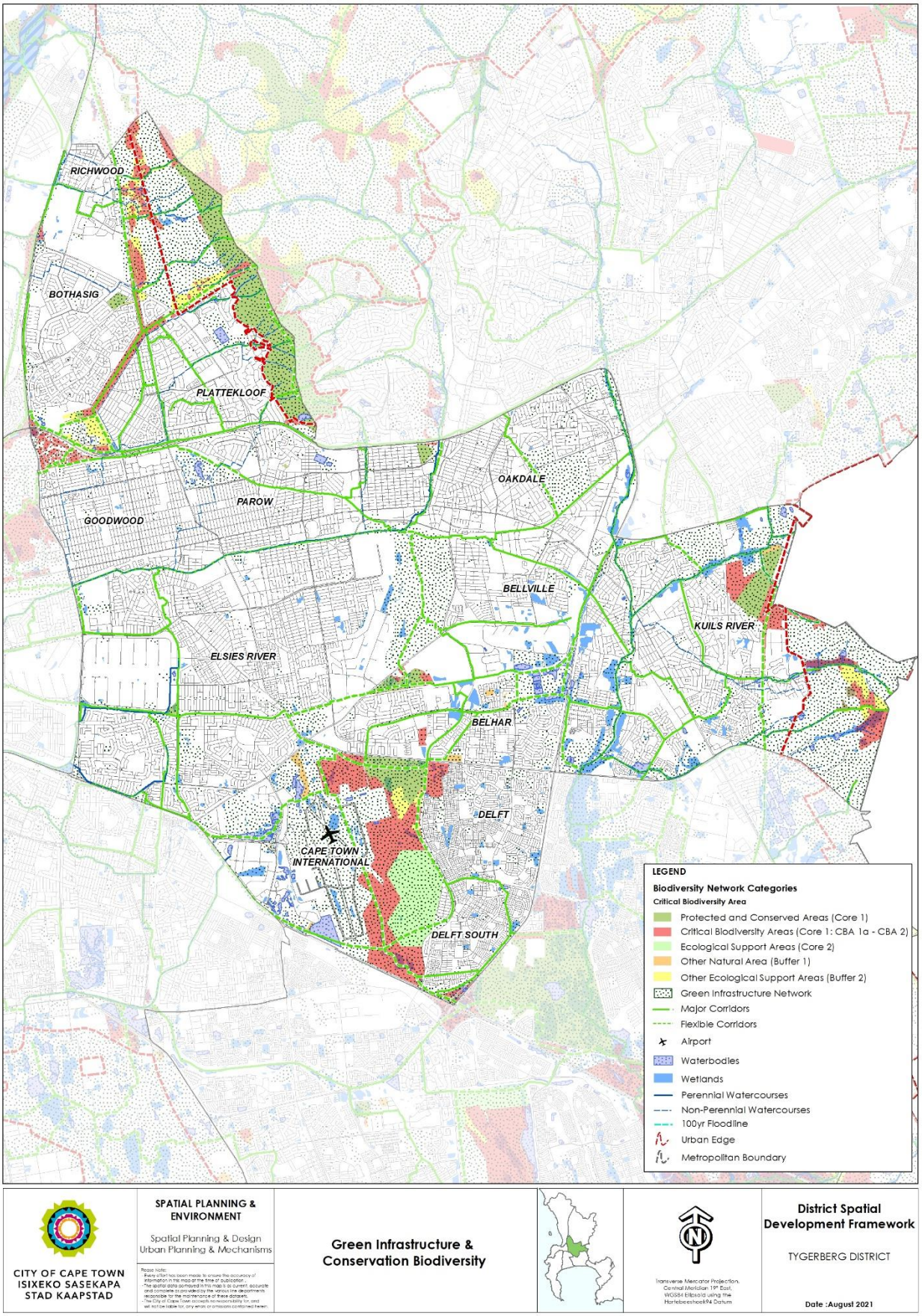


Figure 18: Green infrastructure and conservation biodiversity

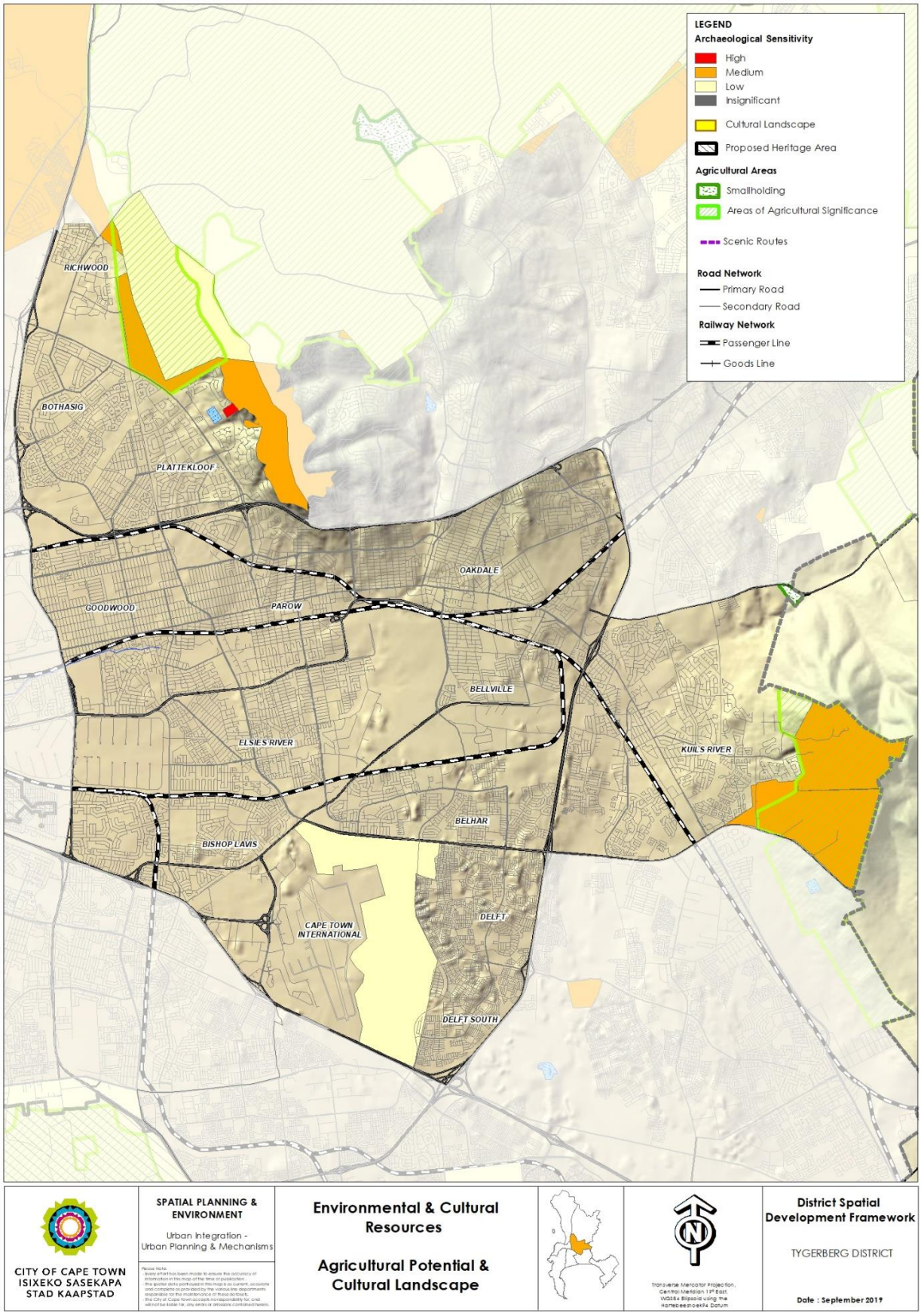


Figure 19: Agricultural potential & Cultural landscapes

3.2 Key Development Pressure and Opportunities

3.2.1 Development Pressures and Constraints

3.2.1.1 Biodiversity

- Inappropriate planning and historic modification of rivers and the riparian zone. Residential and several industrial areas as well as infrastructure are located along the rivers in this district;
- Population growth and urban/economic development, Tygerberg District faces significant growth pressure in both the high and low-income markets;
- Dominance of invasive alien fauna (tilapia, carp and catfish) in the Elsieskraal;
- Increasing pollution and waste and effluent generation; and
- Illegal dumping along rivers resulting in pollution.

3.2.1.2 Hydrology

- Inappropriate planning and historic modification of rivers and the riparian zone. Residential and several industrial areas as well as infrastructure are located along the rivers in this district;
- Population growth and urban/economic development, Tygerberg District faces significant growth pressure in both the high and low-income markets;
- Dominance of invasive alien fauna (tilapia, carp and catfish) in the Elsieskraal;
- Increasing pollution and waste and effluent generation; and
- Illegal dumping along rivers resulting in pollution.

3.2.1.3 Cultural, Heritage, Agricultural and Mineral Resources

- Degradation of Voortrekker Road corridor;
- Increased urban development pressure e.g. at the Haardekraaltjie Camp Site and in the Durbanville Hills Cultural Landscape; and
- Unsympathetic additions and alterations to wine estates in the Durbanville Hills Cultural Landscape.

3.2.2 Integrated Opportunities

Conservation of core environmental features and assets (including POS, beaches, rivers, wetlands, biodiversity etc.) will yield the following integrated benefits for the future growth of the city and its residents:

a. Positive economic development through tourism, job creation, GDP growth linked to:
    - Local tourism and amenity (particularly in the Tygerberg Nature Reserve);
    - Establishment and maintenance of ecological corridors, especially the Eskom servitude corridor north of Monte Vista which links biodiversity areas in Maitland (Table Bay District) to the Tygerberg Mountains on the border of Tygerberg and Northern Districts;

- Integration of biodiversity with the Metropolitan Open Space System;
- Environmental education (particularly in the Cape Flats Nature Reserve, which is administered by the UWC, and Symphony Way, which is located close to the residential areas of Delft); and
- Rehabilitation and conservation (particularly of sensitive and critical vegetation near the airport and in the northern part of the district).

b. Strengthens the city resilience to and mitigate risks associated with natural and unnatural disasters:
    - Rivers are able to improve the water quality of contaminated stormwater, within limits;
    - Functioning rivers are able to provide flooding control; and
    - Rivers provide fauna and flora habitat and can serve as corridors, connecting ecosystems.

c. Positive social development by:
    - Upgrading and enhancement of the Voortrekker Road Urban Corridor;
    - Recognition and documentation of historic struggle sites;
    - Adding value to sense of place through conservation and development of features of historical value e.g. in the Durbanville Hills Cultural Landscape.

3.3 Spatial Implications for District Plan

Table 11 below documents the key spatial implications for the Integrated DSDF and EMF in order to mitigate any potential negative impact on the natural and cultural environment; and enhance the opportunities associated with conservation of natural and cultural resources.

Table 11: Environmental spatial implications

NATURAL/CULTURAL RESOURCE	SPATIAL IMPLICATION
A. Biodiversity 	1. Conserve remnants of sensitive and threatened vegetation types, particularly the Critically Endangered Cape Flats Sand Fynbos (in the lower-lying areas at the foot of the Tygerberg Hills), renosterveld (in the moderately undulating plains, valleys and lowlands of the Tygerberg Hills) and the Endangered Cape Flats Dunes Strandveld in the south-eastern portion of the district; 2. Control development pressure in the key sensitive areas, such as Plattekloof and the Cape Town International Airport and finding an appropriate balance between conservation and development; 3. Avoid development outside of the urban footprint; 4. Where these remnants conflict with areas earmarked for commercial, industrial or residential development, ensure adequate botanical and faunal impact assessments, identifying appropriate mitigation measures, before these activities are approved. Current conflicts include proposed residential areas outside of the urban edge near Richwood and Plattekloof, and mixed use residential and commercial development on the eastern portion of the Cape Town International Airport; 5. Rehabilitate and maintain areas of sensitive natural vegetation and high biodiversity value and establish and maintain "green corridors" where possible (particularly the Eskom servitude (Plattekloof Natural Heritage Site) between Edgemead and Monte Vista); 6. Control and remove invasive alien vegetation in line with the City's Invasive Alien Species Strategy (and particularly in and close to nature conservation and biodiversity priority areas, for example the Tygerberg Nature Reserve, Cape Flats Nature Reserve and Symphony Way near Delft); 7. Control illegal dumping, particularly in and adjacent to important biodiversity sites, and 8. Restrict access to, and the illegal removal of, terrestrial species, particularly in the Tygerberg Nature Reserve.
B. Rivers, Wetlands and Ground Water 	1. Establish and maintain appropriate river and wetland buffers and prevent inappropriate land uses in these areas; 2. Establish 1:50 and 1:100 year flood lines for rivers where they have not yet been determined or have not been accurately delineated (e.g. Elsieskraal and Jakkalsvlei) as well as flood prone areas and prevent inappropriate land uses in these areas; 3. Implement measures to improve the functioning of, and water quality in, the Elsieskraal and Jakkalsvlei by rehabilitating these rivers, where possible, and implementing engineering solutions to improve ecosystem health and Pollution and Waste Management where rivers are canalised; 4. Orientate proposed new development (industrial, mixed use and residential) along the Elsieskraal towards the river, and include the river corridor into the district's open space system to maximise the amenity value of the river corridor, at every possible opportunity; 5. Control illegal dumping and littering, particularly in areas where dumped material can enter or alter stormwater and river systems, and 6. Ensure effluent from industrial development is not discharged in the stormwater system or directly into rivers.

C. Heritage and Cultural Landscapes 	1. Protect the Durbanville Hills Cultural Landscape; 2. Enhance the heritage value of the Voortrekker Road Urban Corridor, focusing on pockets of historic structures such as the Roman Catholic Church and various turn-of-the-century industrial structures; 3. Consider adaptive reuse of the Wingfield World War II aircraft hangers, and 4. Conserve the Haardekraaltjie Camp Site.
D. Mining and Agriculture 	1. Protection of high potential agricultural land and areas currently being used for agricultural purposes; 2. Ensure the extraction of sand in areas where this is possible take cognisance of the biodiversity and socio-economic conditions of the surrounds; 3. Prevention of illegal sand mining, and 4. Ensure appropriate interfaces between urban development activities and the agricultural areas.

C: STATE OF THE BUILT ENVIRONMENT

4 LAND USE AND DEVELOPMENT TRENDS

The Tygerberg District is characterised predominantly by low density residential development to the north of Voortrekker Road, whereas the area south of Voortrekker Road, is characterised by medium and higher density developments. These developments include the bulk of subsidised human settlement areas such as Delft, the commercial strip development along Voortrekker Road, and the industrial areas of Parow, Epping 2, Airport Industria, Beaconvale, Elsies River Industrial Area, Sack's Circle and Triangle Farm. The District also accommodates the Cape Town international Airport (CTIA) as well as the second largest transport interchange in the city, i.e. Bellville Station.

The area of Kuils River is characterised by an agricultural hinterland to the east that comprise of predominantly wine farms. The area is characterised by mainly low density residential areas to the east of Van Riebeeck Road, whilst the area to the west is characterised by medium to higher density human settlements.

What follows hereunder is an indication of the status quo and emerging trends in the broader district. The following subsections provide an overview of the key development trends per land use in the district.

4.1 Residential

See Figure below for building plan submission over the last 5 years.

Building plan approvals over the last 5 years were concentrated primarily in areas such as Burgundy Estate (higher density), Baronetcy (single residential and higher income), the Zevenwacht and Haasendal area (Kuils River), Belhar extension 8 (mostly subsidised) and Delft (subsidised).

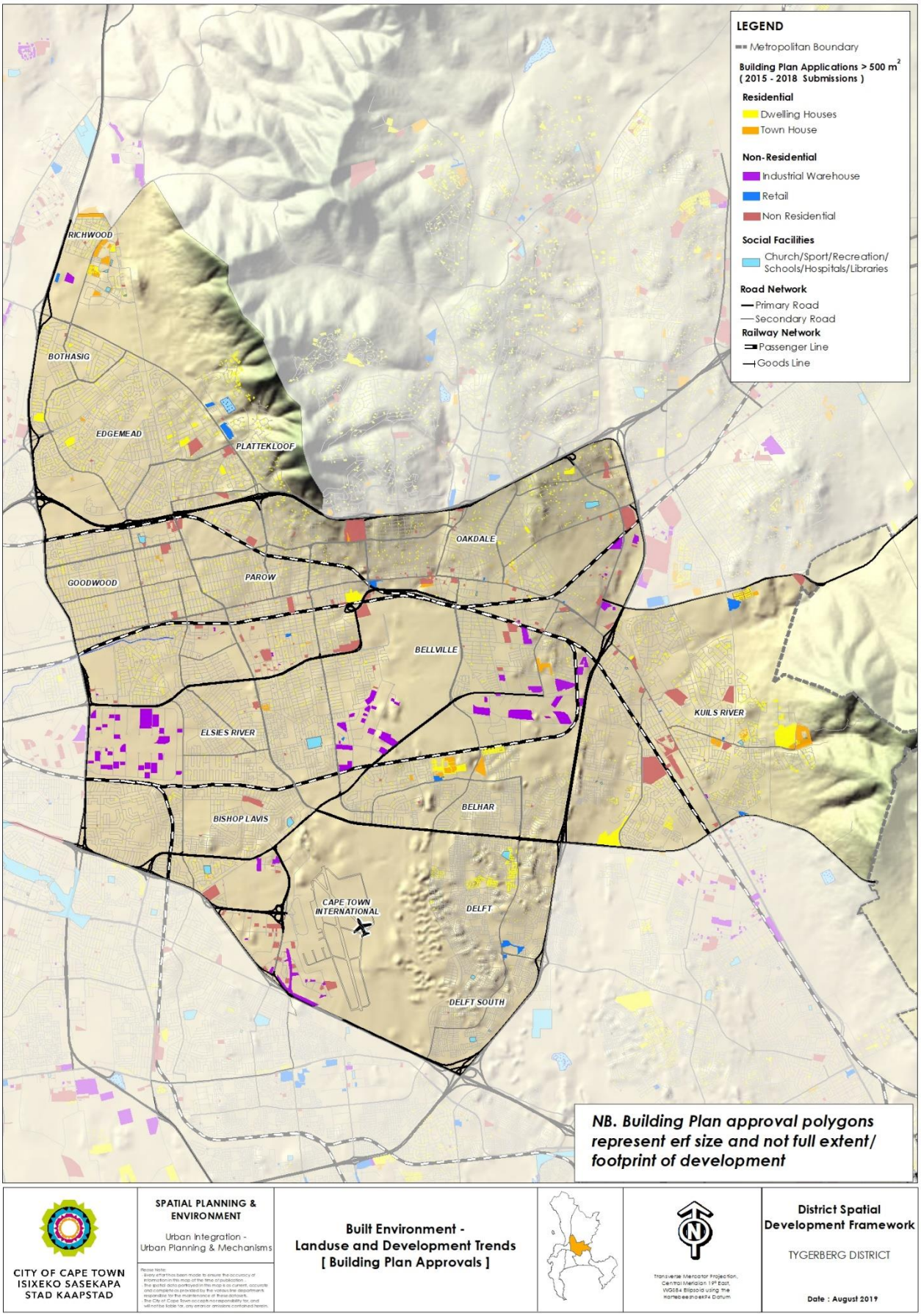


Figure 20: Land use and development trends

Higher densities for the low and middle income groups are mostly located south of Voortrekker Road in Elsies River, Bishop Lavis, Bonteheuwel, Kalksteenfontein, Delft as well as areas in Kuilsriver, west of Van Riebeeck Road in the Kalkfontein area. These areas are also known for the large extent of back- yard dwellers.

The lower density, and more affluent areas are primarily located north of the N1 freeway and include inter alia neighbourhoods such as Welgelegen, Panorama, Plattekloof, Monte Vista, Baronetcy estate, and Burgundy estate. In the latter case, a variety of typologies has been provided for, catering for broader income brackets.

In the Kuilsriver area, the middle and higher income areas are mostly located east of Van Riebeeck Road, and include areas such as Zevenwacht.

In view of the City's Densification Policy and Transport Orientated Development Strategic Framework, there is a definite increase in enquiries for densification in the lower density areas, and new developments tend to be of a higher density form. The typologies in new developments have also changed over the recent years and the focus is now more on group housing and the development of flats.

More recent applications/developments in the Haasendal area, show higher densities, even for single residential development, as well as different typologies providing for a wider range of income groups. The original concept for the development was based on low density, mostly single residential development, but over time the concept has been amended to cater for a wider range of income groups. This can be attributed to a shift in the market demand, affordability, as well as a change in strategic direction by the City of Cape Town to insist on a more compact urban form. Notwithstanding the shifts towards supplying more compact residential development typologies, these developments are located in areas which have not been prioritized for public transport investment by the City, and are thus not categorized as TOD. The concern is that, while densifying, these areas are likely to remain car-dominated/dependent for quite some time. Inevitably, the urban environment is not pedestrian friendly.

4.1.1 Public Sector Development Trends

Public housing projects over the last 5-8 years were mostly located in the areas of Delft, Belhar, Kalkfontein and Kalksteenfontein, with smaller infill developments in the Elsies River environment. These developments were mostly infill developments, where in Delft, infill is still occurring as part of the former N2 Gateway Project. Infill development in Belhar (Extension 8, located adjacent to the Unibell Station) provides for a more compact urban form, as well as different typologies, providing access to housing opportunities for a wider range of users. East of Symphony Way, Belhar Extension 23, a social housing development of blocks of flats, 3- 4 storeys, provides for a more compact urban form, supported by rail and road public transport.

Phase 2 of a social housing project (Bothasig Gardens) is in the implementation phase for Bothasig. A partially social housing project is also in the process of completion in Glenhaven, Bellville.

The planning of housing projects to relocate the informal settlements of Malawi Camp, Freedom Farm and a portion of Blikkiesdorp (Delft), is underway and will be located adjacent to Symphony Way, which is a future BRT route.

4.1.2 Private Sector Development Trends

The general trend is that the majority of private initiatives occur as greenfield developments located mainly on the periphery of the urban footprint and focused on a specific income bracket in the residential property market, e.g. Haasendal, Saxenburg and Highbury.

A definite trend to provide for student rental accommodation is evident, especially in the areas surrounding the tertiary education complexes. Along Voortrekker Road, in the Parow CBD and in the core of the Bellville CBD several student accommodation developments have been completed, where the University of Western Cape has taken ownership of an underutilized building that provides for education facilities as well as accommodation.

The extent of single residential plots (Single Residential Zone 1) have definitely decreased with new developments, and on average is around 600- 700m². An increase in group housing , 'walk-up' apartments as well as smaller blocks of flats developments have occurred especially in the Parow and Goodwood areas. The Burgundy Estate as well as development in the Haasendal area caters for different typologies of housing development, providing for a larger range of income groups, which should be regarded as a positive development trend in the private market sector. The same can be said for the residential development in Highbury that is more focused on the middle income households. However, the trend for the provision of larger single residential properties in the higher income bracket is still evident in areas such as Baronetcy Estate, and can be ascribed to market demand and affordability. Other open market development in the pipeline include inter alia development in and around the Kuilsriver golf course and Bottelary smallholdings.

Applications for higher density housing infill developments have also occurred, such as the development at Goodwood station (PRASA) as well as at the Elsies River station (265 rental units). In the latter instance, it should be noted that the densities and typologies have changed from flats to 'walk- ups', therefore a change to a slightly lower density development. This is because the cost of development in such target markets becomes prohibitively expensive after the first 4 storeys. It is argued that the momentum regarding the provision of affordable residential rental development is starting to build. Financial institutions are also recognizing that investment in affordable residential development is becoming less risky due to the extent of demand in the lower-middle residential submarkets. There are now visible signs of intensification within stagnant "downtown" contexts within the Voortrekker Road Corridor, such as Goodwood and Parow.

Developments such as erf 21712 (c/o Picton Street and King Edward Road, Parow) are focused at the more affordable market although still out of reach of the lower- income bracket.

A definite increase in applications for second dwelling applications have been experienced, which most probably is due to the fact that it has become a primary land use right in terms of the provisions of the MPBL, to allow for property owners to be able to sweat their assets. Other reasons may be the decrease in affordability for young families and or first time home owners, it may serve as extra income to the primary household. In the latter instance, such applications have also been considered in areas like Delft. In this regard, this form of affordable residential rental delivery is an important form of densification in suburban contexts.

4.2 Employment Centres

One cannot expect that the economic active population in the district is only employed in centers, as other industrial areas such as Epping 1, Montagu Gardens, Paarden Island and commercial centers such as Bellville and Cape Town CBD area drawing employees from across the metropolitan area. It is further acknowledged that industrial nodes in the cape metropole should not be regarded as pure industrial areas, as large areas are being taken up by commercial uses, which in many cases include some form of retail.

As the Tygerberg district primarily falls within the reservation area being called the 'urban core' (MSDF, 2018), where intensification as well as diversification of land use are to be supported, a basic understanding of the economic energy in the district is required. In this regard, the content from the draft document: VRC: Integration Zone: Strategy and Investment Plan: Baseline Assessment (2014) has been utilized in the section below:

Firstly, it should be accepted that the district boundaries are merely administrative boundaries, and each district functions within a wider space economy.

The fact that identified 'Opportunity areas' in the district include the Sacks's Circle industrial area, Elsies River- and Beaconvale industrial areas, as well as the Bellville CBD area, which includes the Bellville PTI were identified, based on different directives such as property values, vacancy rates, etc, raises the question whether there is demand in the market to redevelop in these areas, or not. The area around Durban Road, between the N1 Freeway and Voortrekker Road is also included. The identification of these areas further raises questions regarding future development directives for these areas.

In broad terms, the variables impacting on the growth and or decline of these areas should be understood:

- Almost one of 5 formal (note that 15% of overall employment in the city is informal in nature) jobs in the metropolitan area is located in the Voortrekker Road corridor, and almost 34% of the 183 000 jobs located here are attributable to the industrial sector. It can therefore be concluded that the local economy has a high level of reliance on industrial incomes.
- Another issue that needs to be answered is whether the principles of conventional urban regeneration with emphasis on promoting mixed use development instead of the segregation of land uses, should be promoted. In this regard, the focus of reducing commuter trips at a more micro- scale and creating a vibrant public environment, should also be considered.
- The Voortrekker Corridor is host to 25% of Cape Town's industrial and 11% of its commercial property base respectively.
- When assessing building development statistics (2010-2013) and focusing on employment- generating activities, it is clear that commercial development, especially office development happened in the nodes north of the corridor along the mobility corridor of the N1 freeway, i.e. Century City and Tyger Valley, whilst industrial development happened along the belt to the south of the corridor, i.e Airport Industria, Philippi Industria, Parow industrial area and LaBelle/ Cecil Morgan Grounds. The question is whether the lack of vacant land and greenfield development attributed to the non-investment, or if other problems, such as the lack of urban management, relating to maintenance and security also contributed.

- When the nature of the links between nodes within the corridor, and those externally to the corridor, be assessed, the conclusion is that the internal links are mutually reinforcing, whilst the outward links to peripheral nodes appear to be largely competitive. There is also a stark contrast when the performance of the nodes within the corridor is compared to those outside of the corridor, i.e. the performance outside the corridor was much higher than that inside the corridor, which showed a similar lower performance.
- The question arises whether there is positive potential, over time, for spill- over effects once push effects such as high rentals and congestion (for example) in the nodes along the high mobility routes, start to negatively affect consumers. The assumption is that this may not happen in the short- to medium term, as developers and other institutions, still have a variety of options to, for example, curb negative impacts such as congestion.
- When land values in the industrial nodes are assessed, it has transpired that the highest land values are in the nodes located to the west, i.e. Ndabeni, whereas Sack's Circle and Elsies River Industrial nodes are the cheapest. The suggestion is therefore that the land values here are depressed for locational reasons. It is further confirmed that the supply of vacant industrial land is not a significant determinant of land values or building development.
- Both office and street front retail rentals are significantly lower in the corridor, even when compared to more poorly located nodes such as Mitchell's Plain. This confirms a lack of demand for space in the area, which is confirmed by high levels of office vacancy in the

  Bellville area. One could argue that the relatively low residential densities associated with the corridor contribute to low residential thresholds to support street-front retail.
- When building completion trends (2005-2013) are analysed, it transpired that industrial developers have generally avoided industrial and mixed use areas abutting Voortrekker Road (see figures below). New office development continues to be concentrated in established nodes such as Cape Town CBD. Tyger Valley, Century City, and more recently in Claremont (JLL, 2019). See graph below.

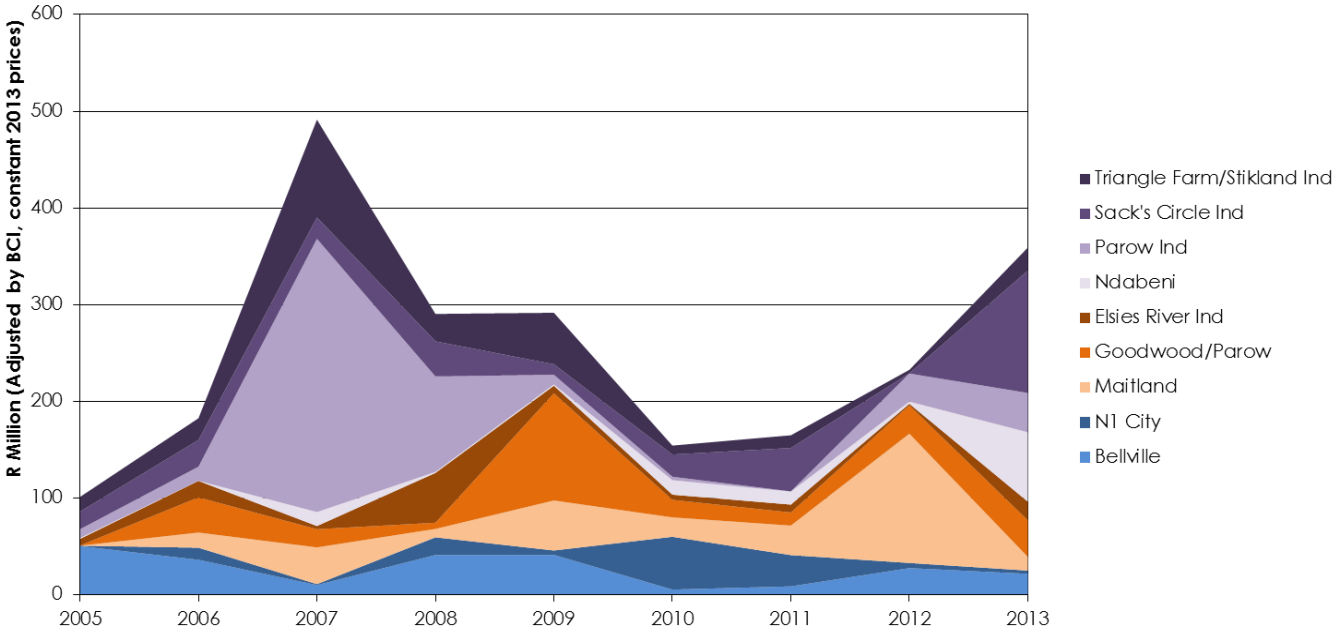


Figure 21:Non-residential building development in Tygerberg district

- The development of new retail space has flat-lined, with the exception of Bellville, suggesting that Bellville is being repositioned away from an office node and towards a retail node, driven by commuter through- put. See map below.

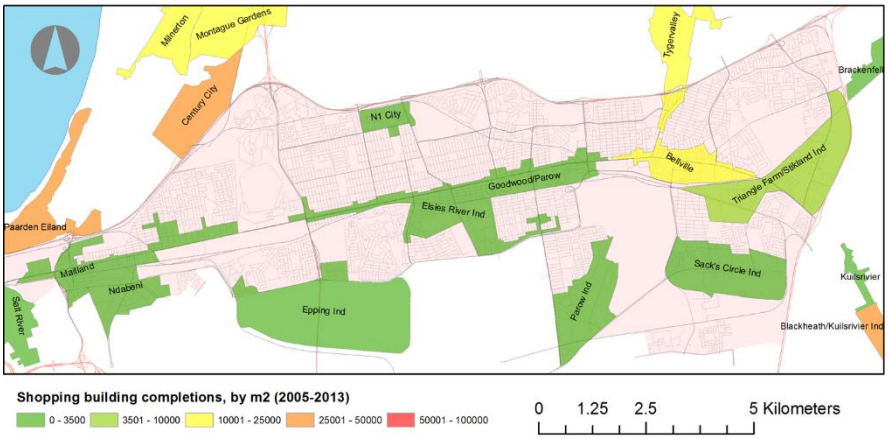


Figure 22: Buildings completed in commercial/industrial nodal areas

- When building plan submission trends (only 2012-2013)/ demolition permit data (2005- 2012) is analysed, it seems as if industrial development interest has strengthened in Parow Industria, Epping & Sack's Circle, but not in Elsies River industrial area. Goodwood and Parow areas have shown a considerable increase in the redevelopment of buildings for commercial development. See maps below.

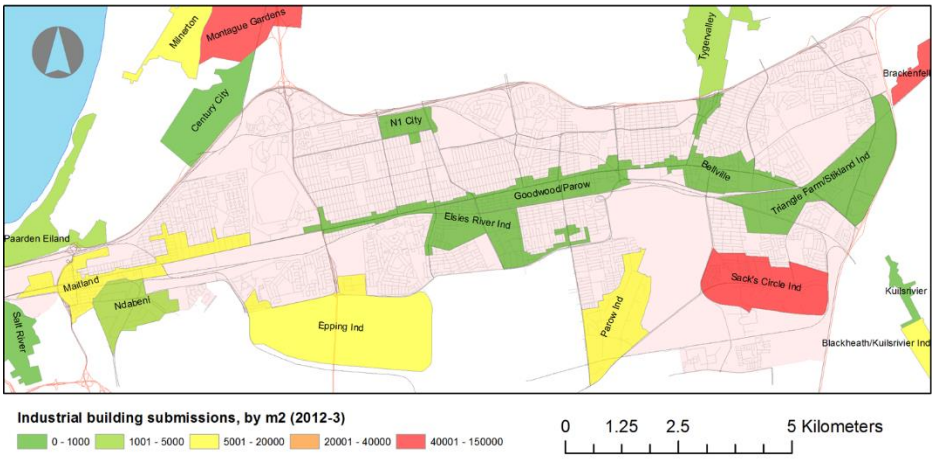


Figure 23: Building plan submissions in industrial areas

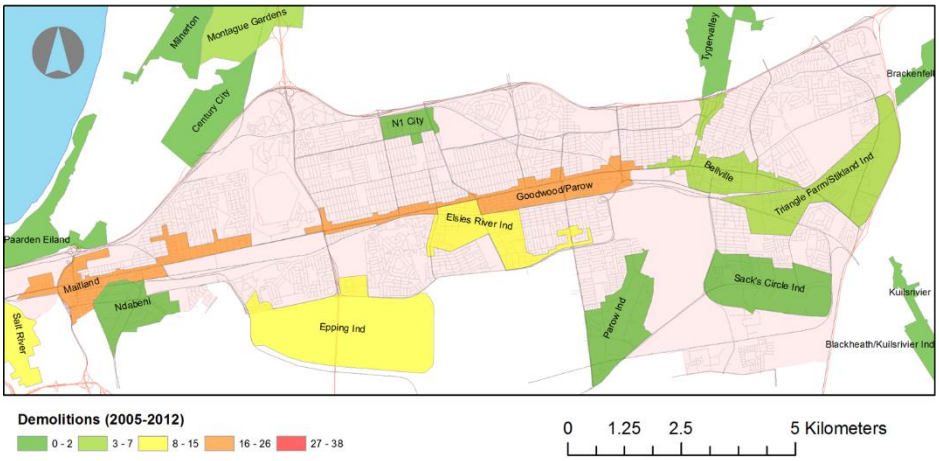


Figure 24: Demolition permits

- It can be argued that the Voortekker Road corridor enjoys a relatively favourable level of accessibility to surrounding areas, with the area only marginally affected by congestion.
- The question is however, what causes the lack of development/ investment in especially the industrial areas, such as Elsies River. It is stated in the draft documentation that: "There are mounting indications that this dramatic escalation in violent crime is having a grave impact on the study area's ability to retain higher-order economic activity." While urban management concerns are still prevalent in Elsies River Industria, it is argued that the overall trend has improved marginally with the introduction of the Elsiesriver CID.
- When the categories of land use in the corridor were analysed (2014), it was found that retail activities continue to be concentrated along Voortrekker Road, and that there is a notable presence of retail in nodes formally regarded as industrial, such as Elsies River industrial area, that include Beaconvale.

4.2.1 Industrial

Epping is the largest industrial area where a level of manufacturing is still occurring, therefore the level of employment is gathered to be higher than industrial areas focusing on distribution, storage, maintenance, etc.

Other industrial areas include Airport City, Boquinar, Sack's Circle, Parow Industria, Bellville South Industria, Triangle Farm and Elsies River Industria, where performance of industrial activity has stagnated to varying degrees over the last decade.

The above is also evident in the number of building plan submissions for industrial development, which were approved mainly in the areas of Epping 2, Sack's Circle and Parow Industria.

New industrial development only occurred at Airport Industria, and there was little evidence of redevelopment in the existing industrial areas, except for upgrades. The redevelopment of the King David Country Club (golf) to the north of Boquinar industrial area, also for industrial purposes, is also in the process of approval.

The City's revision of the 2013 Manufacturing Investment Incentives Policy spatially targets underperforming industrial nodes with high potential to support manufacturing in labour intensive industrial sectors based on spatial investment priority and ECAMP market performance scores. In this regard, 4 of the 5 spatially targeted areas selected for implementation of the incentives policy are located in the Tygerberg District. These include the following industrial areas: Elsies River, Parow, Sacks Circle, Triangle Farm/Stikland.

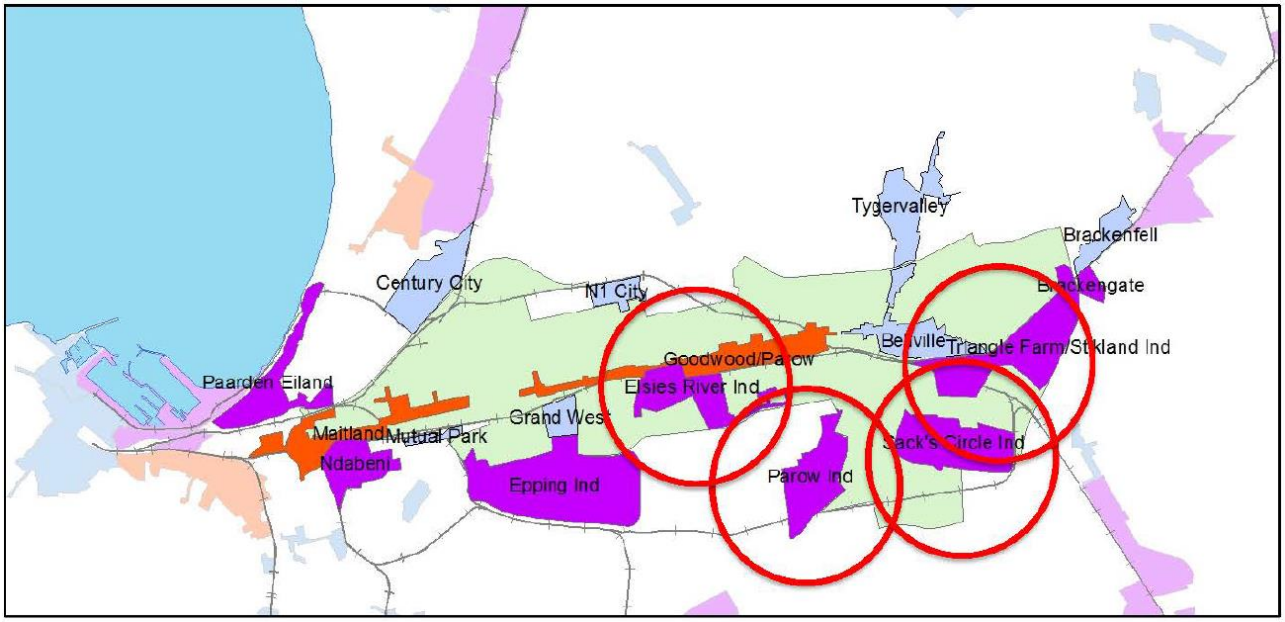


Figure 25: Spatially targeted investment incentive policy areas

4.2.2 Retail and Office

Retail centres include the Parow Centre and N1 City, which can be regarded as regional centres as well as the Bellville Mall, located within the arena of the Bellville transport interchange. The other main retail/ commercial strip development occurs along the length of Voortrekker & Van Riebeeck Roads as well as Durban Road (south of the N1). Smaller retail centres along Voortekker Road include the so- called China Town Centre, Parow Family Centre (c/o Giel Basson) and McIntyre Square (c/o McIntyre Drive). The Tygerberg District also accommodates larger corporate head offices such as SANLAM, ESKOM as well as public facilities such as SA Revenue Services, Domestic Services offices, all located along Voortrekker Road.

No new commercial development of note, except the Zevenwacht Mall in Kuils River has occurred in the district except for neighbourhood centres that have developed inter alia along Langeberg Road in Kuilsriver, along Van Riebeeck Road, in the Delft CBD and along Van Riebeeck Road (Beaconvale).

In conclusion, one cannot expect that the economically active population in the district is only employed in these centres mentioned above, as other industrial areas such as Epping 1, Montagu Gardens, Paarden Island and commercial centres such as Bellville and Cape Town CBD area drawing employees from across the metropolitan area. It is further acknowledged that industrial nodes in the Cape metropole should not be regarded as pure industrial areas, as large areas are being taken up by commercial uses (wholesale and retail trade, repair of vehicles), which in many cases include some form of retail. A good example

of such a mixed use industrial node is Parow East Industrial area (located to the immediate east of Parow Centre), where a substantial degree of office (Foschini Group Head Office) and retail activity co-exists with industrial activities. Furthermore, it is interesting to note that, in terms of the City of Cape Town Industrial Survey (2016), Epping industria is dominated by wholesale & retail and repairs of vehicls (35%, 2016), in relation to manufacturing that accounts only 26% (2016 figure) of use in the area.

4.2.3 Supportive Land Uses

Other employment centres include the Tygerberg and Karl Bremer Hospitals as well as 4 private hospitals, i.e. Panorama, Louis Leipoldt and Melomed, N1 City and the Kuilsriver Netcare hospital. These hospitals are in general surrounded by other medical- related uses (e.g. consulting rooms, oncology centres, eye hospital/ hearing centre), contributing to these employment precincts.

The district also houses 4 larger tertiary education facilities, i.e. University of Stellenbosch medical school, CPUT (Cape Peninsula University of Technology) and UWC (University of Western Cape). Northlink College also has different campuses in the district, such as Panorama, Beaconvale (Parow), Belhar and Bellville.

4.2.4 Mixed Use

A new mixed use commercial development (industrial, offices and retail) adjacent to Richwood (Richwood Park) is in the process of development. One of the forces behind the development was a land claim. It needs to be noted that the reason for not including residential in the development, was the buffer zone around the oil tank farm.

There has been a slow uptake in what could be considered genuine mixed use developments. Two factors are considered to play a role:

- The models for financing, residential versus commercial developments differ;
- Existing legislation does not force a mix of uses but rather allows developers to pick financially viable uses from a list of primary rights within a particular zone.

Unless incentives are provided or legislation is changed, the vision of creating developments that provides a rich variety of uses is considered out of reach.

What is interesting from the phasing of the Richwood development node is that industrial activity seems to be leading over retail and commercial development. This may be an indicator that the demand for large regional retail malls is saturated, while decentralized office development is usually concentrated around retail. This can also be attributed to the recent completion of the new Table Bay Mall within a 10km radius from Richwood.

However, new industrial space seems to be absorbed into the market as fast as the rate that it is delivered.

4.3 Smallholdings

The district accommodates two remaining smallholding areas:

- Bottelary smallholdings in the Annandale area, which is almost fully developed; and
- Smallholdings in the Skilpaddam area along Polkadraai Road where enquiries for development opportunities is increasing. In this area, confirmation has already been given that Stellenbosch Farm 419-14 is located in the Consolidation area (Spatial Transformation Areas, MSDF, 2018). Furthermore, the cadastral units south of Zevenzicht Link Road is also located in the Consolidation area / Urban Core (MSDF, 2018).

4.4 Agricultural Land

Agricultural land in the district include the remainder of the De Grendel farm to the east of the extended Giel Basson Drive (M12) and the farms to the east of the Kuilsriver Golf Course as well as those to the east of Zevenwacht. All of these properties are defined as "Areas of Agricultural Significance" in terms of the MSDF, 2018.

Tourist related uses are found on some of these properties, such as restaurants, wine tasting facilities and conference facilities/ venue facilities.

4.5 Development Pressures

No areas can be singled out as to locations where ongoing pressure for urban development is focussed, but where bulk services capacity is not available or limited.

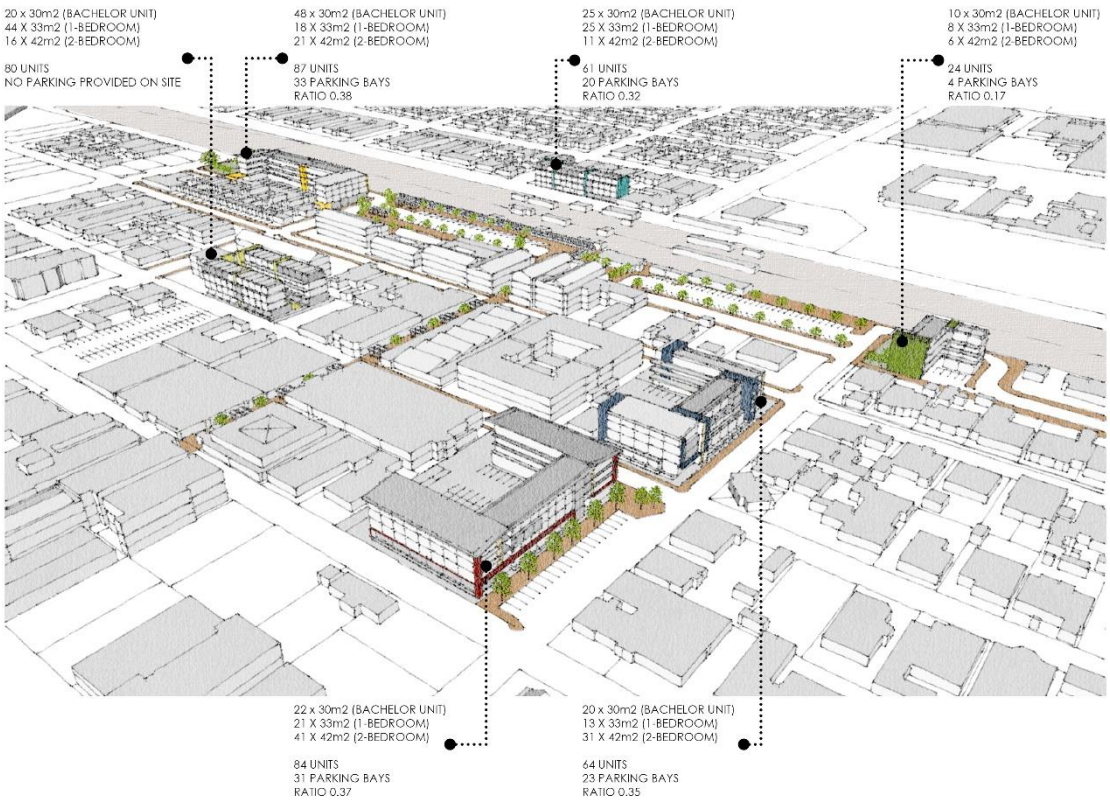
4.6 Existing Development Potential (Vacant Land & Underutilised Rights)

Note that vacant land, where land use approvals are in place or submitted, or development proposals are being considered, are still included in this discussion. The discussion hereunder does not include open spaces, unbuilt road reserves, cemeteries, nature reserves, etc. These are all vacant properties or portions of properties, but cannot be regarded as still being available land for development. However, in the case of undeveloped open spaces, such open spaces may, in future, be considered for development, but will beforehand be subject to evaluation in terms of open space provision in the specific area, community needs etc. as may be determined by the CSIR Guidelines for the provision of social facilities in South African Settlements.

The largest vacant or underutilized land parcels located in the district, such as the Transnet Marshalling Yard, Tygerberg Hospital, Stikland Hospital, Goodwood prison property and Parow golf course may be regarded as vacant and or underutilized, but are not readily available for development. Properties identified in the 2012 Tygerberg District Plan, identified for "New Urban Infill", have to a large extent been developed, such as land in Highbury, properties to the west of the Kuilsriver Golf Course and Bottelary smallholdings, and Kalkfontein. The land not been developed, e.g. in Delft and along Symphony way (adjacent to CTIA) and Belhar are mostly earmarked for subsidized housing projects, where such development is in the pipeline already.

Vacant properties where no land use applications have been submitted, include, inter alia the Communicare property in Annandale (Kuilsriver) (Remainder erven 5561 & 19718), located to the south of Bottelary Road.

Within the Voortrekker corridor, the largest portions of vacant land comprise primarily of underutilized parking areas (city owned) as well as the property taken up by the Bellville Public Transport Interchange, including the Paint City site (Erf 26364, Bellville). Some of these offer definite opportunity for more affordable residential infill development (especially for the social housing market), but, given the increase in interest for student housing development (which may require some form of parking, even if located in a PT2 area), care should be taken not to alienate all of these parking lots, as these areas may provide space

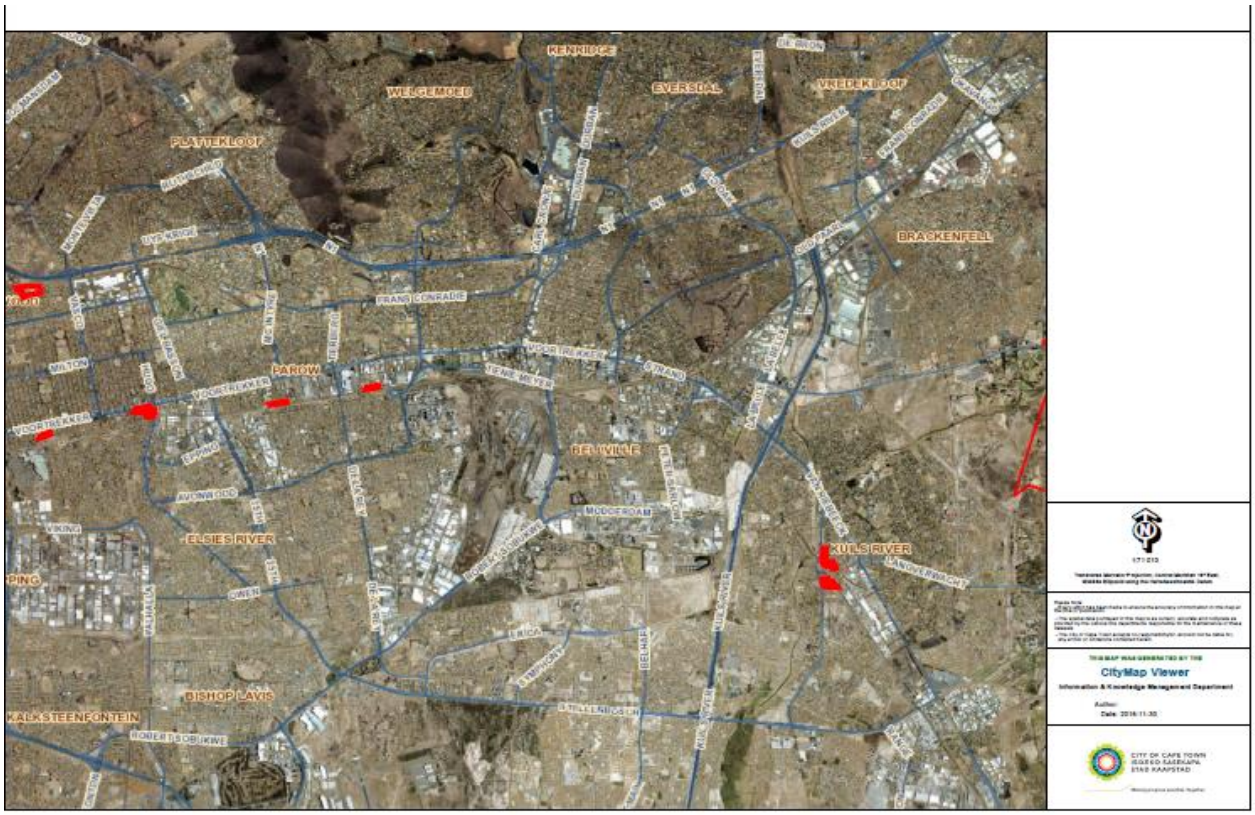


for parking requirements that developers cannot provide. Hereunder is an impression of what can be achieved by developing some of these underutilized parking spaces adjacent to the Parow station.

Vacant/ Underutilsed land parcels are also to be found around rail stations (PRASA/ Transnet and city owned) (See map hereunder):

- Goodwood station; Remainder erven 8433 & 40202 (PRASA) (development application approved for social housing & retail), erf 3292 (Communicare)
- Elsiesriver station; Remainder erf 8563 (Transnet, 2,4ha), erf 36583 (private, 1.3ha)
- Parow station; erf 9018 (PRASA, 0.6ha)
- Tygerberg station; Remainder erf 20139 (PRASA, 0.6ha)
- Monte Vista station; erf 20496 (City of Cape Town, approximately 5ha developable)
- Kuilsriver station; Erven 25533, 1206 (PRASA), Erven 1206- 1210, Remainder erf 980 (City of Cape Town, approximately 1ha)

Another image of what's possible based on a development prefeasibility study of Erf 20496, Tygerdal. Approximately 500 residential units at a gross density of 70 du/Ha (and 1 parking bay per unit)



Along Voortrekker Road, existing approved development bulk (may be regarded as latent and theoretical, due to amendments to zonings in the new MPBL) is available, but as such has not been taken up in the past years, which is of concern, as the focus in the 'urban

core' along the Voortrekker Road corridor is for intensification and diversification of development.

With regard to the provisions in the MSDF (2018), the properties/ smallholdings listed hereunder, is also regarded as available for future urban development (See map below). These properties are also excluded from the 'Areas of Agricultural Significance':

- Stellenbosch Farm 1053/0
- Remainder Stellenbosch Farm 419, portions 5, 10,11, 12, 13,14,17,19,21, 22, 59, 62, 82.

4.7 Key Challenges and Opportunities

4.7.1 Opportunities

- Encourage appropriate development where it is desirable in terms of its impact on heritage (and socio-economic xxx) through the application for exemption of the requirements of S34 and/or S38 of the NHRA in areas where the heritage value of the built environment is not significant or of a low quality.
- Adaptive reuse of historical buildings particularly light industrial buildings to provide quality and affordable residential opportunities
- Transnet Marshalling Yard is identified by Transnet as the preferred location for the consolidation of an inland intermodal port facility, linked by a freight rail shuttle to be in place by 2024 (a dedicated freight line will need to be constructed between the Marshalling Yard and Cape Town Port by 2034. Investment in the Marshalling Yard will most likely create further opportunities for related industrial activities related to manufacturing, agri-processing, and logistical services.

However, in the event that Transnet relocates this facility to a more decentralised location, the Bellville Marshalling Yard would present a significant redevelopment opportunity to the extent that it could fundamentally restructure the existing urban form in this part of the City.

- Tygerberg Hospital
- Stikland Hospital
- Parow Golf Course precinct, if unlocked for development, would present a strategic opportunity for the City to deliver mixed use, mixed income development supported by public transport.

4.7.2 Challenges

- Providing adequate incentives for commercial properties along Voortrekker Road to take up available (latent) bulk land use rights, remains problematic, as the cost of brownfield development, demand and affordability in the market may still hamper redevelopment. Further to this, one of the primary challenges (as reflected by property development professionals) to brownfields redevelopment is the slow rate of property churn within the corridor. Possible explanations are offered below in brief:
  - While the cost of development is the same throughout the city, the income potential of property in the corridor is substantially lower than other areas where the property market is more buoyant. As a result, the viability of new development in the corridor is much more difficult to achieve. Therefore, property owners are more likely to hold onto existing buildings that produce a trickle feed of income;
  - The fact that property values have neither decreased nor increased relative to other investment areas has contributed to the stagnation observed in the corridor. Further to this point, there seems to be a mismatch in the market valuation of commercial property between buyers and sellers, meaning that property cannot readily be transferred into the ownership of willing investors.
- The triggering of heritage protection in areas where built stock is either older than 60 years or approaching 60 years is becoming more of a concern with each year that passes. This is not just a concern in areas prioritised for densification, but also in older suburban areas established in the 1950's to 1960's such as Elsies River and Bishop Lavis. Onerous regulations such as these will inhibit the ability of poorer households to either harness their assets for income generation or simply improve the quality of their properties. Large vacant or underutilised properties are not readily available for development.
- Parking requirements in terms of the MPBL in areas where some form of public transport is available, may still be too high, or the approved PT2 areas need to be extended to a wider area.
- Care should be taken not to utilise properties zoned for open space purposes and or sports fields (even if undeveloped) in low income, high density areas, for other uses, unless it can be confirmed that there are adequate public facilities in the area, addressing the needs of the community.

5 TRANSPORT AND ACCESSIBILTY

5.1 Introduction

This chapter provides an status quo analysis of the mobility and accessibility networks within the Tygerberg District.

There is a strong focus on transport as an informant of the CTMSDF, using the TOD Strategic Framework (2016), in line with international planning trend which recognizes the need for spatial planning tools to support public transport and non-motorised transport options, as well as reducing the need to travel. The CTMSDF now needs to be translated "down" in scale to a district level. This section therefore focuses on the application of TOD to a district / corridor level.

The diagram below is useful in this regard, showing TOD at various scales.

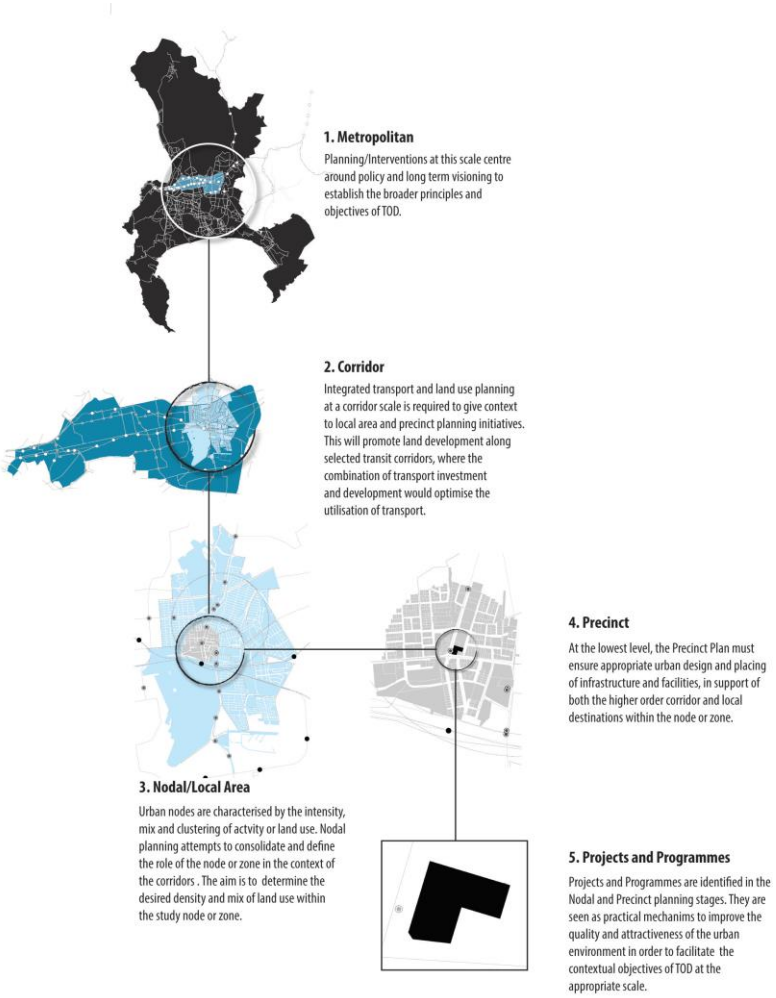


Figure 26: Transit Oriented Development concept at scales

At a corridor scale, TOD requires the generation of bi-directional flow (to replace the current "tidal" commuter patterns), reduced travel distances to public transport, and higher seat renewal (multiple origins and destinations along the route). The district plan will identify which corridors in the district should be reinforced with land use proposals.

5.2 Strategic Parameters & Informants

The City of Cape Town developed a host of strategies which aim to provide various strategic intents and objectives to guide the delivery of an efficient transport system and outline the primary framework within which the system develops. Further strategies address other transport needs such as non-motorised transport, universal accessibility, parking, operations, etc. These strategies are highlighted in the section hereunder.

5.2.1 District Specific Transport Strategies

5.2.1.1 Voortrekker Road Corridor Integration Zone (VRC IZ)

The National Treasury enables metropolitan areas to identify and plan for corridors which serve to integrate previously separated parts of the city, through enabling and encouraging the spatial targeting of public investment into these areas. The VRC IZ is a plan and related investment strategy to improve urban management; to offer appropriate regulatory reforms; to facilitate growth sectors; to enable affordable human settlement; enable public realm upgrades; and manage infrastructure risk. It therefore becomes an important informant to the district plans which it spans.

In particular, it identifies the following "prioritised local areas" for targeted investment: Bellville CBD; Parow; and Saltriver/Maitland.

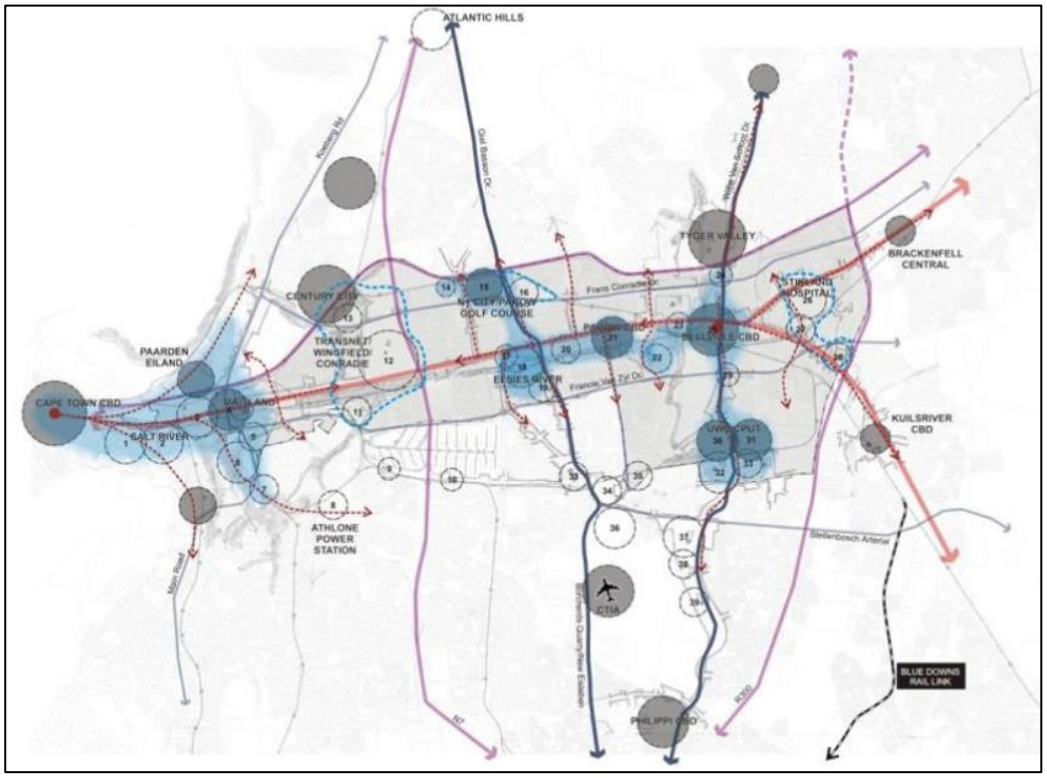


Figure 27: Voortrekker Road Corridor(VRC) Integration Zone

5.2.1.2 Blue Downs Integration Zone

The western portion of this Integration Zone intersects with the eastern portion of the district, covering Delft. There will need to be close coordination between the two planning processes which aim to direct public and private investment decisions.

5.3 State of Public Transport

5.3.1 Existing Infrastructure and Services

5.3.1.1 High Order Public Transport

Rail

The district is well served by rail, with several services linking Bellville and CT CBD (the Northern lines; Strand Business Express; and Northern Business Express); Bellville with the hinterland (Malmesbury/Worcester; Northern line to Wellington; Northern Business Express to Paarl); and the Northern line linking to Strand (including the Strand Business Express). Bellville is also linked to Langa and eventually to Khayelitsha and Mitchells Palin via the Central line.

Major transport interchanges include Bellville, Tygerberg, Parow, Elsiervier and Kuilsrivier, and to a lesser extent, Vasco station.

However, with the decline in rail, and the lack of a MyCiTi trunk route, it is not well serviced by long haul, mass transit, as the GABS express service between Bellville and the CT CBD is limited.

Bus Rapid Transit (BRT)

There is currently one BRT service in the district, linking the Cape Town International Airport (CTIA) to the CT CBD as a direct airport shuttle service. As it operates in mixed traffic (no dedicated lane), it is inefficient during the peak periods. During the 2017/18 financial year, it carried an average of 7 600 passengers per month. The only planned BRT route in the district is the extension of Robert Sobukwe Drive to link with Durban Road (before 2032).

Air Transport

The district accommodates the Cape Town International Airport (CTIA) which is a significant mover of people and goods. It thus must be considered in its role as both a land use, and a major interchange as part of the transport network.

As a land use, it is both a major trip producer and trip attractor. The timing of these trips is dependent on the flight patterns of passenger and freight. Hence the strong morning and evening peaks will remain, and increase, as the CTIA's services expand. The challenge is to enable as many conversions as possible of passenger trips to public transport modes.

As a transport interchange, the CTIA has provided extensive parking for short and long term stays. The provision of a dedicated MyCiTi service to the Cape Town CBD has done little to influence this. In addition, increased e-hailing services perpetuate the generation of near single-occupancy trips. A major deterrent to using the MyCiTI service is that it operates in mixed traffic, and is impacted on by the congestion (or an incident) on the Nelson Mandela Boulevard and the N2.

There have been different schemes to provide a dedicated right of way service to Bellville CBD (either road or rail based). These should be pursued.

This transport hub does offer the fundamentals for opportunities for more efficient public transport movement (not linked to the air travel), particularly from the Bellville area, via the CTIA, using a dedicated right of way and the existing available park and ride facilities.

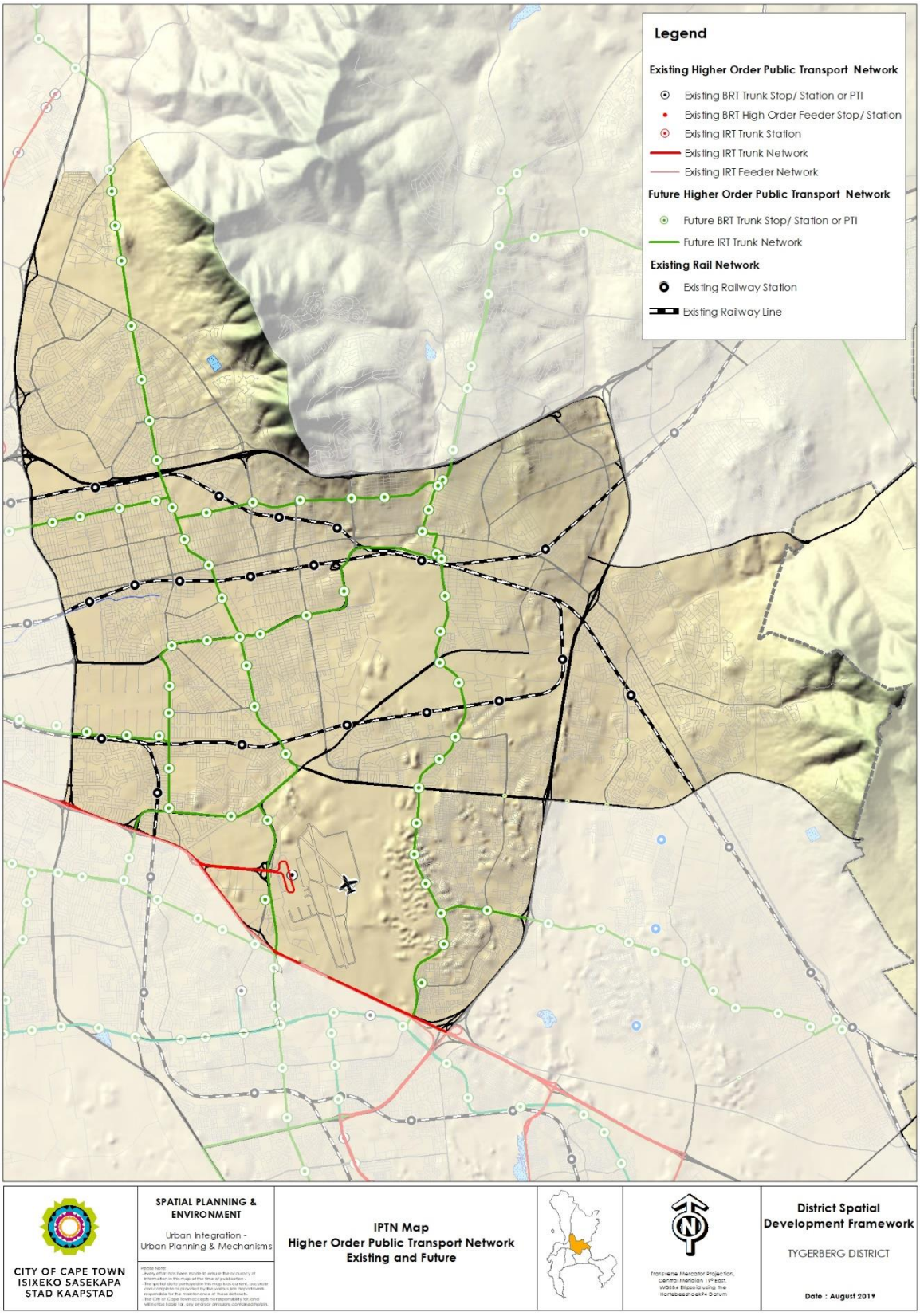


Figure 28: Existing and Future high order public transport services

5.3.1.2 Low Order Services (Mini-bus taxis, Buses and NMT)

Minibus Taxis and GABS, and associated Public Transport Interchanges (PTIs)

The district is well-served by minibus taxi operators and bus services, which operate along the main routes in the area, particularly along Voortrekker Rd, and Delft Main Rd to a lesser extent. They provide transport to stations, commercial and retail areas and employment areas.

Major destination points include Bellville, followed by Parow station and Parow shopping centre, Kuilsrivier CBD and shopping centre, Zeevenwacht Mall, Delft Main Rd South, and Halt Rd near Elsiesrivier station / industrial area.

The following public transport facilities serve the district:

Table 12: Public transport facilities in Tygerberg district

Name	Formal/ Informal	Any plan for upgrading
Cambridge Public Transport Interchange	Formal	
Epping Minibus-Taxi Rank	Informal	
Goodwood Station Transport Interchange	Informal	
N1 City Shopping Centre Minibus-taxi Terminus	Formal	
Vasco Station Transport Interchange	Formal	
Belhar Station Transport Interchange	Formal	
Bellville South Minibus-taxi Terminus	Formal	
Bellville Station Transport Interchange	Formal	Catalytic Land Development Project
Charlesville Minibus-taxi Rank	Informal	
Delft (Eindhoven) Minibus-taxi Terminus	Formal	
Delft (Voorbrug) Minibus-taxi Terminus	Formal	
Elsies River Station Transport Interchange	Formal	
Kalkfontein Minibus-Taxi Terminus	Formal	
Karl Bremer Hospital	Informal	
Kuilsriver CBD Public Transport Interchange 1	Informal	
Kuilsrivier Station Transport Interchange	Formal	
Parow Station Transport Interchange Northern Side	Informal	Scoping
Parow Station Transport Interchange Southern Side	Formal	
Tyger Valley Centre Minibus-taxi Terminus	Formal	
Tygerberg Hospital Public Transport Interchange	Formal	
Tygerberg Station Transport Interchange Northern Side	Formal	
Tygerberg Station Transport Interchange Southern Side	Formal	
Unibell Station Transport Interchange	Formal	

a. Non-motorised Transport (NMT)

Significant NMT infrastructure is planned for the district: some cycling routes exist in Goodwood, Bothasig and Ravensmead. Some settlements in the district have a cellular layout, reducing accessibility and connection with adjacent areas. Mobility is suppressed because of safety – not only from crime, but the prevalence of gangs in some areas prohibit residents from crossing gang boundaries.

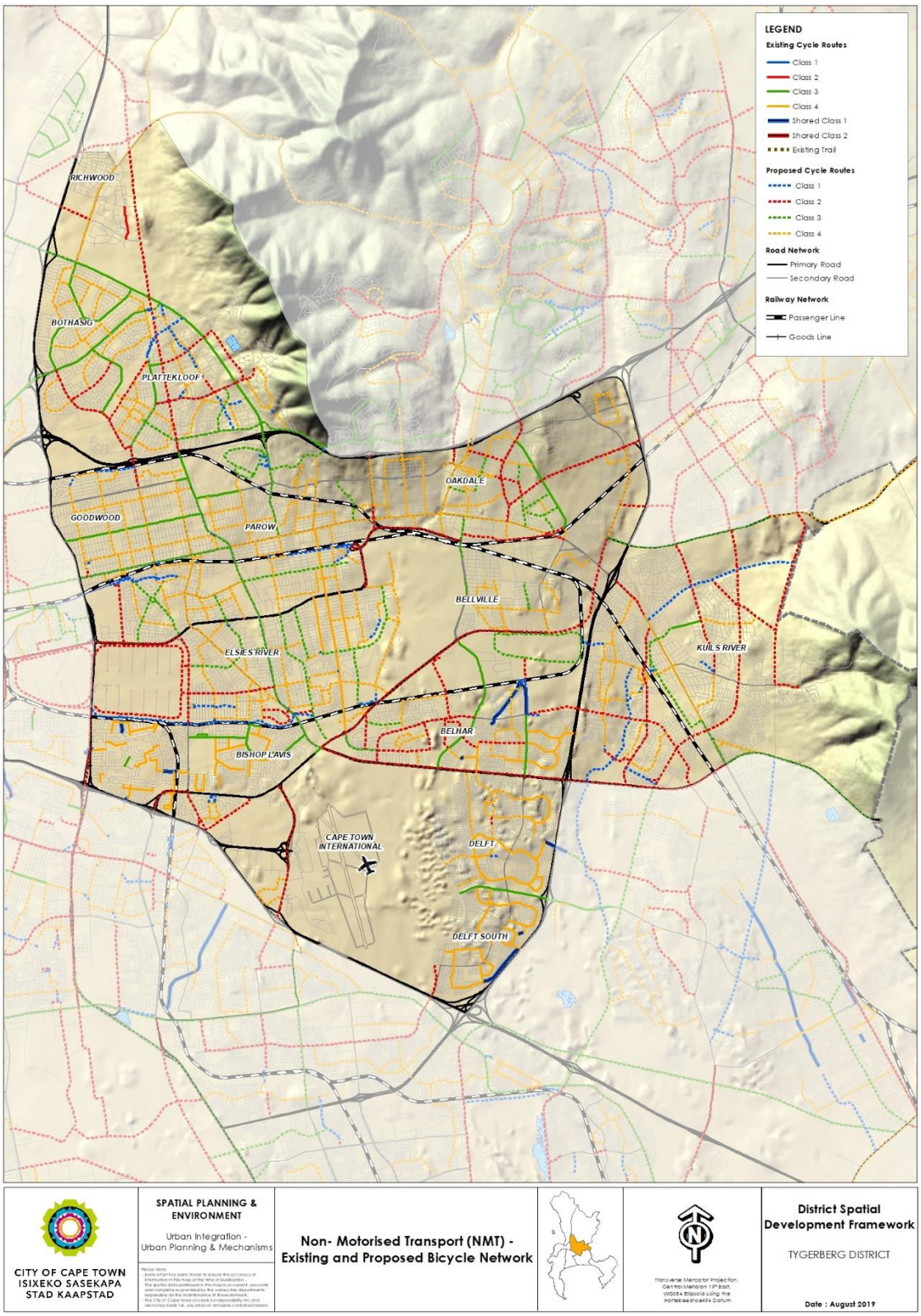


Figure 29: Existing and Future bicycle network

5.3.2 Planned Transport Infrastructure and Services

5.3.2.1 BRT feeders and trunks

In Phase 2, trunk route T17 from Khayelitsha to Century City via the Airport Precinct is planned and will pass Bishop Lavis, Bonteheuwel and Epping. T13 is planned from Mitchells Plain to Durbanville, passing Delft, Belhar, Bellville South, and Bellville.

T14, T16 and T19 in Phase 3 will also benefit the district. Refer to the Bellville Transportation Framework for delivery timeframes. T13 = 10-15yrs and T14 = 20-25yrs. Therefore, continued reliance on taxi and GABS bus is expected for the foreseeable future.

5.3.2.2 Rail

The resources for the following intended projects are within the Western Cape Regional Plan and MTEF (2016-19):

- Redevelopment of Bellville station in order to provide better facilities for trains that terminate there
- Between Bellville and Mutual stations: Four tracked with centre tracks used for high-speed non-stop services and outer tracks used for stopping services
- Blue Downs Rail link will link the Metro South-East to the eastern part of the district at Blackheath station

The Northern Rail (Bellville and Monte Vista) Modernisation Study is currently underway. The study will ultimately determine an infrastructure and operational investment rollout plan for the modernization of the rail corridor.

The Blue Downs Rail link accesses the eastern part of the district near Blackheath station. Already, significant planning has been undertaken on this line, and it is subject to a joint planning process between the City of Cape Town and PRASA.

A rail link between Bellville and the CTIA has long been an option. While no resources have been assigned to it, the rail reserve alignment should remain protected to enable future options.

5.3.2.3 Public transport Interchanges (PTI's)

Bellville is a prioritized local area within the VRC IZ. Bellville PTI has significant status as a priority project as part of the City's TOD intervention. Significant planning work has been undertaken on the precinct: the intention is to upgrade the PTI, in conjunction with PRASA; to develop City-owned land parcels; upgrade the public realm; and plan the integration of future MyCiTi routes with the PTI.

Parow Station (north) is in need of a new PTI facility to accommodate the volume of mini-bus taxis operating from this location.

5.3.3 Level of Public Transport Accessibility

As part of the TODC model a scoring of the various Transport Accessible Precincts (TAPs) around stations and stops in the city was conducted. The overall score provides a measure of the level of accessibility of the City's current public transport network using the following indicators:

C1. Status of station: Existing or Proposed
C2. Status of network: Existing or Proposed
C3. Connectivity: Accumulative Travel time to the City's top 10 employment destinations
C4. Capacity: Capacity of stations to accommodate passenger volumes
C5. Modal Integration: Level of integration between modes of public transport (Rail/BRT/PTI/Feeder)
C6. Intensity: Number of people within 500m of a station/core feeder stop

Note that this scoring methodology does not take into account the *functionality* of the public transport services. The measure is purely a *locational* score. Based on these scorings, the following patterns are highlighted for the Tygerberg district:

- The existing TAPS along the railway lines have particularly high accessibility.
- The Bellville CBD and surrounding area has the largest cluster of high accessibility scores in the district.
- In future, through the MyCiTi roll-out, the north-south routes (Symphony Way in Delft to Durban Rd in Durbanville; Valhalla Rd in Valhalla Park to Plattekloof Rd in Bothasig) will have good accessibility scores.

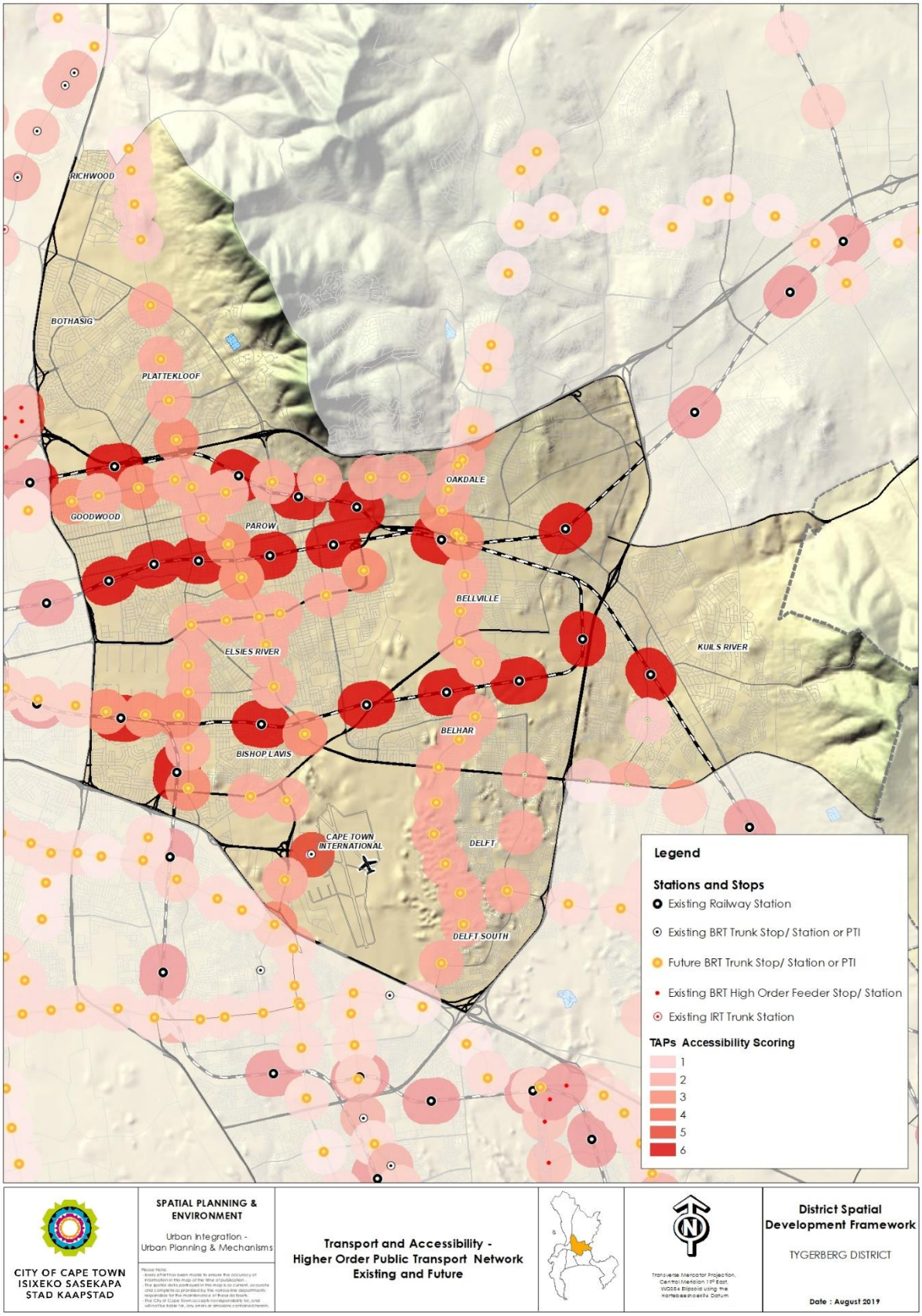


Figure 30: Transport Accessibility Precincts(TAPs) scoring

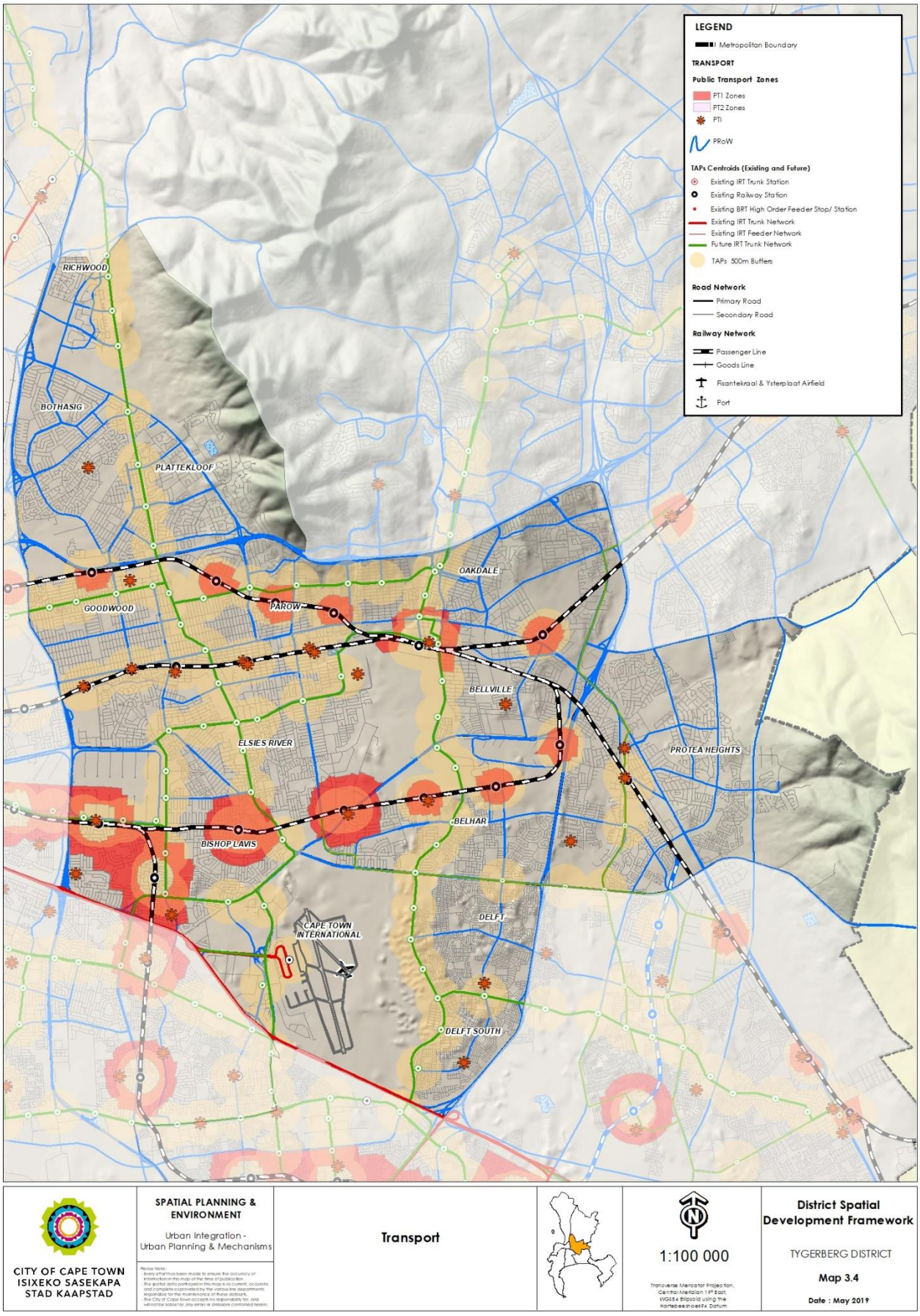


Figure 31: Current public transport infrastructure

5.4 State of Road Infrastructure

5.4.1 Overview of the district road network

In terms of the functioning of the road transport network, connection north-south across the CT CBD-Bellville rail lines and the N1 freeway is limited and problematic; and there are numerous "missing links" in arterial and connector routes.

Freeways:

Along the northern, eastern and southern district boundaries, the R300 (managed by SANRAL) as well as the N1 and N2 (managed by the WCG) received significant upgrades over the past 20 years. However, along the western boundary, the M7 (Jake Gerwel Drive) remains the only designated freeway in the city which is not built on freeway standards.

Arterial Roads:

Because of the location of the Airport and the Bellrail Transnet land, as well as the fact that the land between Voortrekker Road and the railway line developed before the arterial road network was planned, Voortrekker Rd is the only continuous east-west arterial road extending through this district from the M7 as far as the R300.

Other arterial roads include:

- Robert Sobukwe Rd
- Airport Approach Road
- Stellenbosch Arterial/ 35th Avenue/ Jan van Riebeeck/ Giel Basson/ M12
- Viking Road, Avonwood Road, and Francie van Zijl Drive.

5.4.1.1 Roads Upgraded / constructed over the last 5 years

See map below showing recently upgraded roads, and possible new upgrades.

5.4.1.2 Historic Road Schemes to be reviewed

The alignment of the Tienie Meyer Bypass extension may be reviewed.

5.4.1.3 Congestion Management

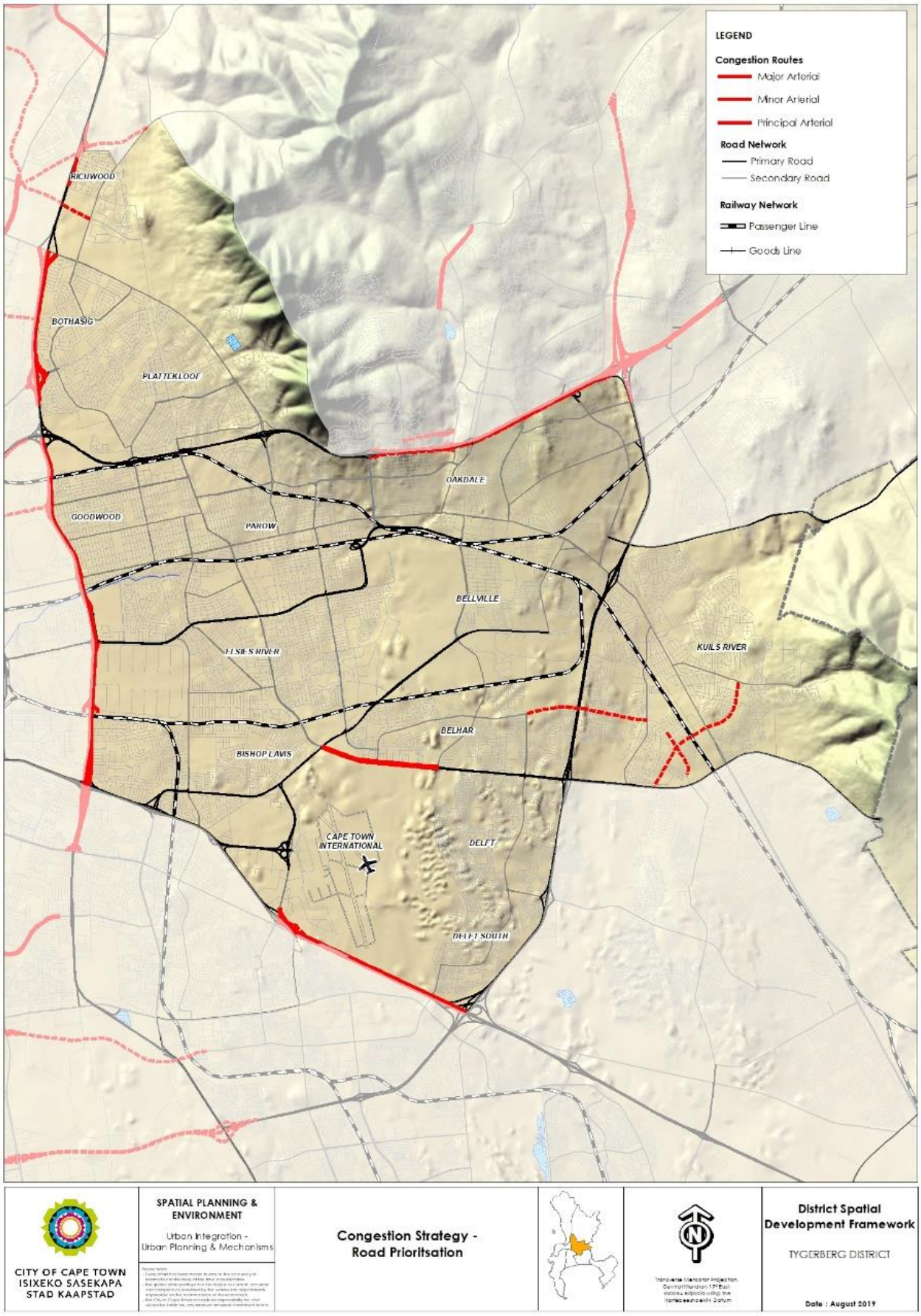


Figure 32: Congestion Strategy Road prioritisation

5.4.1.4 Parking

Kuilsrivier station boasts the most utilized park and ride facility in the city, linking the hinterland, including Stellenbosch residents to the rail station. Bellville public transport interchange boasts the second largest park and ride patronage in the city.

There are different parking issues in different part of the district. For example, Durbanville business district experiences significant on-street parking. On the other hand, there are under-utilised public parking areas in the Voortrekker Rd Corridor integration zone, which are strategic land parcels which are being considered for development in support of TOD. The high demand for parking in the Bellville CBD could precipitate the private provision of parking garages.

These varying issues need to be addressed in this plan.

5.4.2 Planned Roads and Streets

New road connections planned in terms of the metropolitan transport plan are shown in the map below. This district contains numerous proposed links and upgrades compared to the other districts.

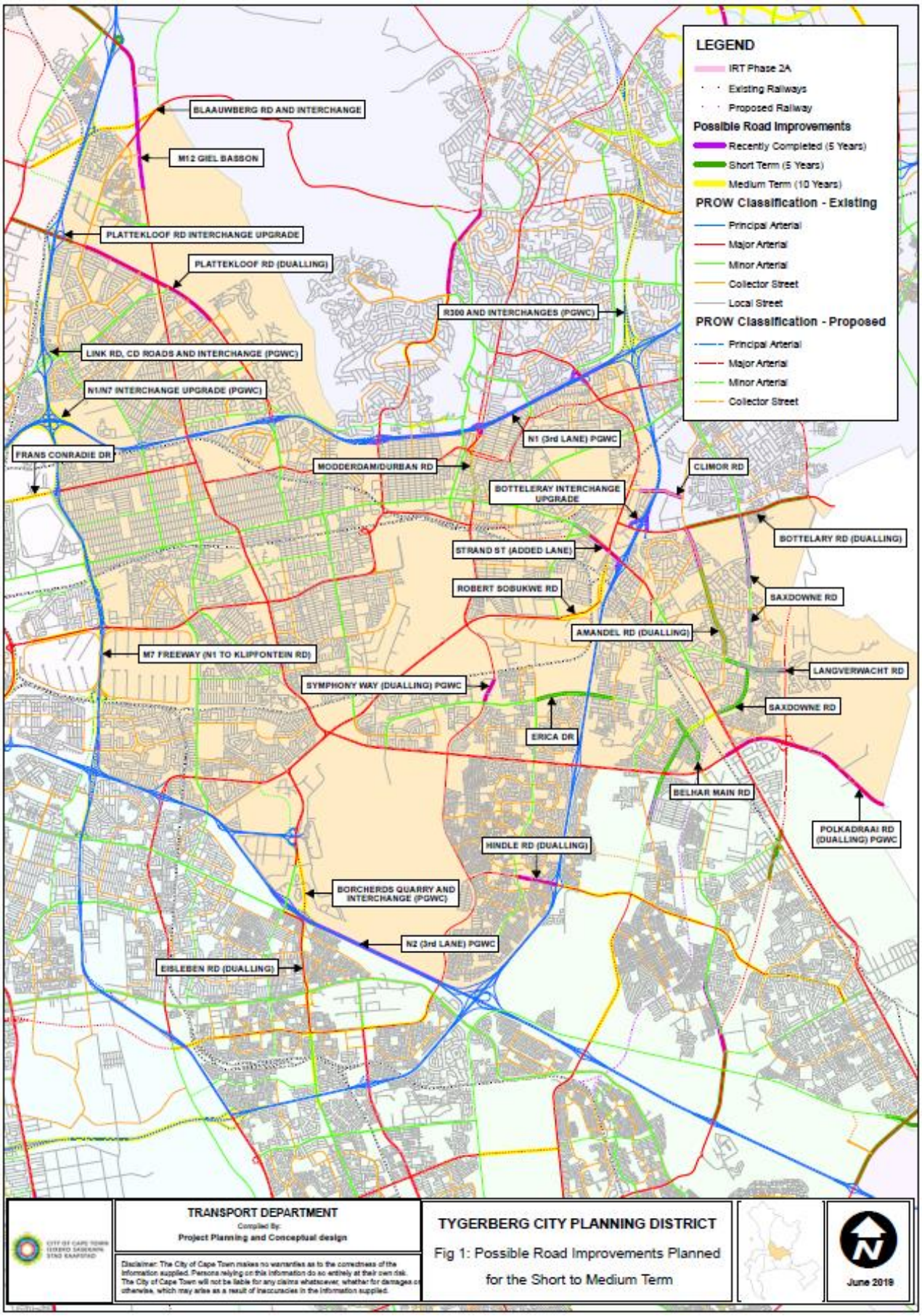


Figure 33: Planned upgrades and new public RoW links

5.5 State of Freight

The freight sector is critical to the efficient movement of goods in support of the economy and the provision of services. On the other hand, it can be a hindrance to traffic flow, and trucks place a disproportionate maintenance burden on road infrastructure (and the impact of accidents are great).

Freight movement in the city as a whole can be seen on the map below: clearly the largest volumes are on the national roads, and related to the Port. The port together with over 30 industrial areas located in various parts of the City, contribute to a high number of trucks on the municipal road network. In this district, Epping Industria, the CTIA and Blackheath Industria generate the highest freight traffic volumes.

Information obtain from inter alia a Port Technical Subcommittee Working Group meeting of June 2019, it transpired that the Belcon site is in future to be utilized for container storage/ activities. The future intensification of freight activity with associated freight traffic services at Belcon would no doubt have to have a substantial impact on the receiving road network surrounding the site.

The City's Freight Management Strategy addresses the planning and management of freight operations within the city's functional region. It recognises the need to shift the modal split back towards rail where possible.

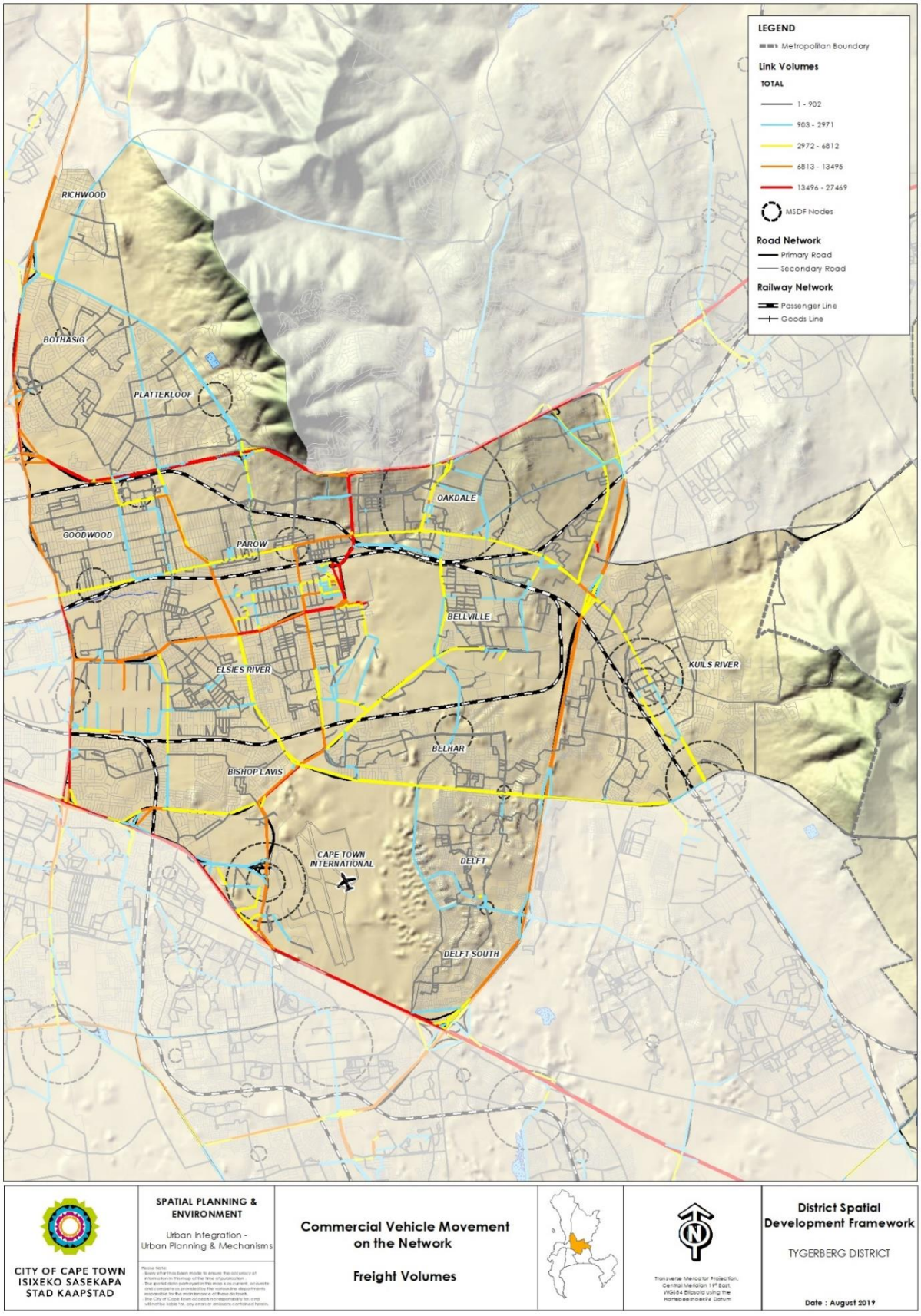


Figure 34: Commercial vehicle freight movement

TRANSNET manages the goods line (Monte Vista line) which traverses the district and accesses the hinterland.

5.6 Travel Patterns

5.6.1 Current (EMME Demand – Base year 2015)

The following features for the district as whole can be observed:

- There are areas of strong trip attraction in several industrial areas which are mainly south of the N1. These are mainly employment nodes
- Other trip attractors would be the significant tertiary education facilities in the district.
- The southern part of the district is dominated by trip generators
- The eastern and northern extremities of the district are farming areas with minimal trip generators or attractors
- The more affluent suburbs to the north of the N1 contain a relativley balanced number of trip generators and attractors.

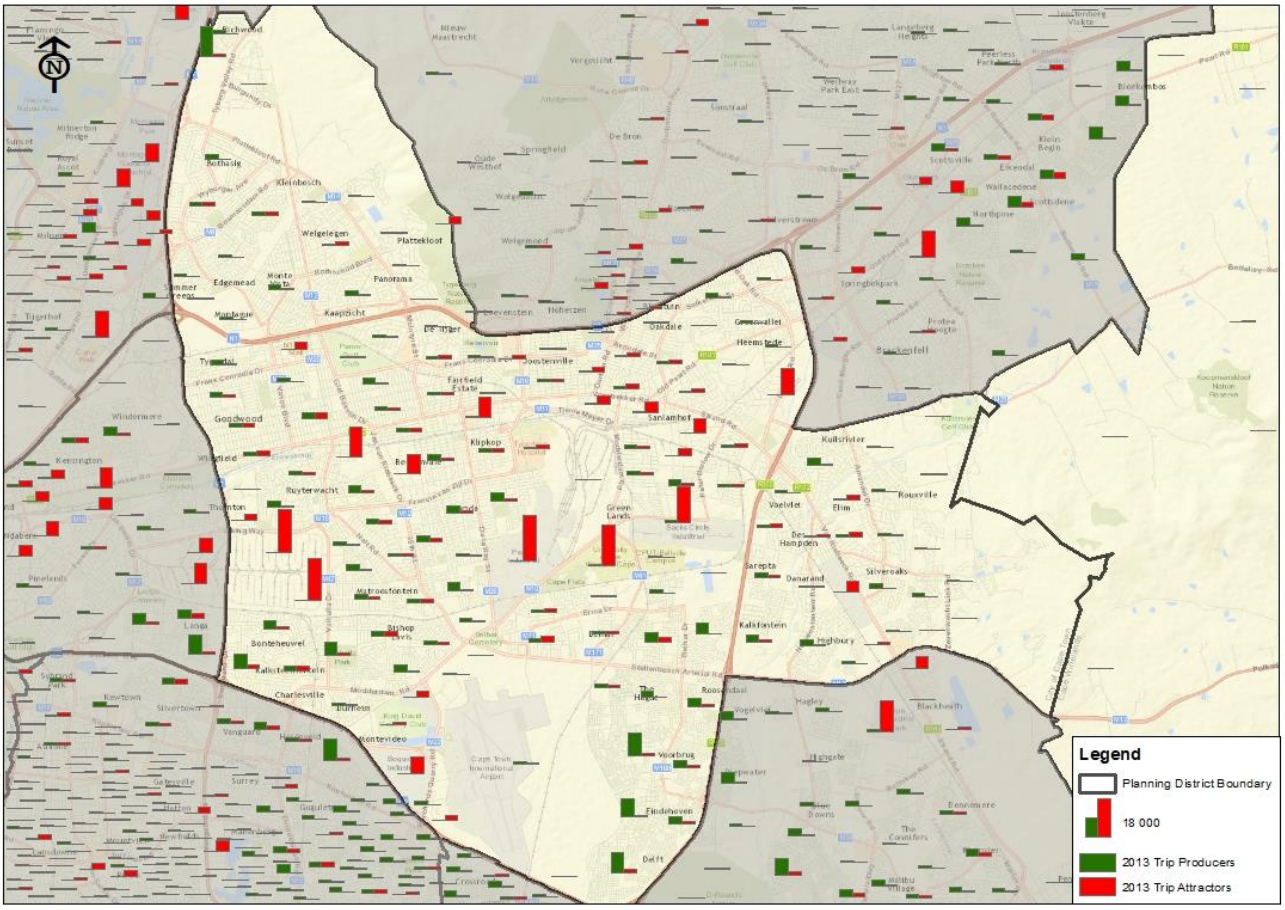


Figure 35: Trip generators and attractors in 2013

5.6.2 2013 Origin-Destination Movements

The metropolitan origin-destination maps show the following patterns:

- Many residents remain in the district, but still many move out of the area, mainly to the Cape Town CBD. In 2010, most residents travelled by private car
- The district attracts trips mainly from the Metro South East and east by public transport, and from the north and east by private transport
- This is the one district which is able to generate bi-directional flow of trips, which increases the efficiency of the transport infrastructure.

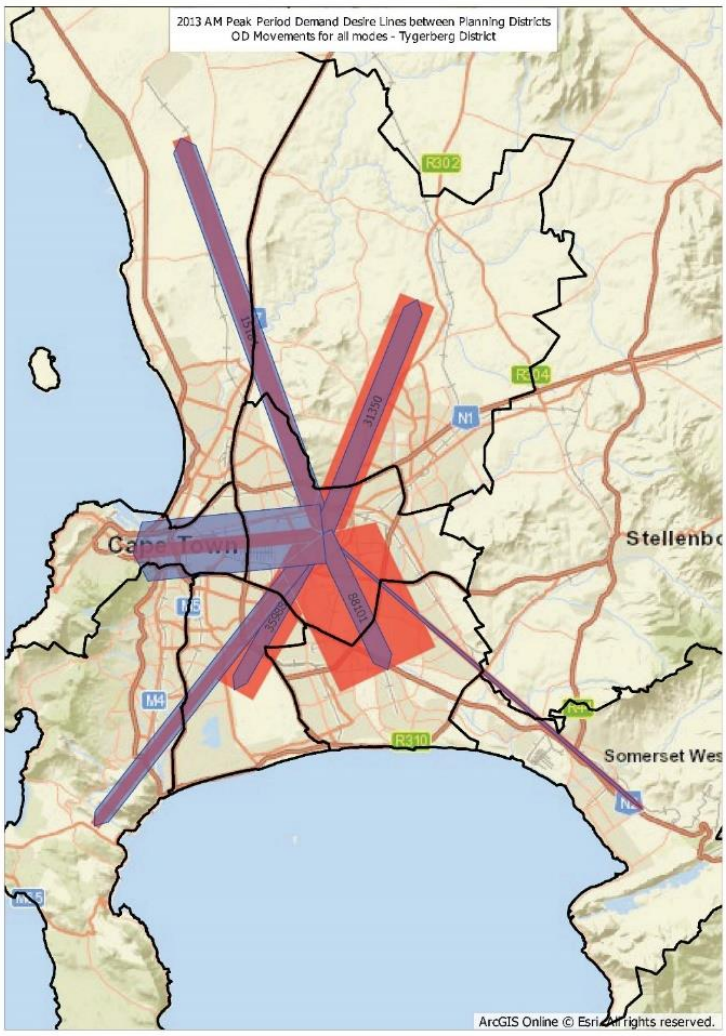


Figure 36: Morning peak period: Origin-Destination 2013

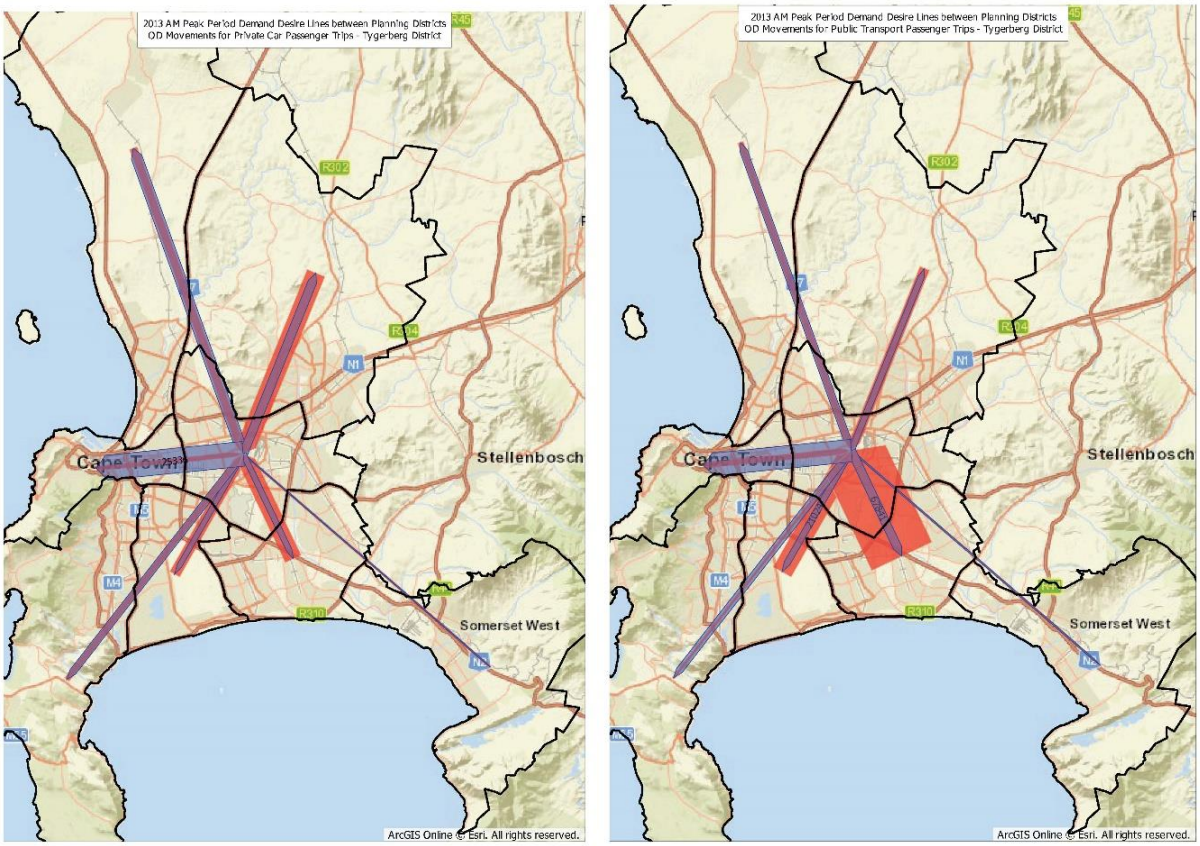


Figure 37: 2010 morning peak period movement patters for (a) private cars and (b) public transport

Table 13: Origin and Destination trips for Tygerberg district

Origin	Destination	NMT	Car	Taxi	Bus	BRT	Train	Public Transport	Total
Tygerberg	Table Bay	583	4102	5128	3089	51	6453	14721	**19406**
Tygerberg	Blaauwberg	179	3951	2295	911	11	753	3970	**8101**
Tygerberg	Northern	276	4812	1741	779	0	481	3001	**8089**
Tygerberg	Tygerberg	4509	11104	8985	4432	0	3808	17225	**32838**
Tygerberg	Helderberg	295	1769	1804	930	0	276	3011	**5075**
Tygerberg	Khayelitsha / Mitchells Plain	214	795	1743	820	3	613	3179	**4188**
Tygerberg	Cape Flats	425	1150	1798	958	0	1448	4204	**5780**
Tygerberg	Southern	6	396	1743	886	1	1947	4576	**4978**
		6487	**28080**	**25237**	**12806**	**66**	**15779**	**53888**	
Tygerberg	Tygerberg	4509	11104	8985	4432	0	3808	17225	**32838**
Table Bay	Tygerberg	264	2775	1280	651	28	2799	4758	**7797**
Blaauwberg	Tygerberg	167	569	1195	1360	42	230	2827	**3563**
Northern	Tygerberg	270	7730	1624	1255	1	1725	4606	**12606**
Helderberg	Tygerberg	944	5151	3451	2322	0	838	6611	**12705**
Khayelitsha / Mitchells Plain	Tygerberg	296	4317	7922	9508	92	4945	22467	**27080**
Cape Flats	Tygerberg	905	3402	3690	3285	0	3347	10322	**14629**
Southern	Tygerberg	3	2546	433	352	1	3048	3835	**6384**
		2849	**26490**	**19595**	**18733**	**165**	**16933**	**55425**	

5.6.2.1 Future Ideal Distribution of Trip Generators and Attractors (2032)

In modelling the future land use patterns which would generate the demand for trips to be served by the IPTN, an "ideal" scenario, namely "Comprehensive Transit Oriented Development", or CTOD, was run for 2032. The CTOD response is to try to balance trip attractors and trip producers in all areas, to theoretically eliminate/ minimise the need to travel by having jobs and residences in the same area. The map below shows this ideal future state to work towards, with growth in the right locations to minimise travel time.

From a transport optimisation perspective, the large quantity of anticipated residential units (trip producers) in some locations which are far from existing trip attractors needs to be countered / matched by new non-residential land uses (trip attractors) in order to achieve this goal.

From a spatial planning perspective, this means mixing land use (diversifying land use). This DSP must use it as a guide and determine how this is possibly achievable.

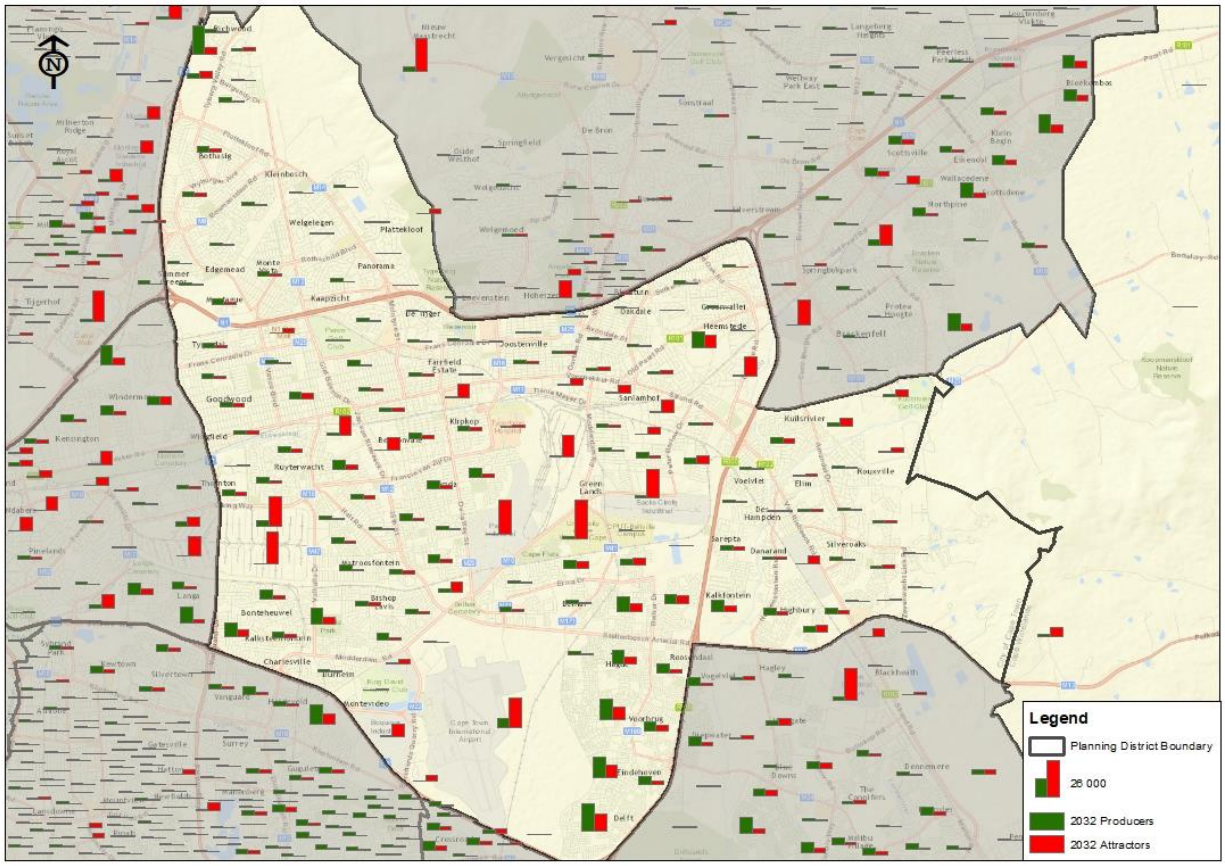


Figure 38: Ideal mix of future trip producers and attractors(CTOD:2032)

The following features for the district as whole are anticipated or hoped for:

- Significant growth is expected in this district, and this is desirable if it is in the form of intensification within the urban inner core area. While the industrial areas are unlikely to grow significantly, new industrial areas such as that associated with the expanded airport, as well as employment areas such as Voortrekker Rd, are expected to grow
- Trip producers (residential land uses) are expected to increase across the district

- It is hoped that if the farming areas to the north along the N1 (outside this district) are developed, they will develop into a mix of trip producers and attractors, rather than low density, mono-functional, residential estates
- It is hoped that trip attractors in the form of work opportunities will develop along Symphony Way.

5.7 Key Transport Challenges and Opportunities

5.7.1 Constraints

The challenge is that the urban form is generally characterized by insular townships with low density development. This leads to low transport densities which cannot support quality public transport because of long commuting distances, low seat renewal (through multiple destinations along the route), and little bi-directional flow. The plan will attempt to address these challenges, which are land use issues.

The arterial road network and other high speed roads impact on pedestrian safety.

5.7.2 Opportunities

The district includes areas receiving significant planning attention through not only the Voortrekker Rd Corridor Integration Zone, but also the Bellville CBD as a priority project in the Catalytic Land Development Programme (CLDP). Both these initiatives go beyond planning projects, to include investment programmes, including stakeholder partnering, and private sector activation.

The expansion of the CTIA is also a major boost for the district, but the City's proactive response to this is essential to maximize the benefits, and minimize the additional pressure on the transport network.

The existing MyCiTi CTIA shuttle service, along with the potential for park and ride facilities at the CTIA, have the potential for greatly enhanced connectivity between the eastern part of the district, and the CT CBD.

5.7.3 Spatial Implications

The redevelopment of Bellville as a secondary metropolitan node should be supported in this plan, and, along with the expansion of the CTIA, could result in substantial spatial efficiencies in the district.

Throughout the district, it may well be worthwhile aligning with the Resilience Strategy process: some of its related pathfinding questions have relevance:

- How can we can we improve the design and co-location of public facilities to achieve multiple resilience dividends?
- How can we incentivise city residents to become more involved in resilient place making?
- How can partnerships in society be leveraged to contribute to reducing the stress of traffic congestion?

6 INFRASTRUCTURE

The information hereunder is primarily based on data extracted from the 2015 Medium Term Infrastructure Investment (MTIIF) as well as the 2017 draft MTIIF, and may be outdated in certain instances where infrastructure projects have been implemented between 2015-2018.

The plans hereunder provide a snapshot in time of the infrastructure situation.

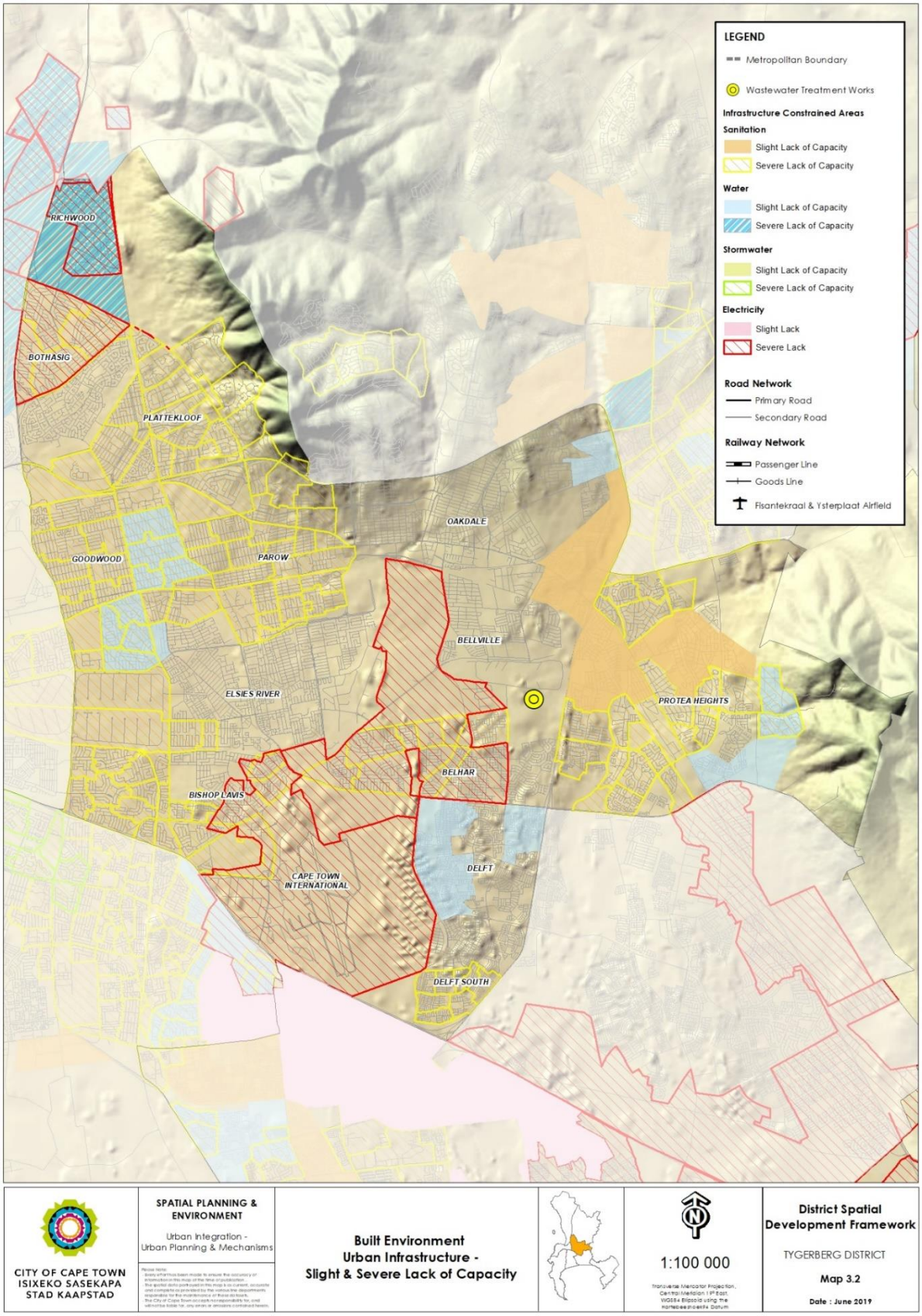


Figure 39: Areas with lack of infrastructure capacities

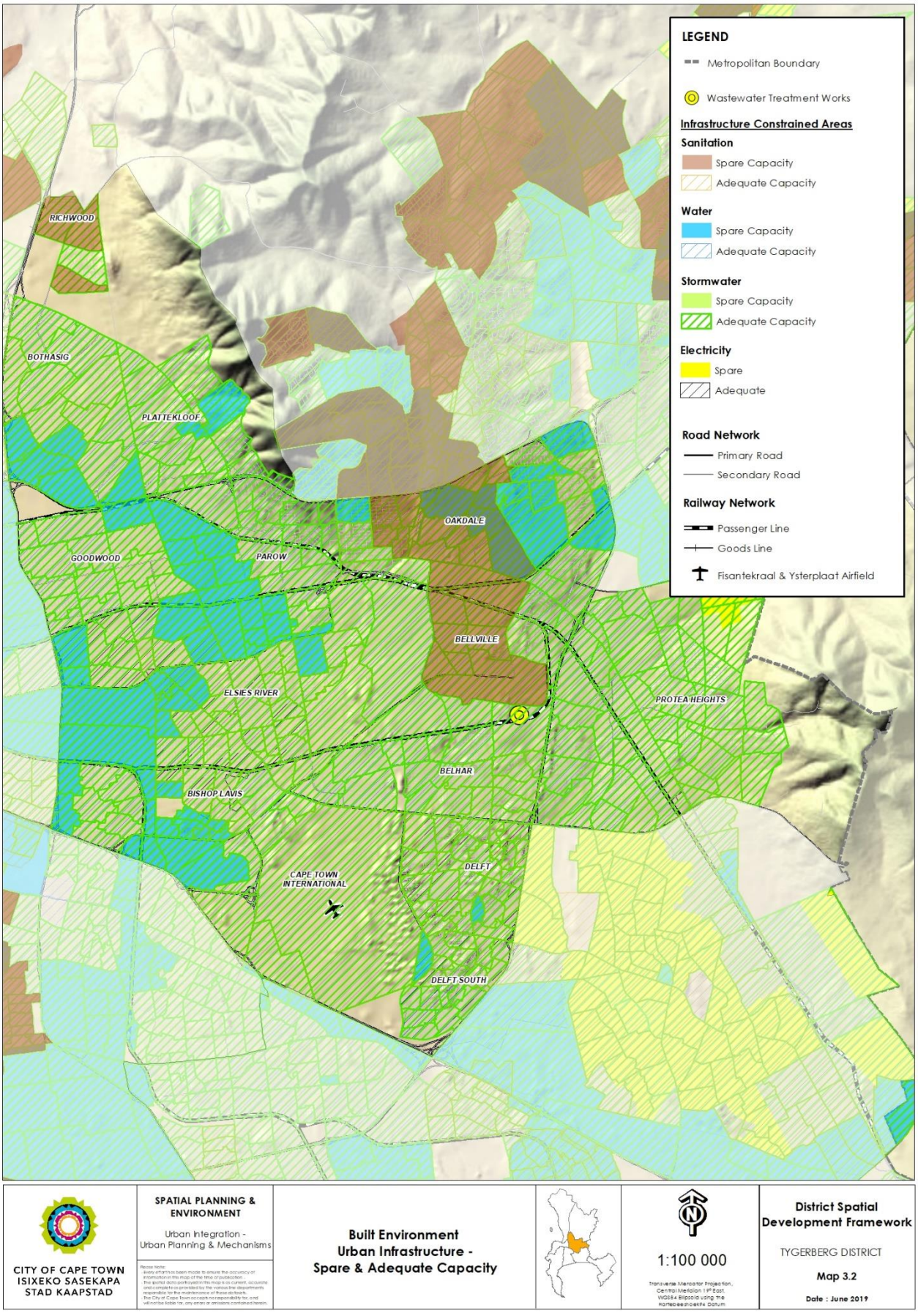


Figure 40: Areas with spare infrastructure capacities

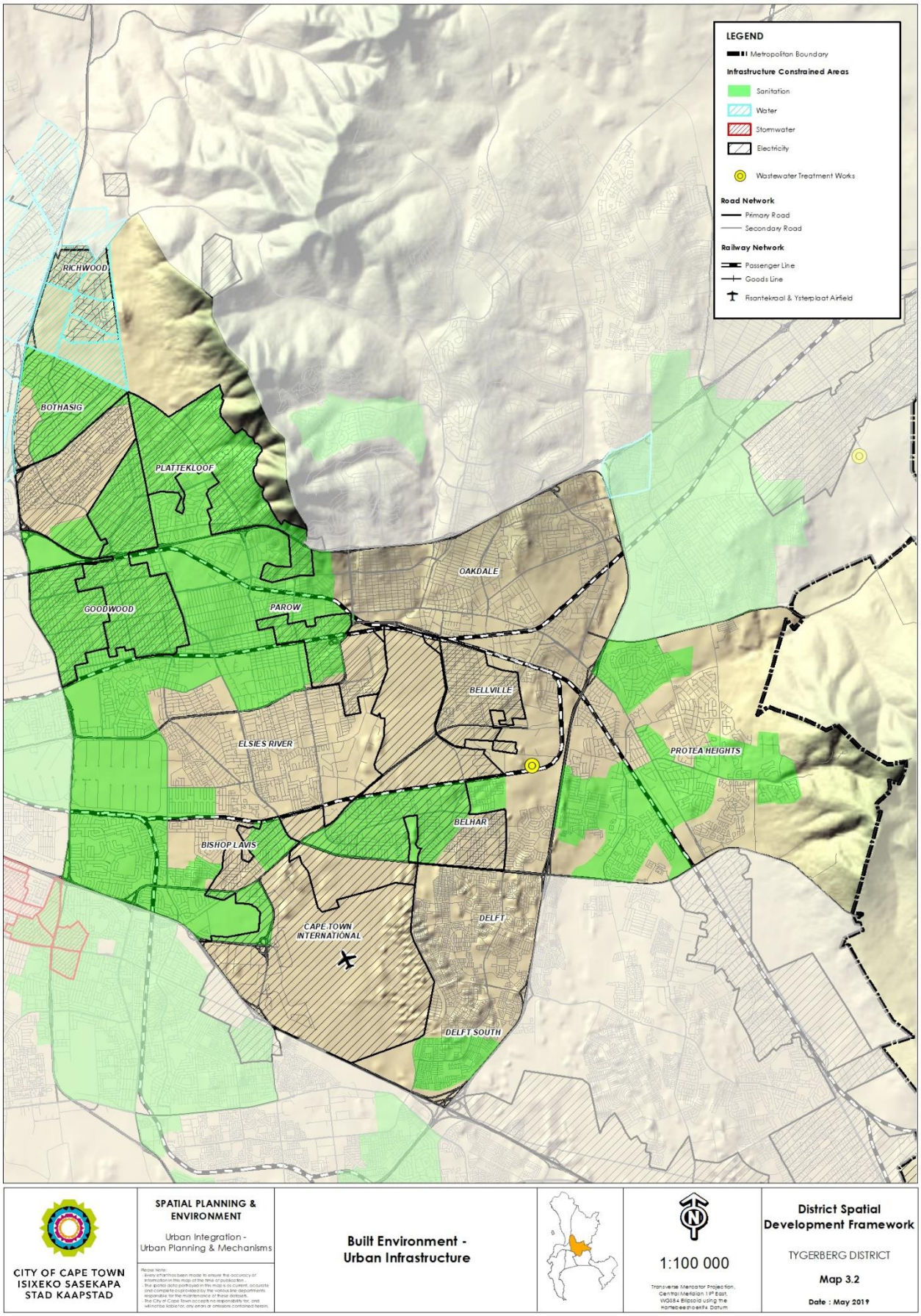


Figure 41: Infrastructure constrained areas

6.1 Electricity

The Tygerberg district falls within the Eastern service area for the Directorate: Energy, that covers the larger Bellville and Parow and Kuilsriver areas, as well as the wider area of Kraaifontein that include Brackenfell and Durbanville in the Northern district.

Over the last 5 years approximately R20m of capital expenditure occurred in the service area, that included upgrades to substations and other infrastructure.

In order to accommodate future developments in the service are, an application has been lodged with ESCOM already to increase the intake (from Stikland substation) at Oakdale substation from 66kV to 132kV for internal distribution to the Boston and Doordekraal substations. The increase in intake revolves not only around capacities, but is also tariff-orientated.

With potential developments within the Voortrekker Road Corridor in mind, master planning has been concluded and adequate capacity is available to cater for future developments in the area. Adequate capacity is also available to accommodate future developments in the Haasendal area in Kuilsriver (phased approach).

With regard to provisions in the Municipal Planning By-Law (2015), with regard to the provision for second and third dwelling units on a single residential property, notice need be taken of the impact of large areas taking up the rights, the impact may require the upgrade of infrastructure in order to increase capacities.

Bulk electrical infrastructure includes:

- Existing main transmission substations (MTSs)
- New MTSs
- Existing 132/11 kV distribution substations
- New 132/11 kV distribution substations
- Existing 132 and 66 kV underground (UG) cables and overhead lines (OHLs)
- New 132 kV UG cables

The information used for the assessment of bulk electrical infrastructure capacity is from 2018 peak loads at distribution substations. The information was processed and each substation supply area classifies according to its level of existing capacity. There are 114 substation supply areas in the metropolitan. 82 of these are within the City of Cape Town's distribution area, while 38 are within Eskom's area of distribution. The table below gives the definitions used to classify the capacity of a substation area. The assessment was done using Transport Analysis Zones (TAZ's) which have different geographical delineations when compared to the substation supply areas.

Table 14: Definitions of electrical system capacities

Capacity status	Definition
Severe lack of capacity (red)	Over 100% of firm substation capacity
Slight lack of capacity (Orange)	90% to 100% of firm substation capacity
Adequate capacity (Yellow)	70% to 90% of firm substation capacity
Spare capacity (Green)	Less than 70% of firm substation capacity

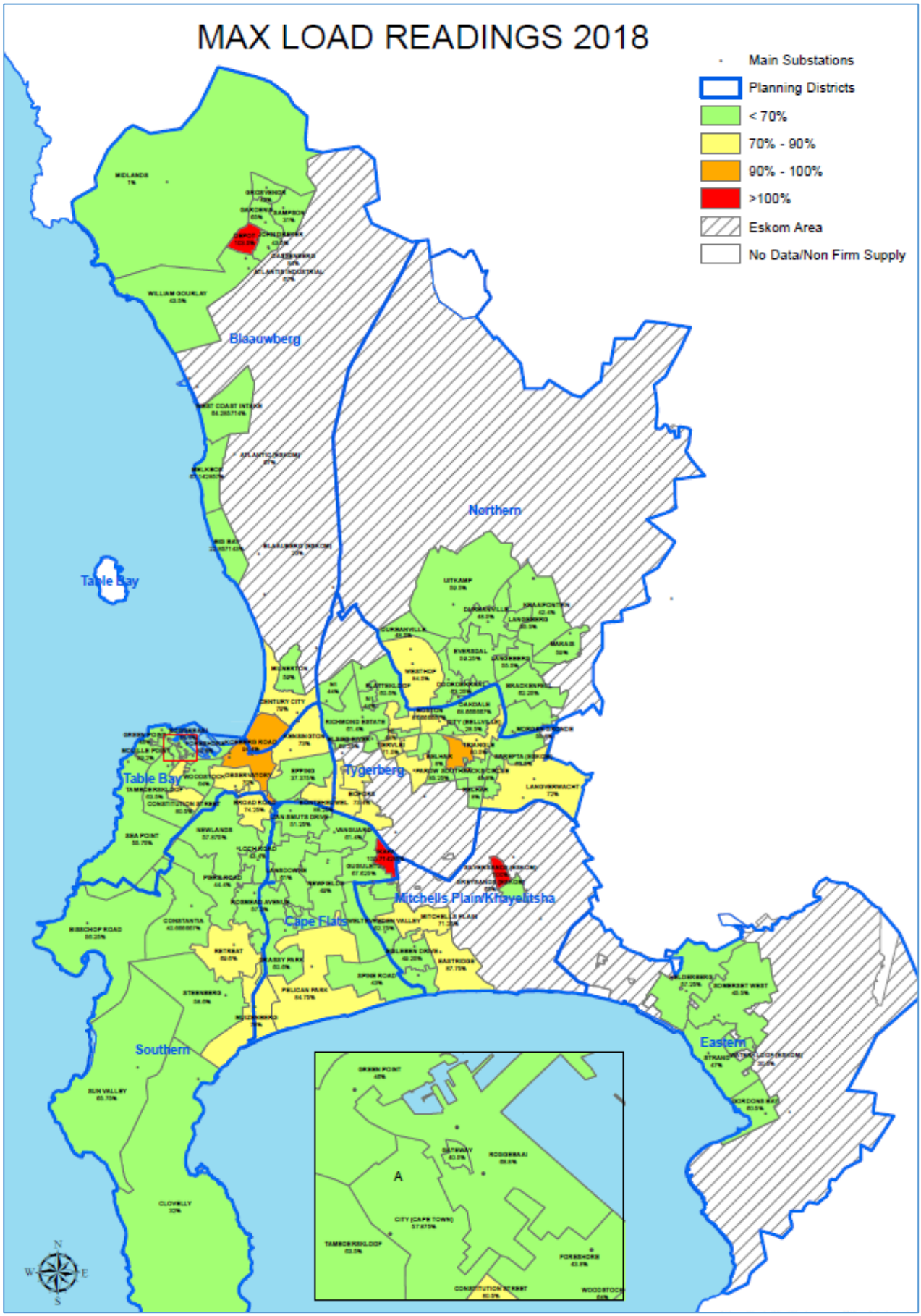


Figure 42: Substation loadings 2018

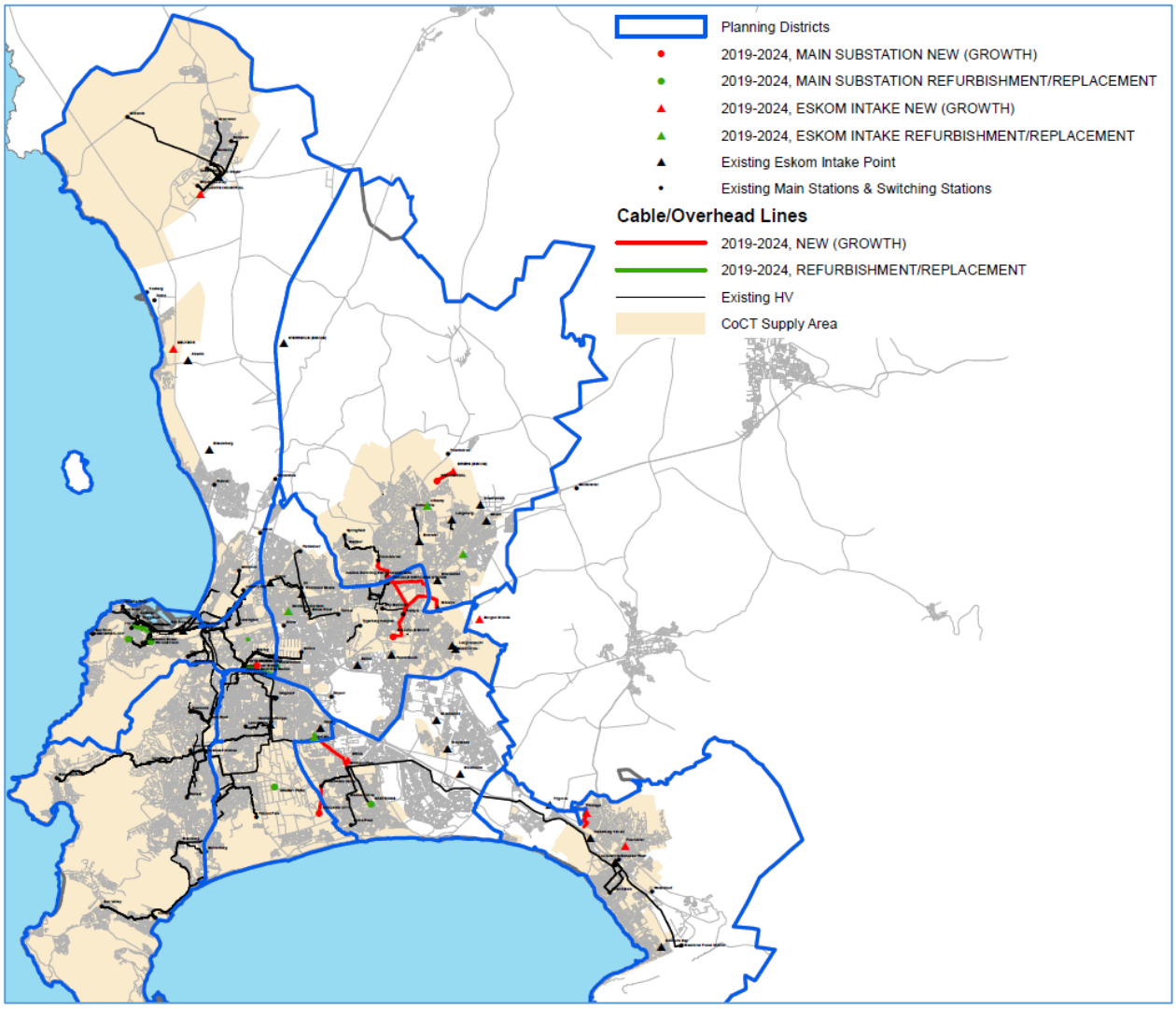


Figure 43: Proposed electricity infrastructure projects

Bulk electrical infrastructure includes:

- Existing main transmission substations (MTSs)
- New MTSs
- Existing 132/11 kV distribution substations
- New 132/11 kV distribution substations
- Existing 132 and 66 kV underground (UG) cables and overhead lines (OHLs)
- New 132 kV UG cables

In **Tygerberg district**, no areas have a **severe lack of capacity**.

The following areas have a **slight lack of capacity**:

- Bellville South is at 90%-100% capacity

The rest of the District has **adequate** or **spare capacity**:

The capacity at Bellville South will be upgraded to deal with the above issue. A project to consolidate Eskom intake points in the area and upgrade the network voltage is planned.

6.2 Water

For the purposes of this project bulk water infrastructure included the following:

- Bulk supply system from the water sources to the water treatment works (WTW)
- WTWs
- Supply pipelines from the WTW to reservoirs
- Reservoirs
- Pump stations and rising mains
- Distribution pipes ≥250 mm diameter (nominal)

The information used for this baseline assessment relies on 2011 and 2015 data which was processed for MTIIF. The impacts of the drought (2016-2017) in terms of water infrastructure and provision is not accounted for.

Table 15: Definition of water system capacity

Capacity status	Definition
Severe lack of capacity	0 - 15 m residual pressure in the reticulation networks < 36 hours x AADD reservoir storage
Slight lack of capacity	15 - 24 m residual pressure in the reticulation networks 36 - 48 hours x AADD reservoir storage
Adequate capacity	25 - 60 m residual pressure in the reticulation networks 48 – 72 hours x AADD reservoir storage
Spare capacity	> 60 m residual pressure in the reticulation networks > 72 hours x AADD reservoir storage

In Tygerberg, the following areas have a **severe lack of capacity**:

- Burgundy Estate, Richwood

The following areas have a **slight lack of capacity**:

- Richmond Estate, Ruyterwaght
- Parts of Delft
- Zevendal (Zevenwacht area)
- Belair, Oakglen

The rest of the District, including Cape Town Airport, Epping, Bellville, Elsies River, Delft and Delft South, Parow, Kalksteenfontein, Plattekloof have **adequate** or **spare capacity**.

6.3 Sanitation (Waste Water and Solid Waste)

6.3.1 Waste Water

The Zandvliet WWTW is experience severe capacity problems, and upgrade to the treatment works is planned to start during the first quarter of 2019. Upgrades are also planned for the Bellville WWTW (Tygerburger 28 November 2018).

Waste Water infrastructure includes the following components:

- All wastewater treatment works (WWTWs)
- Pump stations (≥50 ℓ/s duty flow)

- Rising mains (≥250 mm diameter (nominal))
- Gravity pipelines (≥250 mm diameter (nominal))

The information used for this baseline assessment relies on 2011 and 2015 data which was processed for MTIIF.

Table 16: Definition of WWTW capacity

Capacity status	Definition
Severe lack of capacity	WWTW: Capacity exceeded (major drainage areas) Gravity mains: < 15 % relative spare capacity
Slight lack of capacity	WWTW: Capacity exceeded (minor drainage areas) PS: Required pump flow 105% - 115% of current capacity Gravity mains: 15% - 30% relative spare capacity
Adequate capacity	WWTW: 95% - 100% of treatment capacity required Gravity mains: 30% to 50% relative spare capacity PS: Required pump flow 95% - 105% of current capacity
Spare capacity	WWTW: < 95% of treatment capacity required PS: Required pump flow < 95% of current capacity

In Tygerberg, the following areas have a **severe lack of capacity**:

- Delft South
- Kalksteenfontein, Epping, Goodwood, Parow, Plattekloof, Ruyterwacht, Bothasig
- Parts of Kuils River
- Belhar

The following areas have a **slight lack of capacity**:

- Stikland Industrial
- Parts of Kuils River

The following areas have **adequate** or **spare capacity**:

- Bellville, Delft
- Cape Town Airport, Boquinar Industrial Area
- Most of Elsies River,
- Burgundy Estate, Richwood, Edgemead
- Parow Industrial,

6.3.2 Bulk solid waste

Bulk solid waste infrastructure considered for the purpose of this project consists of the infrastructure required to provide current waste management services to existing and future developments and new infrastructure associated with evolving legislative requirements. This includes:

- Landfills and associated mechanical plant
- Refuse transfer stations
- Drop-off facilities
- Collection vehicles
- Material recovery facilities
- Alternative treatment technologies
- Cleansing vehicles

The information is based on data from 2011 and 2014/2015.

Table 17 shows the existing bulk solid waste management infrastructure capacity status.

Table 17: Capacity status for solid waste(Source : MTIFF)

Infrastructure type	Capacity status	Comment
Landfills and mechanical plant	Lack of capacity	The banked airspace is less than the international benchmark of 15 years
RTSs	Spare capacity	The total transfer capacity available exceeds the total operating capacity
Drop-off facilities	Adequate capacity	The drop-off service coverage is sufficient
Collection vehicles	Adequate capacity	
MRFs	Adequate capacity	
Alternative treatment technologies	Not required i.t.o. present basic services	The future basic requirements are still to be identified
Cleansing vehicles	Lack in capacity	

6.4 Stormwater

Limited capital expenditure (approximately R2m) occurred over the last 5 years in the Tygerberg and Northern district catchment areas. In many instances capital projects are linked to projects of other services, such as Parks Department, where projects are implemented within river corridors.

From information gathered, it seems that much of the seasonal flooding can be attributed to system abuse, localised low points e.g. areas in Goodwood & Parow, sand problems (areas in Delft) as well as the lack of capital budget (where upgrades are required or increase in pond capacities are required, or operational budget for pro-active maintenance.

In terms of stormwater attenuation and treatment, the policy guideline that is followed is that any new development and or redevelopments on properties larger than 4 000 m^2 should attenuate and treat stormwater on-site. In the district, stormwater capacity is to a large extend dependant on the following rivers:

- *Elsieskraal River*: The Elsieskraal River forms part of the Salt River Catchments Flood Hazard Zones. The Elsieskraal River and its associated 1:100year floodline is as a major constraint to development within strategic portions of properties of the Voortrekker Road Corridor Integration Zone. The results of the modelling of the flood hazard zones indicate that areas abutting the Elsieskraal River are prone to substantial inundation by 1:100 year flood events. The implications of the Elsieskraal floodline on new developments at numerous stations along the Bellville Railway line are particularly troublesome given the emphasis on encouraging TOD at rail station precincts. The City has approved the demarcation of Public Transport (PT1&2) Zones around rail stations. The overlapping Elsieskraal River floodline over a substantial portion of these zones reduces the desirability of these areas for redevelopment.
  The lack of adequate stormwater attenuation upstream within the catchment of the Elsieskraal has a particularly harmful impact on several high profile development areas identified as catalytic projects. These include the Two River Urban Park, Mowbray Golf Course and most importantly, the Conradie Hospital Site.

This has given rise to the appointment of engineering consultants (study commenced) to investigate solutions to address the above constraints to developments down-stream (i.e. either by the addition of gabions (coffer dams) upstream, and or the extension of existing dams), and thereby reducing the floodplain area of the river corridor. Upgrades in this regard has already occurred at the Jack Muller/ Danie Uys park and Elizabeth park. Another upgrade is planned for the Tielman Marais park, located south of Langenhoven Street in Bellville. Other potential options to address the issue is increasing the capacity of the quarry dam on the property of the University of Stellenbosch business school site in the Northern District.

- *Kuils River*: A high level Stormwater Master Plan (2013) exist for the Kuils River. For new infill developments in both Delft and the Cape Town International Airport property (CTIA), attenuation and treatment will need to happen on-site. For future developments on CTIA property, a stormwater master plan will be required in order to address attenuation and treatment in a holistic manner.
- *Bottelary River*: Stormwater Master Plan (including a river corridor plan) will be required to accommodate future development in the catchment area.

The stormwater system of the CCT consists of a wide range of infrastructure components. The CCT's *Management of Urban Stormwater Impacts Policy* (CCT, 2009) defines the stormwater system as "both the constructed and natural facilities, including pipes, culverts and watercourses, whether over or under public or privately owned land, used or required for the management, collection, conveyance, temporary storage, control, monitoring, treatment, use and disposal of stormwater".

The stormwater infrastructure applicable to this study therefore includes the following:

- Piped networks (excluding provision for minor drainage system associated with road provision)
- Culverts
- Open channels, lined and unlined, including watercourses
- Detention and retention facilities
- Energy dissipation structures
- Water quality management facilities
- Outfalls to watercourses or the sea
- Storm surge and flood protection infrastructure

In the Tygerberg District, the MTIIF does not identify any areas with a **severe lack of capacity**, but many areas have backlog infrastructure and require upgrading, especially the Elsieskraal Canal/ River.

6.5 Key Opportunities and Constraints

In terms of the assessment above, areas that have spare capacity signify opportunities, while those with a severe lack of capacity are the most constrained areas.

However, as Bulk Infrastructure Contribution Levies in many cases contribute to resolving capacity issues, it will be difficult and or impractical to highlight areas of constraints.

7 HUMAN SETTLEMENTS

The concept of integrated human settlements goes beyond providing housing, but rather speaks to creating environments that support the social, physical, and economic integration of housing developments into the existing urban fabric and establishing quality living environments that are sustainable. This means that housing is merely one of the basic infrastructure components required to build integrated and resilient communities (see Figure 44 below). Housing must be integrated within areas through housing mix, typologies, design and income, and be close to transport routes supporting transit-oriented development.

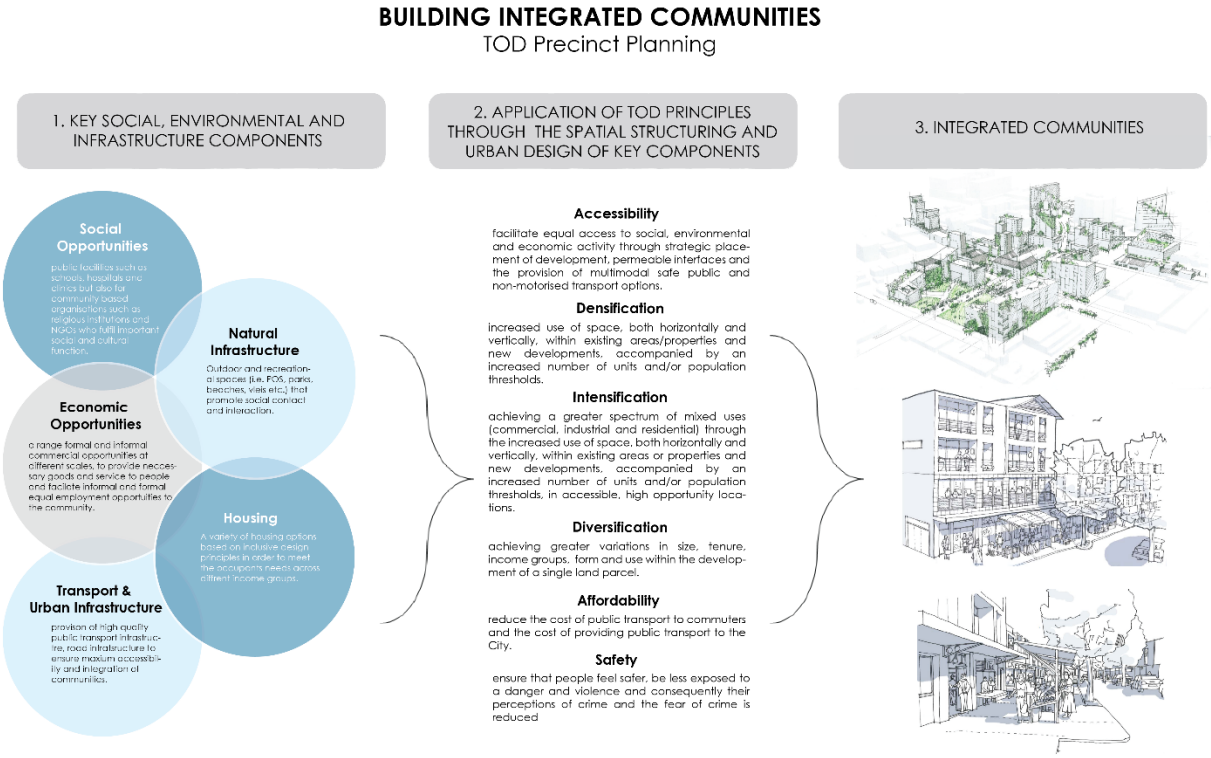


Figure 44: Building Integrated Communities

7.1 Housing Overview

7.1.1 Type of Structure

The majority of dwellings in this district consist of formal dwellings with a percentage of 87.08 %, compared to 12.92 % of informal dwellings. The formal dwelling typologies are predominantly freestanding houses or flats, along with a small number of semi-detached and town houses. Semi- detached houses are more prevalent in areas such as Bontehewel, Bishop Lavis and part of Belhar. A strong concentration of cluster houses is found in the Vredenberg area (Bellville), as well as part of La Rochelle. Note that the statics on typologies are outdated, and may have changes since the 2011 Census.

The chart below gives a detailed breakdown of dwelling typologies. The spatial distribution of the various formal typologies is indicated in the accompanying map.

The percentage of informal dwellings is low in comparison to other Districts of Cape Town. However, the predominant areas of Tygerberg with the vast majority of informal dwellings are Delft, Valhalla Park and Bonteheuwel.

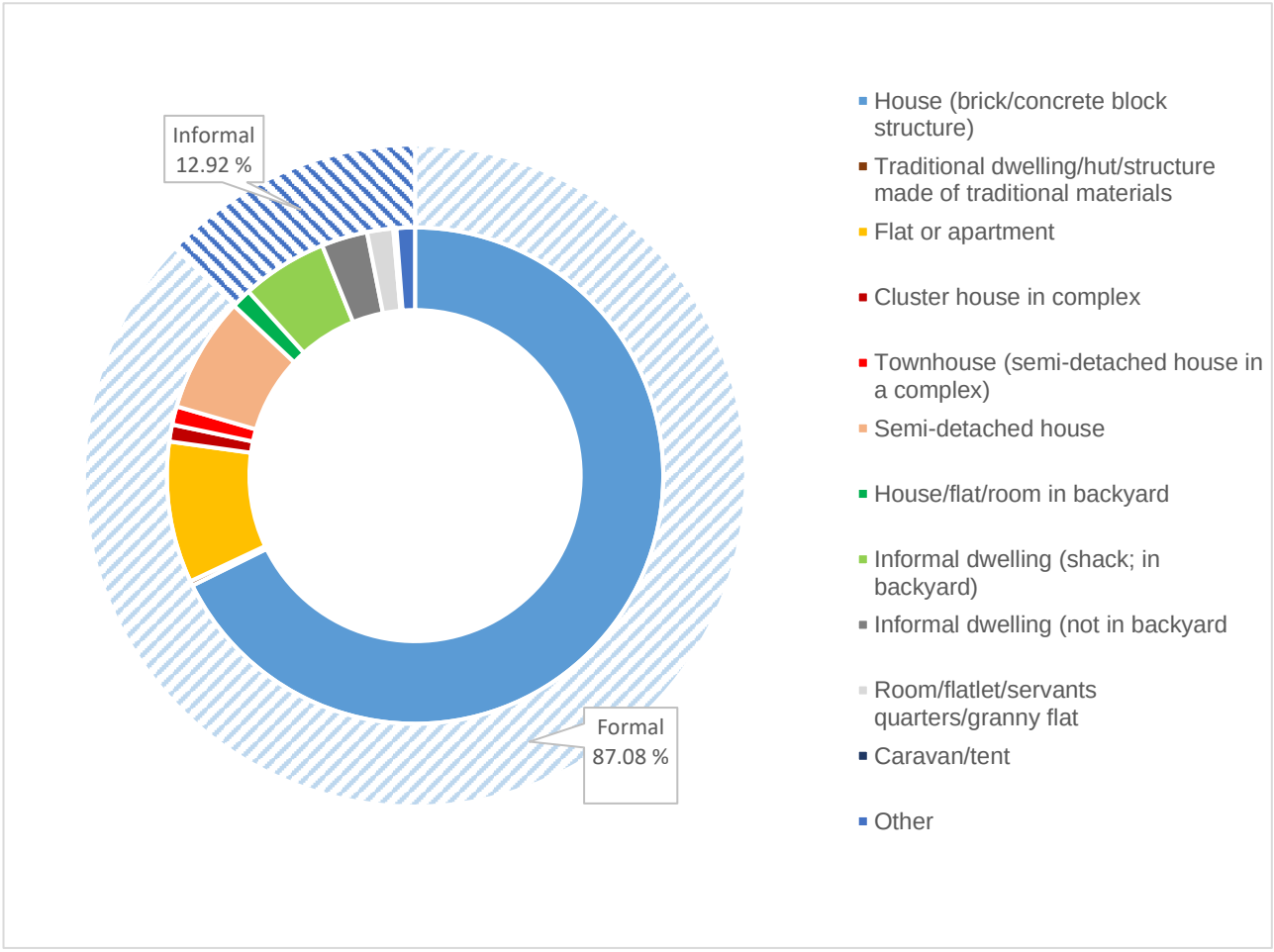


Figure 45: Dwelling typologies

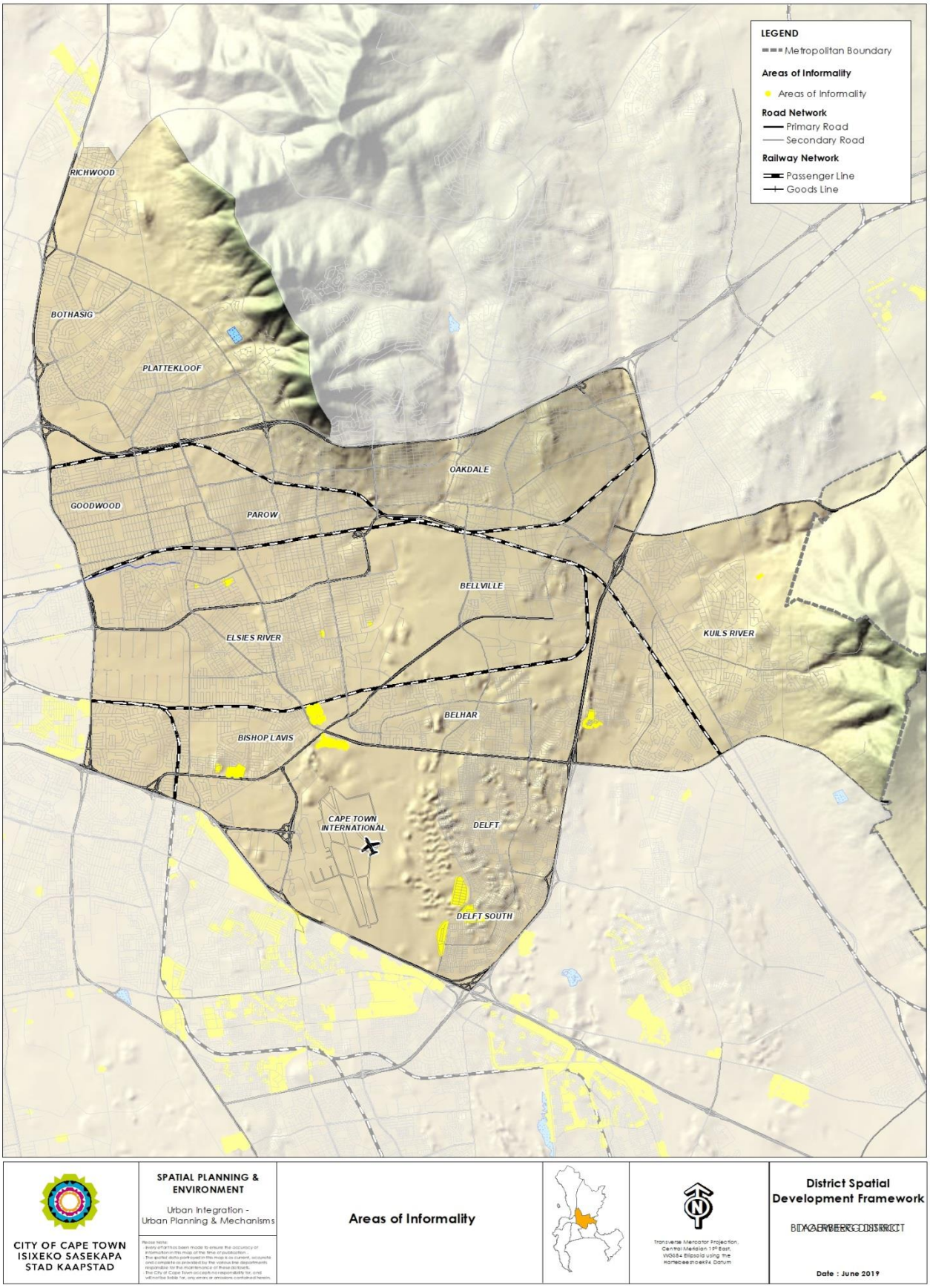


Figure 46: Areas of informality

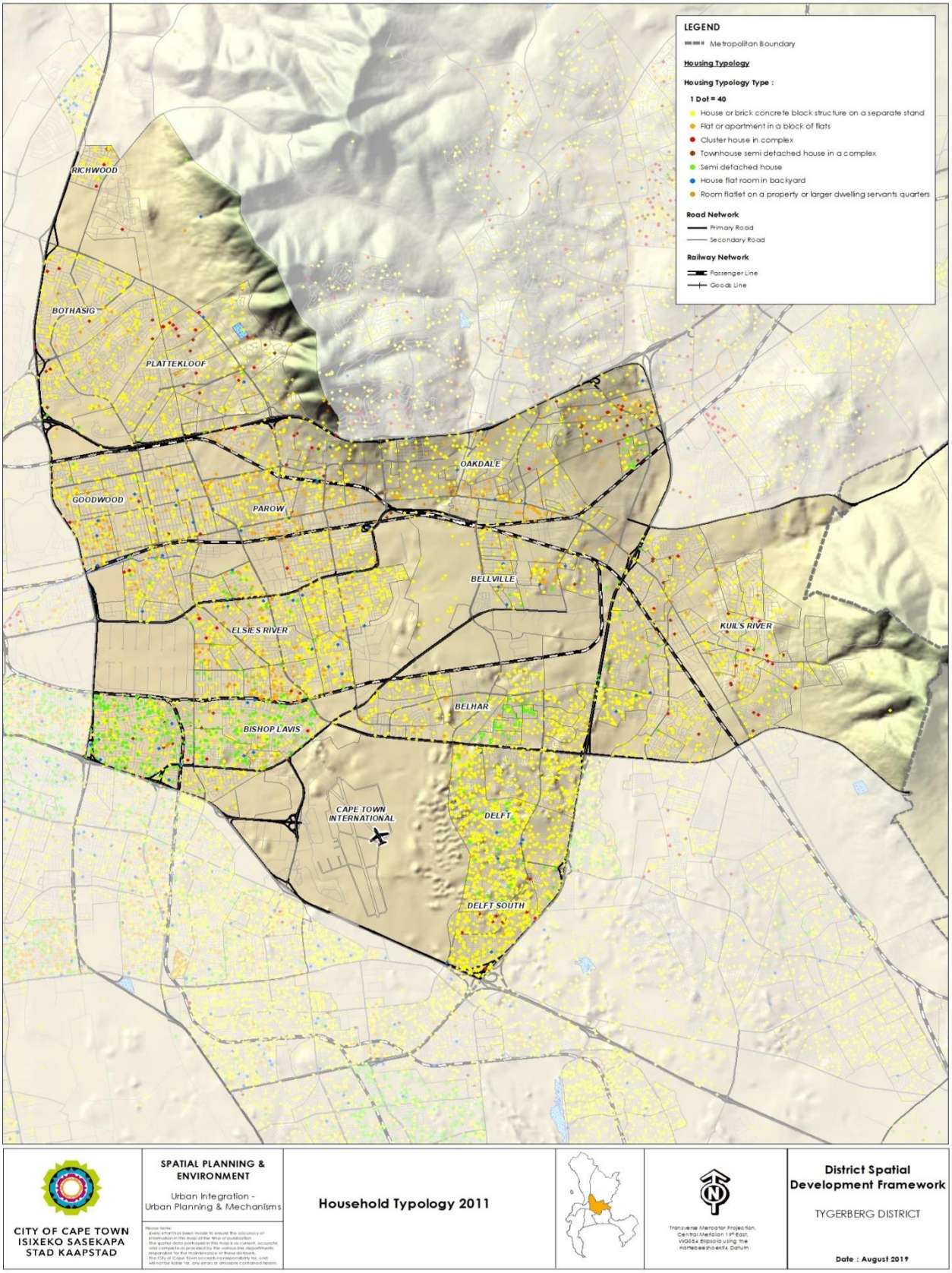


Figure 47: Spatial distribution of household typologies

7.1.2 Tenure Status

Based on census 2011 data the majority of the households are owned(54%) with 30% of owners having fully paid off their properties. The number of rentals within the district is also relatively high at 32%. This provides a snapshot that can be linked to affordability, that may again be linked to housing typologies being provided in the open market.

The spatial distribution of tenure status shows that the highest concentration of rented units are prevalent in the Parow, Goodwood, Elsies, Bishop Lavis and portions of Bellville-South areas. These are also closely aligned to the "medium to higher density" housing typologies. Further to this it can be seen that the "occupied rent-free" housing occurs mostly where informal settlements/free subsidised housing which are located in Malawi Camp, Delft and Kalkfontein. This may be ascribed to the fact that transfer of properties has not occurred at the time yet. Therefore, the situation may have changed since 2011.

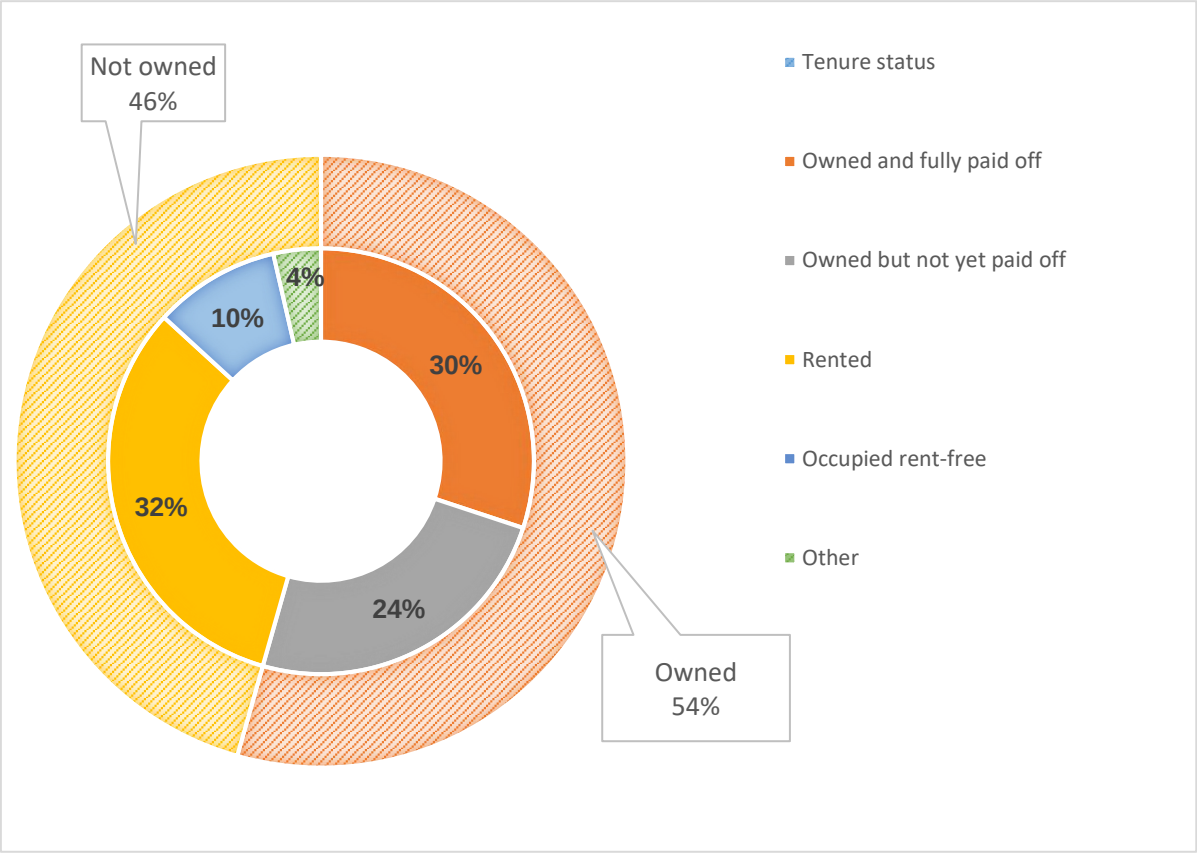


Figure 48: Tenure status in Tygerberg district

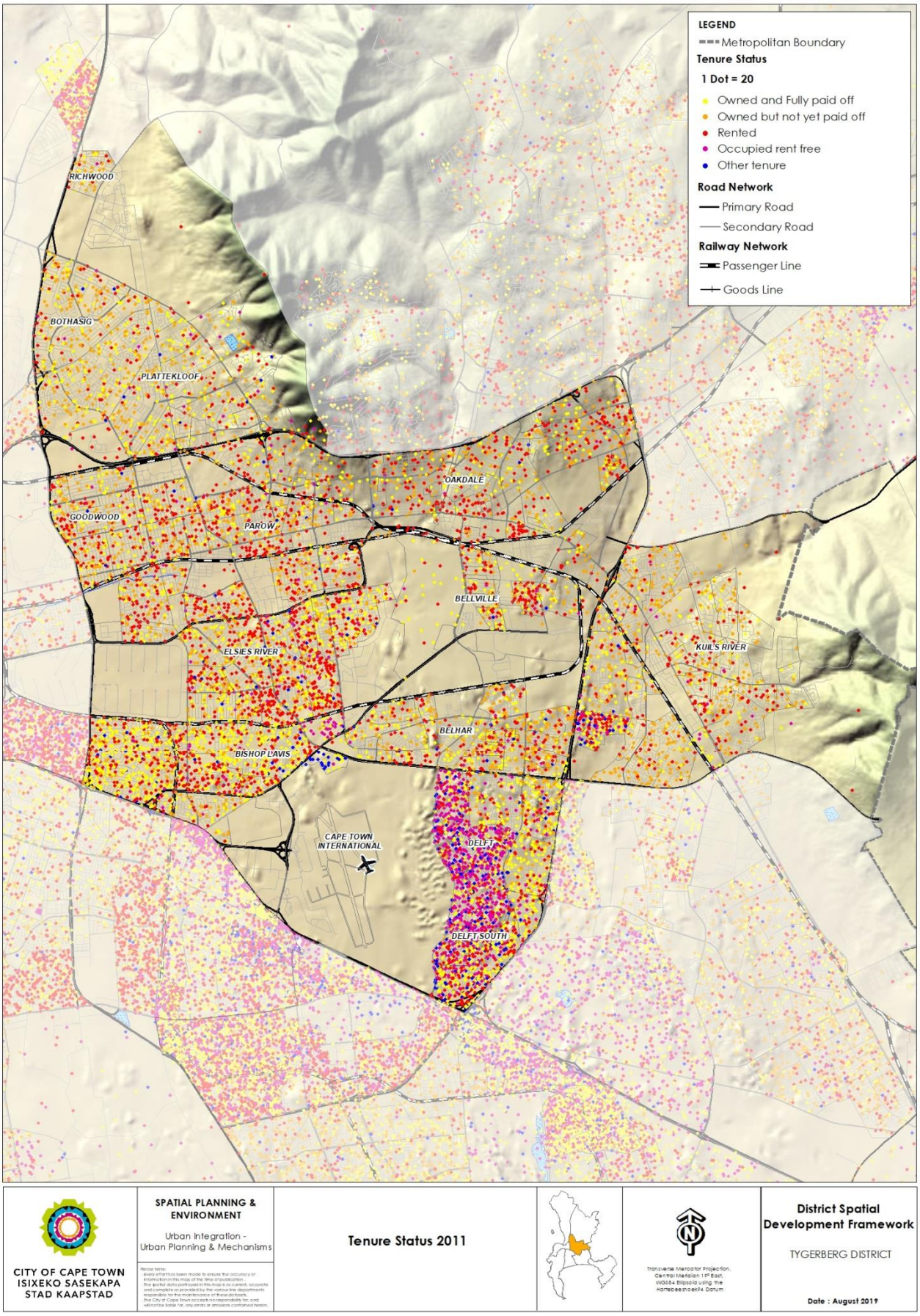


Figure 49: Spatial distribution of tenure status

LIMITATION WITHIN HOUSING DEMAND AND SUPPLY DATA:

Needs Summary:

- Records marked as "Assisted" – this is not a true reflection on supply per financial year as records are not regularly updated. For this reason there is a difference between the figures (per financial year) for "Assisted" records and "Total Supply".
- Furthermore, "Assisted" records primarily refer to the supply of BNG, PHP and CRU housing opportunities as not all housing products supplied are currently captured on the Housing Needs Register.
- Records marked as "Waiting" – this only refers to persons who came forward to express their housing need and not necessarily person who will qualify for a state subsidised housing opportunity. The qualification verification process will only occur once a person is selected for a housing opportunity.

Supply Summary:

- UISP – persons who are beneficiaries within an Upgrading of Informal Settlements Project are not necessarily registered on the City's Housing Needs Register as this is not a mandatory provision as per the prescripts of the National Human Settlements Policy. The idea is to upgrade the identified Informal Settlements regardless of a person's eligibility criteria. A person's eligibility criteria is however taken into account during the transfer of ownership of a services site and/or top-structure.

- GAP – person who are beneficiaries within the GAP market are not necessarily registered on the City's Housing Needs Register. Eligible persons apply directly to the developer to purchase the property and will apply directly to the Western Cape Department of Human Settlement for the Financed Linked Individual Subsidy Programme (FLISP) subsidy.

- Social and rent to buy - persons who are beneficiaries within this housing programme are not necessarily registered on the City's Housing Needs Register as this housing programme caters for households with an income up to R15 000 per month. Prospective tenants apply directly to the respective Social Housing Institutions for rental vacancies.

7.2 Housing Demand

Housing demand in Tygerberg is assessed using a proxy[3] of the number of informal structures in the District, as well as the number of people that have registered their need for housing on the City's Housing Needs Register. NOTE: People who have registered their need for housing might also be living in informal settlements in the area.

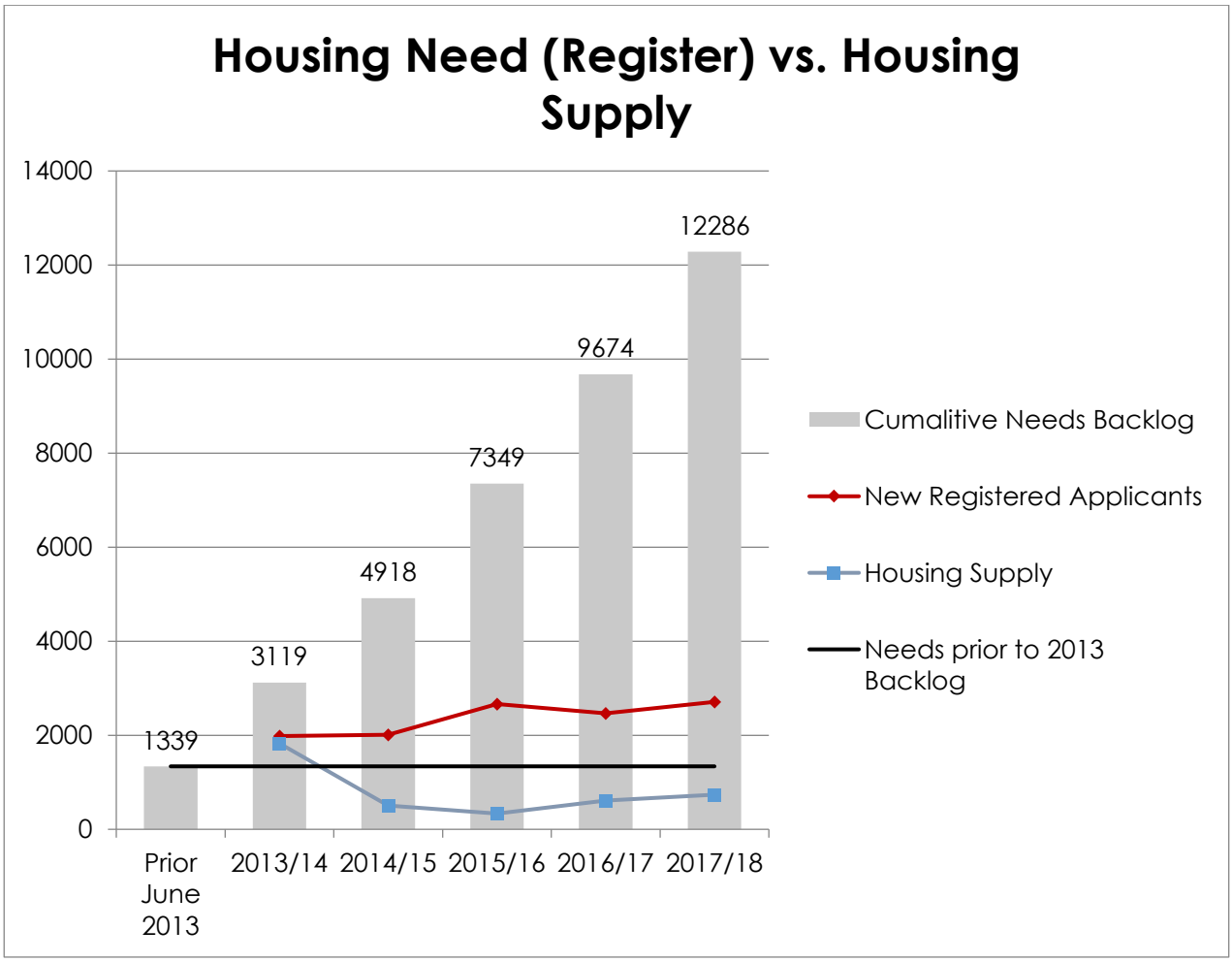


Figure 50: Housing demand and supply over time

There were 7 450 informal dwellings in the District, according to a 2017/18 roof count by the City of Cape Town. Most informal dwellings were located in Delft and Kalkfontein. Tygerberg District had the second lowest number of informal dwellings, at 6 744 informal dwellings – only the Northern District had less informal dwellings. This works out to 4% of the total number of informal dwellings across the City.

By the end of 2018, some 37 610 people in Tygerberg District had registered their need for housing on the City's Housing Needs Registry. This accounted for 13% of all people who have registered their need across the City. NOTE: Anyone is able to register their need for housing

[3] A comprehensive picture of housing demand showing all income levels in relation to housing stock at various prices, is not included in this section.

on the Housing Needs Register, however many of the people registered might not qualify for housing, or their circumstances may have changed over time, thus the data needs to be treated with caution. A background check of beneficiaries registered on the database is only done at project inception.

7.3 Housing Supply

7.3.1 Housing constructed/delivered

Over 2013/14 to 2017/18, 4 012 housing opportunities were created in the Tygerberg District.[4] This included 2 619 serviced sites, transferred as part of the Integrated Residential Development Programme, to households earning R7000 and less. Some 474 Breaking New Ground houses were built in Delft, and transferred to housing beneficiaries on the City's Housing Needs Register who earned R3500 and below. Over the same period, the Upgrading of Informal Settlements Programme assisted 350 households. While 558 housing units were developed as social housing, which catered to households earning between R7 500 and R1 500 (the upper end of the qualifying income bracket for the social housing programme has subsequently increased to R15 000).

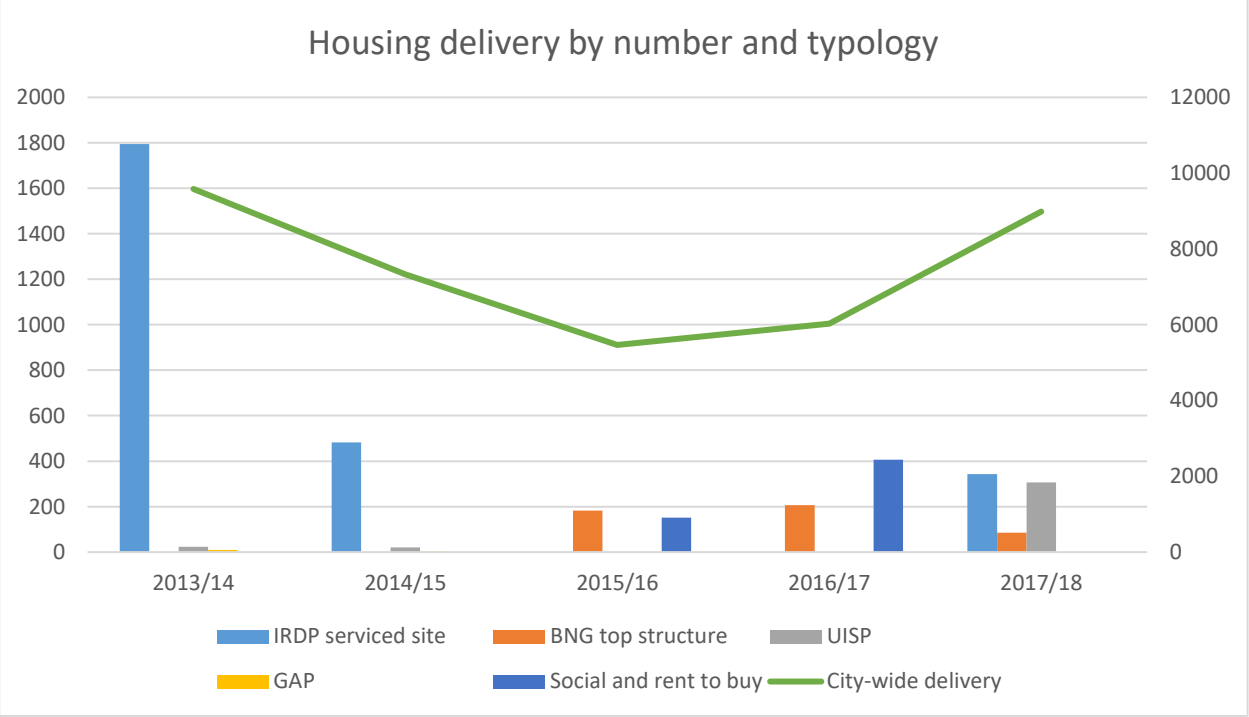


Figure 51: CoCT human settlement delivery data, 2013/2014 – 2017/2018

The City's housing programmes have not been able to keep up with housing need expressed by registrations on the Housing Needs Register. In the period 2012/13 to 2017/18,

[4] *While government is a key provider of housing to households earning lower incomes – particularly those who earn below R3500 – the private sector plays a crucial role in the provision of housing at all income levels. The private sector delivery of housing has not been factored into this analysis.*

some 4 012 housing opportunities were developed in the Tygerberg District. However, over the same period 11 841 additional individuals in Blaauwberg expressed their need for housing by registering on the City's Housing Needs Register, over and above the 25 769 that were already registered in the District. This means that while housing delivery increased by an average of 17% per annum, the number of people registered on the City's Housing Needs Registered increased by an average of 60% per annum. The City is thus failing to make headway in reducing the registered housing need – with housing need continuously outstripping housing supply.

7.3.2 Pipelined, Planned and in Construction

While the data above outlines the housing delivery, the map below outlines human settlements projects that are in construction, planned (meaning budget has been allocated to them), or pipelined (future developments that will be planned next).

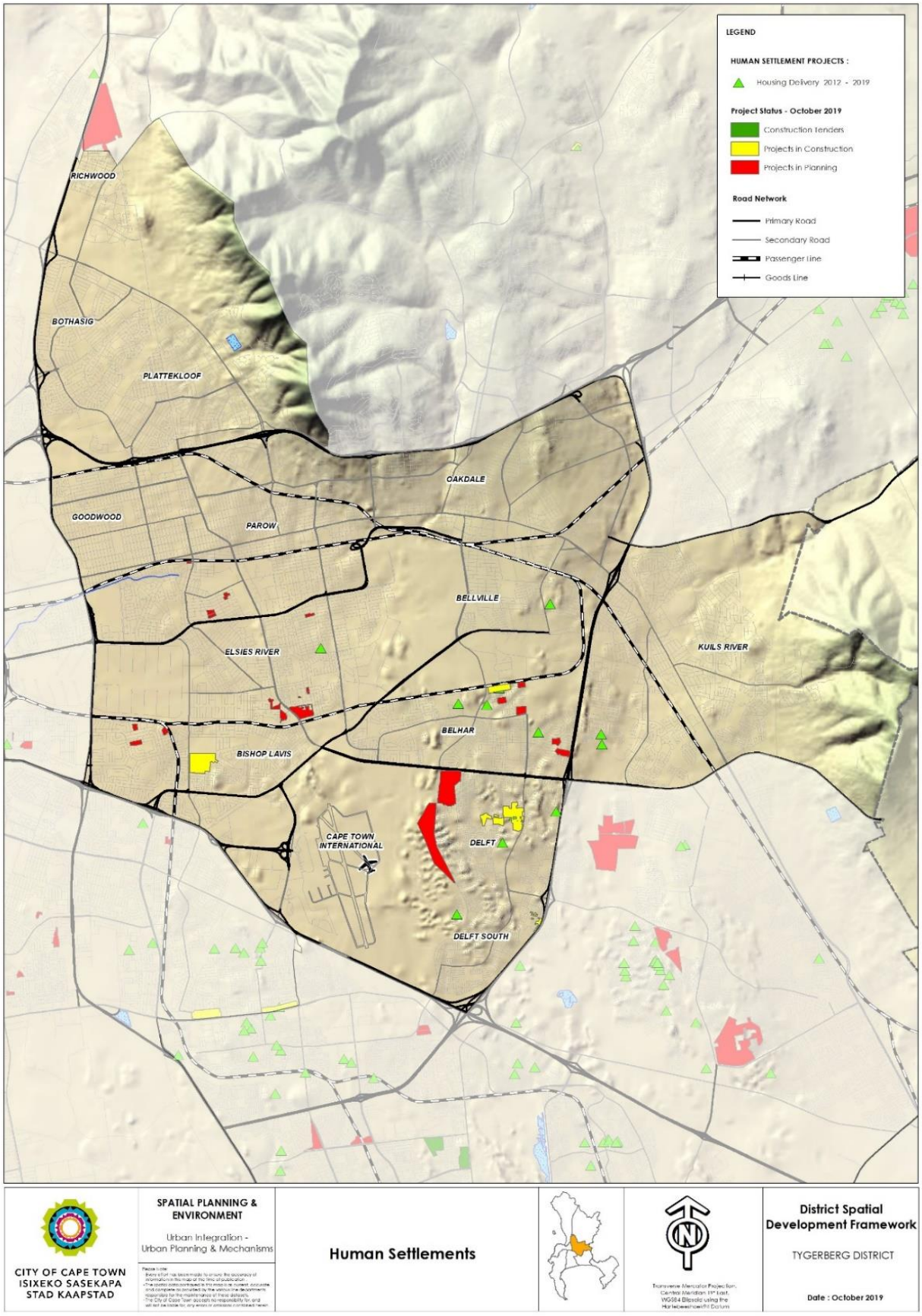


Figure 52: Human settlement planned, pipeline and in construction projects

7.4 Key Opportunities and Constraints

7.4.1 Generic constraints

Human settlements is not just about the development of housing, but also about the development of integrated, liveable communities. A key constraint to human settlements implementation across the City has been a lack of integrated planning of budget cycles, which impacts on the prioritisation of projects by various City Directorates. This has undermined the attempt to create integrated communities in some areas of the City – e.g. social facilities might not always be integrated into housing developments.

The development of integrated human settlements also requires the use of well-located land for government subsidised housing. Well-located land is expensive, in short supply, and often more appropriate for infill, high density developments than the large-scale, single dwelling BNG developments that are often on cheaper land.

Most of the government subsidised housing programmes implemented by the City are nationally funded programmes, which come with strict conditions and legal parameters. These human settlements programme parameters constrain the development of affordable housing that meets the spatial goals of the City – particularly the densification and diversification of typologies.

Capacity constraints regarding the social facilitation of human settlements developments can impact negatively on the outcomes of projects, and remains an ongoing challenge – particularly as it relates to the upgrading of informal settlements.

Land invasion has increased, and represents a significant challenge to the City. Land invasion sterilises land which was otherwise earmarked for human settlements, or other social or economic activity. It represents a challenge to the City's human settlements project pipeline through the redirection of resources to respond to land invasions. It also results in community conflict between those who have invaded land, and those who are waiting for long periods of time on the Housing Needs Register.

In situ upgrading of information settlements is a challenge, as firstly the land might not be suitable for development (e.g. area that is prone to flooding, environmentally sensitive areas etc.), and secondly, some areas of the City might be too dense so that de-densification becomes necessary in order to enable formalisation of areas.

7.4.2 Local constraints

No large tracks of vacant land are available anymore for large scale, well located greenfield development. Underutilised land parcels, such as the Belcon site, is not available for development. Smaller pockets of undeveloped community facility sites may be available in developed areas, but surrounding communities may be protective of such spaces.

7.4.3 Local Opportunities

As one of the key integration zones in the City, the Voortrekker Road Corridor has significant potential for affordable housing development – initiated from the public, and private sector. The VRC IZ in its entirety is identified as a catalytic project under the HDA Priority Housing Development Areas programme.

High density social housing developments in well-located areas close to public transport, can catalyse integrated human settlements in the area – particularly considering the location of key economic nodes within the District. There is also potential for the private sector to develop rental or ownership GAP housing.

8 PUBLIC FACILITIES

8.1 State of Supply and Demand

The following section provides an overview of the analysis on current supply of community facilities informed by the updated Community Facility Guidelines and Standards for Facility Provision reviewed in 2020. Each facility has a set of planning standards for providing facilities which have been articulated by line departments, work-shopped and agreed to with key stakeholders. The facilities guidelines and standards were incorporated into a modelling exercise that sought to understand sufficiency or insufficiency in the distribution of community facilities and build a hierarchy of civic clusters (a network of nodes with community facilities) across the City. The type of facilities assessed linked to the different nodal hierarchies is illustrated in Figure 53 below.

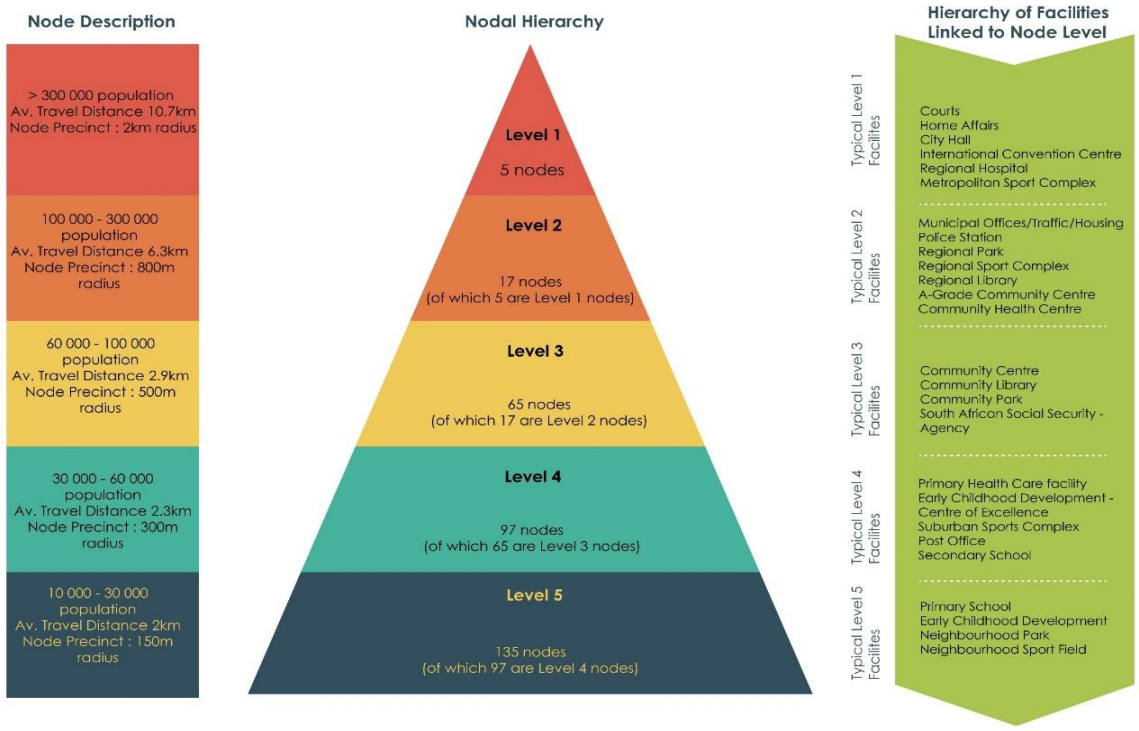


Figure 53: Community facilities cluster hierarchies

8.1.1 Existing facilities

The map below illustrates the distribution of existing facilities and highlights sufficiency/insufficiency in the form of a heat map. The neighborhoods that fall within areas shaded red and orange are the most underserved areas in the district.

In Tygerberg District the portions north of Voortrekker Road have a high number of community facilities which are well located and accessible, especially facilities in close proximity to the Voortrekker Road Corridor, and the railway line. The provision of libraries

along Voortrekker road corridor is notably high and the level of service is at regional scale, which is more than the required need. The suburbs of Delft, Belhar, Bonteheuwel and Ravensmead/Elsies rivier are the areas of highest need. The details related to the type of facilities that would be required in the areas of highest need is indicated in the section below.

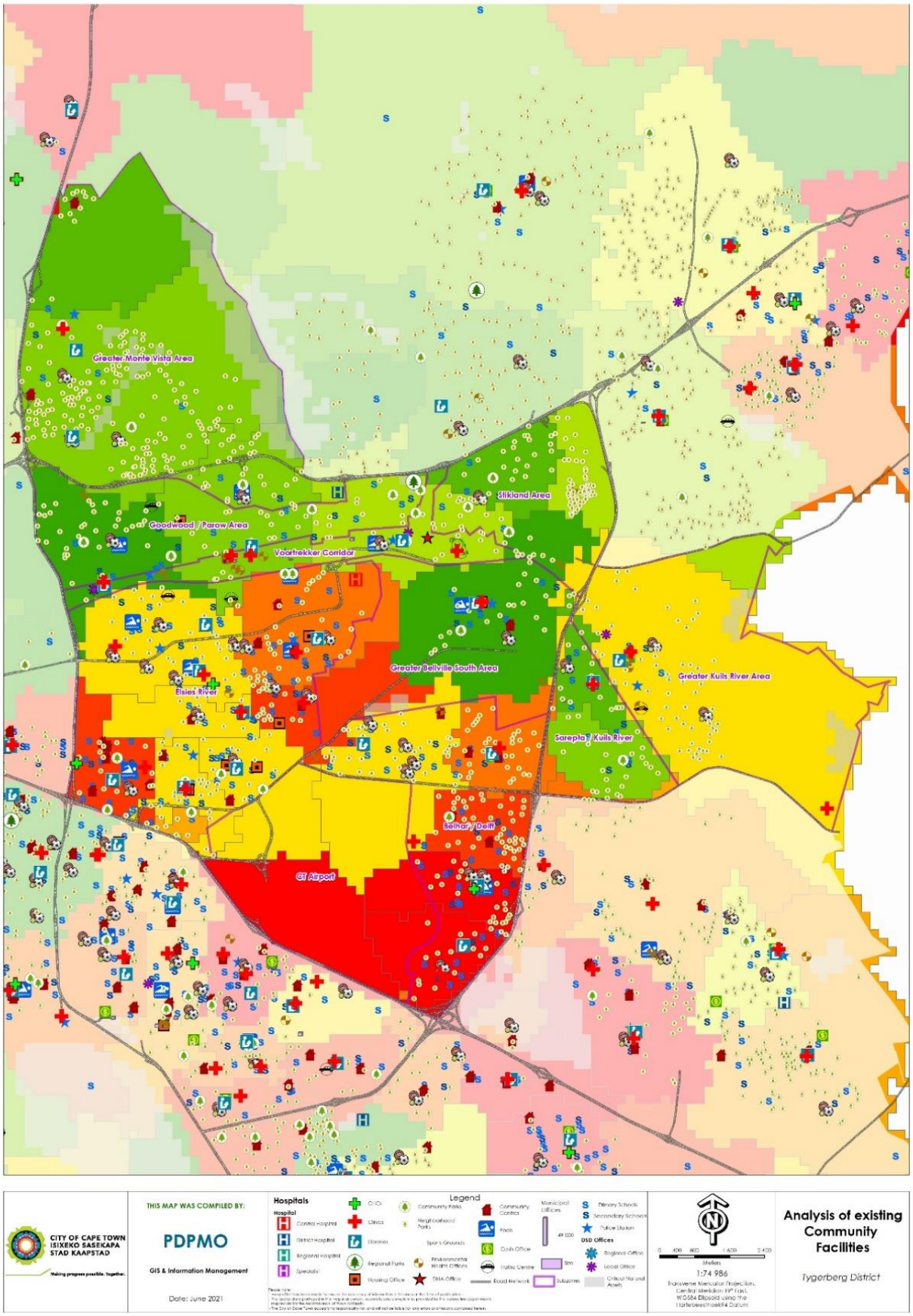


Figure 54: Existing community facilities

8.1.2 Needs analysis

Table 18 show the results generated from a modelling exercise that was undertaken to identify the type of facilities required to meet the needs of the population growth estimated for 2020 and 2040 within the service catchment areas of need as identified above. The results have taken into account sector specific assumptions, guidelines and standards for facility provision.

Table 18: Areas of highest public facilities' need in Tygerberg(2020 & 2040)

	2020			2040		
Facility Type	**Node/Area**	**Population Demand**	**Facilities Required ***	**Node/Area**	**Population Demand**	**Insufficient Supply***
Community Centres			0	• Delft The Hague • Delft CBD • Delft South • Kuilsriver • Uitsig	488 928	-5.5
Education	**Primary Schools** • Delft The Hague • Delft South • Bonteheuwel • Kuils River • Belhar ext.16	277 227	12.7	**Primary School** • Belhar ext.16 • Bonteheuwel • Delft The Hague • Delft CBD • Kuilsriver • Uitsig	409 124	-22.4
	Secondary School • Delft The Hague • Delft CBD • Delft South • Bonteheuwel • Belhar ext 16	373 517	8	**Secondary School** • Belhar ext.16 • Bonteheuwel • DelftThe Hague • Delft CBD • Delft South • Uitsig	531 394	-21.5
Libraries	**Community** • Delft The Hague • Kuils River	172 042	2	**Community** • Bonteheuwel • Delft The Hague • Delft CBD • Kuilsriver • Uitsig	543 472	-4.8
	Regional Delft CBD	323 437	1.7	**Regional** Delft CBD	409 866	-2
Primary Health	**Clinic**			**Clinic** • Belhar ext.16 • Uitsig	146 411	-0.8
Parks	**Neighborhood** • Delft The Hague • Delft CBD • Delft South • Bonteheuwel • Belhar ext.16	300 983	-49 ha	**Neighborhood** • Belhar ext.16 • Bonteheuwel • Delft The Hague • Delft CBD • Delft South • Uitsig	429 874	-92ha
	Community • Delft The Hague • Delft CBD • Delft South • Kuils River • Belhar ext.16	396 946	-7.5 ha	**Community** • Bonteheuwel • Belhar ext.16 • Delft The Hague • Delft CBD • Delft South • Kuilsriver • Uitsig	722 238	-12.9
	Regional Delft CBD		-2	**Regional** Delft CBD	409 866	-2.6

Sports grounds	• Delft The Hague • Delft CBD • Delft South • Bonteheuwel	339 002	-26ha	• Belhar ext.16 • Bonteheuwel • Delft The Hague • Delft CBD • Delft South	529 364	-34.1
	*** Equivalent to No. of Facilities / No. of unserved population/ha of land required**			*** Equivalent to No. of Facilities** Positive values indicate an over provision; Negative values indicate a shortfall relative to the standards		

8.1.3 Insufficiency break down

Figure 55 unpacks the detail related to insufficiency, specifically reflecting facility insufficiency or need in relation to the nodal hierarchy. It should be noted that this is based on the modelling and interpretation of data (supply of facilities, population, facility standards, distance) specifically for the following facilities: Neighbourhood Parks, Community Parks, Regional Parks, Community Library, Regional Library, Primary Health Care, Sports Grounds, Schools (Primary & Secondary). The insufficiency has been depicted through bar graphs that highlights the number of facilities needed per nodal catchment area. However, the education facilities have been omitted from the bar graphs as the needs are expressed through the number of learners requiring access to education facilities and schools are provided at different scales namely small, medium and large schools.

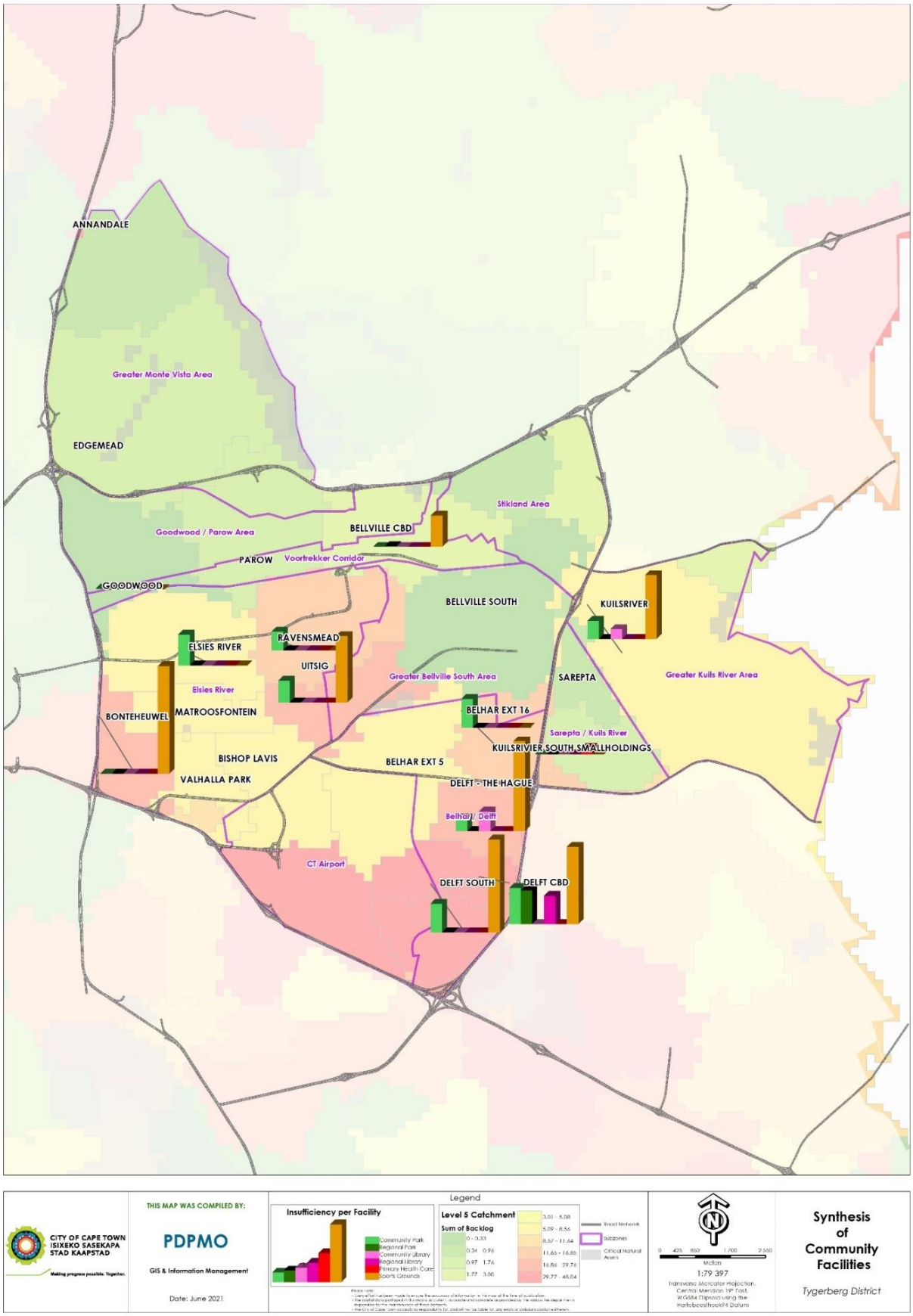


Figure 55: Facility insufficiency in Tygerberg

8.1.4 WCED Educational facilities assessment

The Western Cape Education Department has identified 6 hotspot areas across the city based on the current service delivery challenges and provision of education services. The aim is to stabilize these areas from an overall education provision perspective through implementation that is directed in a spatially targeted manner that ensures that the demand/need is met at a provincial level. These areas are: Dunoon, Bloekombos/Wallacdene, Delft/Mfuleni, Imizamo Yethu/Hout Bay, Ocean View/Masiphumelele and Lwandle/Nomzamo.

The overall Tygerberg District is considered 'stable' from an education perspective. It is also well serviced from a special needs perspective. Incremental residential growth, specifically from the private sector needs to be monitored from a regulatory perspective in relation to the current education supply. As an example areas such as Edgemead & surrounds where development is promoted for i.e. 10 -300 units at a time without the overall consideration of the social impact it may cause. It should also be noted that Delft and Mfuleni is assessed as one from an education perspective. Delft/Mfuleni, Belhar and eastern parts of the district is considered areas of concern for the WCED. While the infrastructure context for each may be different, it ultimately influences education provisioning.

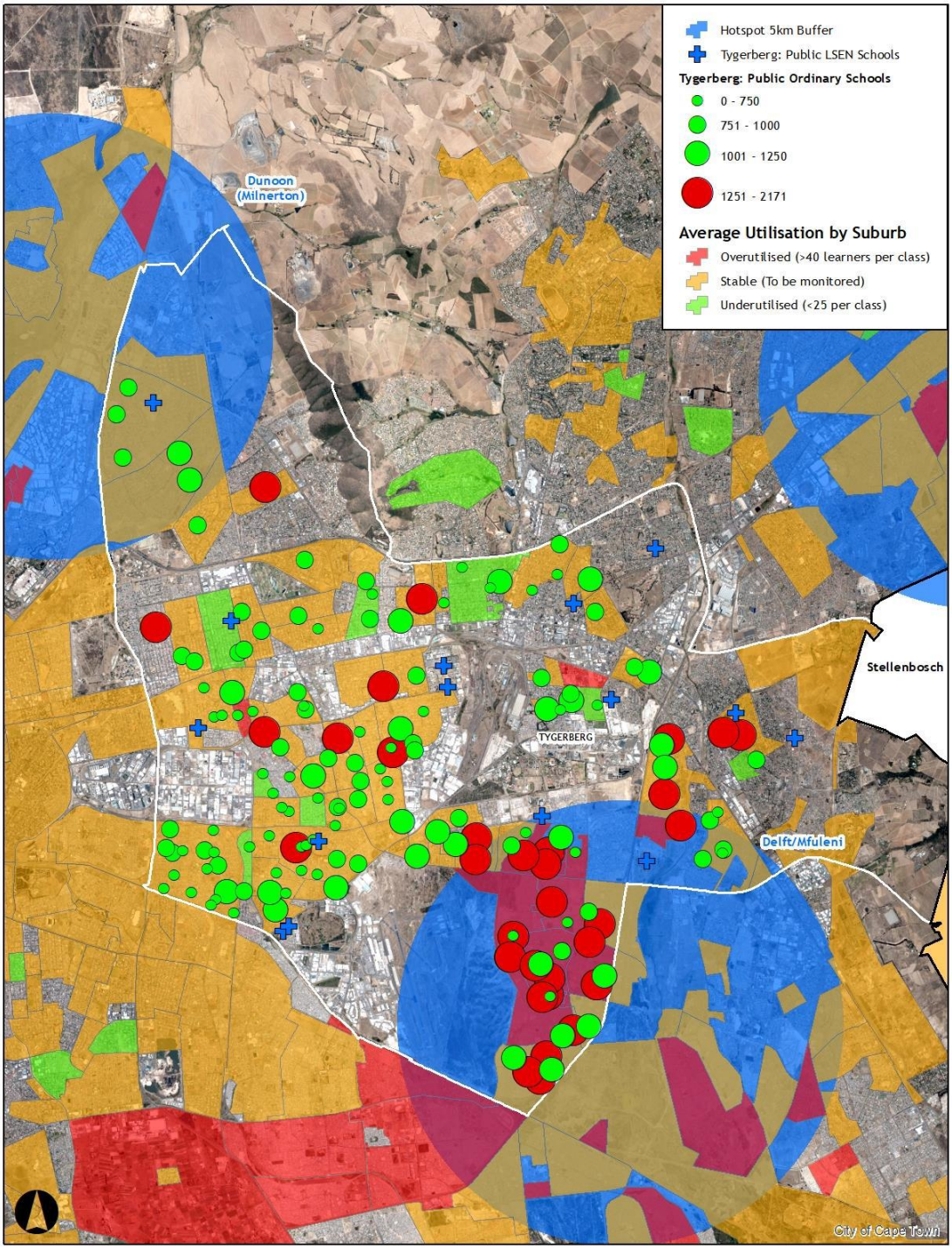


Figure 56: WCED areas of need and sufficiency

8.1.5 Fire Stations

There are four fire stations within the Tygerberg District which includes Bellville, Goodwood, Kuilsriver and Belhar. These fire stations serve the entire district. Belhar Fire station serves the largest percentage of the population across a relatively small area when compared to the rest of the fire stations. This is generally due to the high population densities within the Belhar fire station's service area.

8.2 Key Observations

It becomes evident that although the district has a wide variety of social services, many of these are still required and not yet present in the district.

- Four precincts have been identified as backlog precincts(concentration of facility backlogs) in the district, i.e. Elsies River, Bihops Lavis, Belhar and Delft.
- New cemeteries are proposed for areas in Belhar and Delft.
- The district is well served with 4 private hospitals and 3 public hospitals. However, the future of the Tygerberg hospital remains unknown.
- The provision of schools by the WCED are developed in accessible locations in order to cater for all learners based on the overall context of the education demand. Schools are not provided for each application for development. In this instance it should be noted that although the Belhar area is considered to be 'stable', it needs to be monitored in relation to the cumulative residential growth anticipated for the area by both public (CoCT & PDoHS) and private sectors.

8.3 Key Opportunities and Constraints

- Rationalisation of the Goodwood and Parow regional libraries in order to make valuable resources available for re-allocation to areas in dire need of the service.
- Bellville optimization precinct that create opportunities to consolidate and optimise facilities.
- Potential exist to intensify sports and recreational activities at the Jan Burger Sports Complex in Parow North.
- A public hospital with an ambulance depot is planned to be located in Belhar, Extension 8.
- The need for housing in the eastern part of Belhar and Delft should be carefully considered in relation to the education needs required for this area.
- Availability of suitable land in accessible locations in order to provide public facilities where it is required to serve the growing population and residential developments from both private and public sector housing.

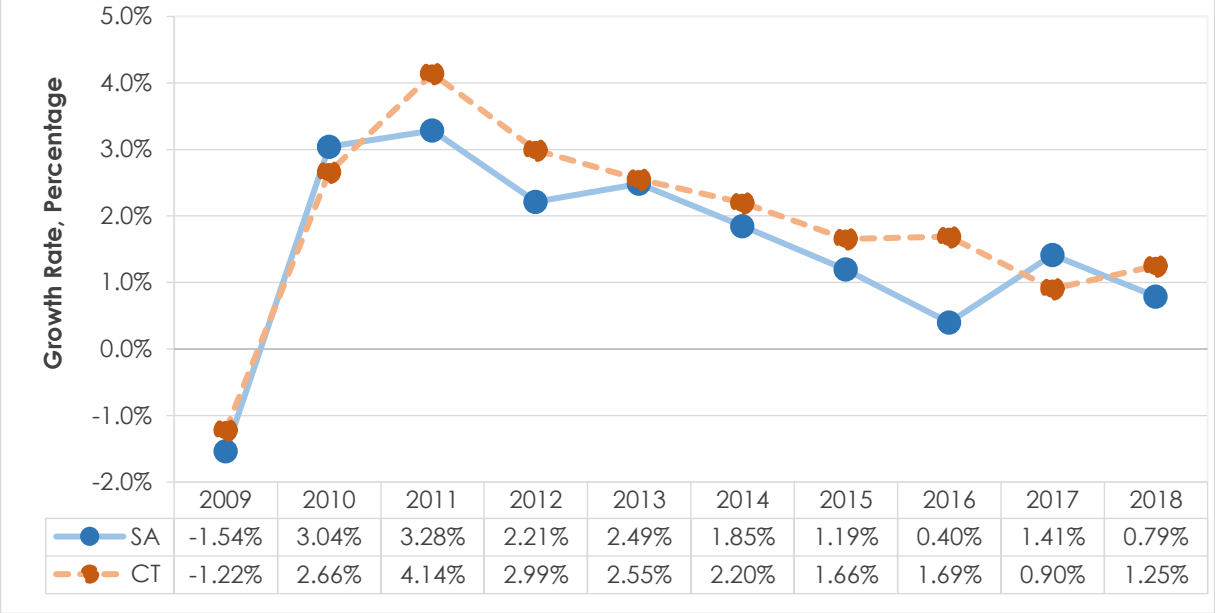
D: STATE OF THE ECONOMY AND PROPERTY MARKET

9 THE ECONOMY

9.1 MACRO-ECONOMY

2018, Cape Town's real GDP growth averaged at 2.1%, outperforming South Africa's average Real GDP growth of 1,67%, however both still reflecting an overall downward trend.

See Figure hereunder.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SA	-1.54%	3.04%	3.28%	2.21%	2.49%	1.85%	1.19%	0.40%	1.41%	0.79%
CT	-1.22%	2.66%	4.14%	2.99%	2.55%	2.20%	1.66%	1.69%	0.90%	1.25%

Figure 57: Average annual Gross Domestic Product (GDP) growth, South Africa vs. Cape Town for 2009 to 2018 (Source: IHS Markit, 2019)

Economic activity in Cape Town largely mirrors trends at the national level though often exceeding the national GDP. Deviations in these trends are observed since 2016; which may be attributable to the recent drought conditions faced in the region. Between the year 2009 and 2018, Cape Town's real GDP growth averaged 2.1%, outperforming South Africa's average Real GDP growth of 1,67%, however both still reflecting an overall downward trend.

Cape Town's appealing lifestyle and skilled labour makes it an attractive financial and business service hub for global and national organisations. As a result, the finance and business services sector has been the largest contributor to the growth of Cape Town's economy in the past ten years. This is likely to result in increasing demand for office space. Although Cape Town's office vacancy rate has remained the lowest among the five largest municipalities[5] (SAPOA, 2018) over the past five years, the negative effects of recent political and economic events have, nevertheless, damaged consumer and investor confidence. This has impacted negatively on an otherwise resilient office vacancy rate and caused a moderate decline in the city's rental growth rate.

[5] The five largest municipalities being; City of Johannesburg, eThekwini, Nelson Mandela Bay, City of Tshwane and City of Cape Town

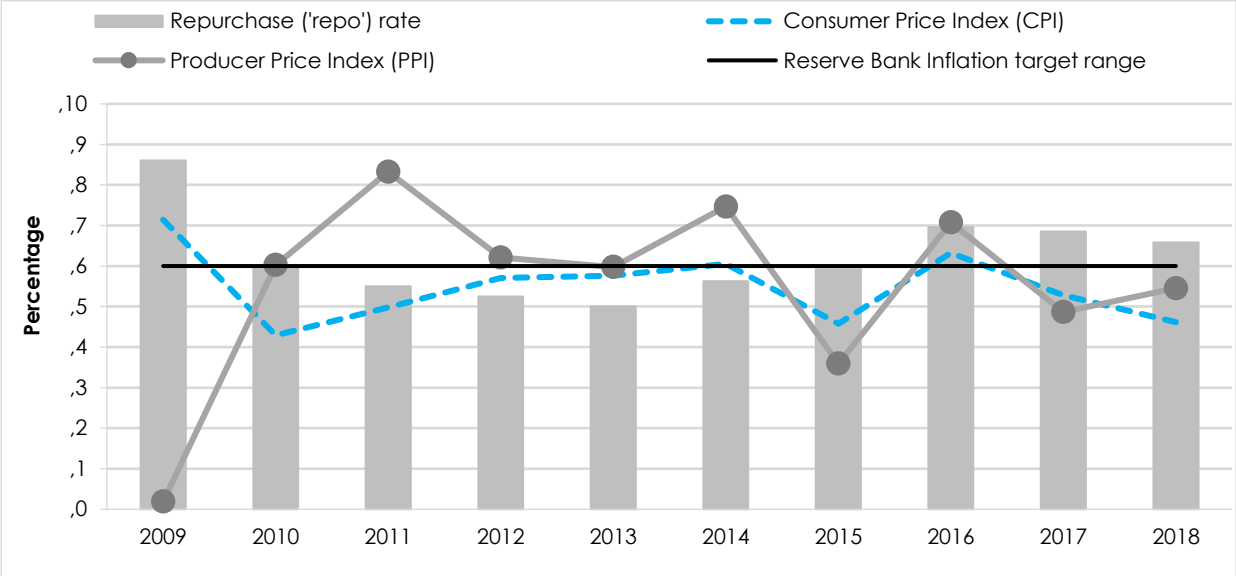


Figure 58: CPI and PPI trends in South Africa, 2009 to 2018 (Source: CPI and PPI extracted from Statistics South Africa, 2018-2019, and repurchase rate extracted from SARB, 2018-2019)

The consumer price index (CPI), inflation rate, and the producer price index (PPI) measure the price fluctuations of goods and services in the economy (See Figure 58 above). Within the ten-year period observed above, the CPI and the PPI varied slightly around the reserve bank upper inflation target rate of 6%.

It can be observed that inflation (6,33%) exceeded the upper limit of the target in 2016. This upward trend could largely be explained by the price increases in housing rentals, recreation and cultural activities. In response to the increase in inflation in 2016, the Reserve Bank increased the repo rate to 7%. While the rate has been adjusted downward since 2016, in response to lower levels of inflation, the repo rate (and, by extension, the prime lending rate) has remained significantly higher than in the 2010 -2015 period. As a result, property buyers have found it costlier to take out mortgage bonds between 2016 and 2018 than in the five year period preceding that. Together with low levels of consumer confidence, this has resulted in dampened activity in the property market.

Another factor impacting on the level of property market investment was South Africa's credit rating downgrade at the beginning of 2017, which led to big international fund managers selling out of South African bonds. This increased bond yields and continued to discourage consumer spending. During this time, it appears that building developers began losing confidence in South Africa's property market.

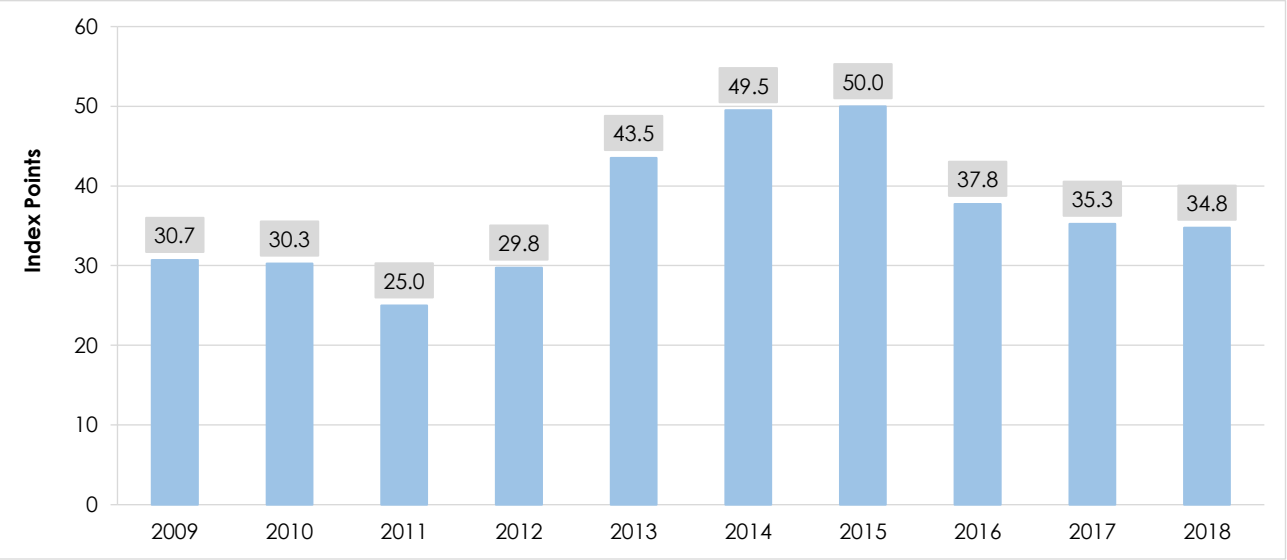


Figure 59: Building Confidence Index (BCI), 2009 to 2018 (Bureau for Economic Research (BER), 2018, FNB/BER Building Confidence Index, 2018)

The Figure above shows the First National Bank (FNB)/BER composite building confidence index for the 10-year period from 2009 to 2018. The Building confidence index records the percentage of architects, quantity surveyors, and contractors and manufacturers of building material, who are either satisfied with or wary of the prevailing business conditions (BER, 2018).

The First National Bank (FNB)/BER composite Building Confidence Index (BCI) declined by 15,3 points from 2015, where it peaked at 50,0 index points, to reach 34,8 index points in 2018. This decline in 2018 can be attributed to the weakened confidence of architects and quantity surveyors, as a result of an unstable economic environment characterised by relatively high office and retail vacancy rates, high interest and inflation rates as well as slow GDP growth (FNB, 2018).

Although the building confidence index has dropped significantly since 2015, Cape Town has continued to see stable growth in building supply with the conversion of older office buildings to residential use cushioning the level of vacancies (Baker street properties, 2018). The weak economic growth is, however, eventually likely to aggravate the weak employment growth which could, in turn, see demand for building or office space declining (JLL, 2018).

9.2 Property Market Performance

The Figure below displays the total floor area of new office building space and new industrial building space added to building stock, against the observed variations in the office and industrial vacancy rates, from 2015 to 2018. There is generally, although not exclusively, a positive relationship between building completions and vacancy rates.

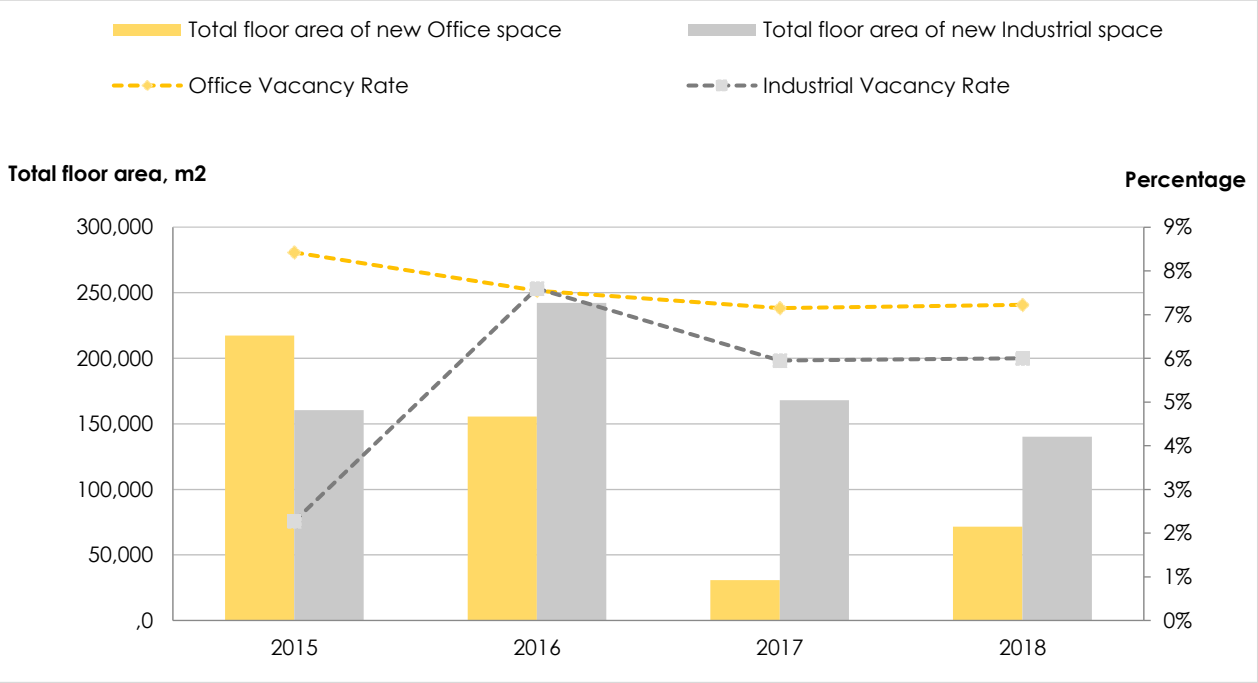


Figure 60: Cape Town's new building completions and vacancy rates for Office and Industrial space, 2009 to 2018 (Transport Business Support Department; South African Property Owners Association (SAPOA), 2019)

The total floor area of new Industrial space increased by 51% to reach a high of 242 394 m^2 in 2016, most likely to address the high demand for industrial space, reflected in the low vacancy rate in the previous year.

Cape Town's office vacancy rate remains the lowest among the five largest municipalities[6] (SAPOA, 2018), however the slowdown in the office-to-residential conversion, which has assisted in reducing office vacancies in Cape Town may reveal the weak demand for office space (JLL, 2018). The Figure above shows that the vacancy rate begins to decline as new office building completions decreased (with 2018 as the exception). A significant drop in building completions (80%) was recorded for 2017; which may be largely attributed to the negative effects of the drought, as the water prices spiked making construction of buildings more expensive.

[6] The five largest municipalities being; City of Johannesburg, eThekwini, Nelson Mandela Bay, City of Tshwane and City of Cape Town.

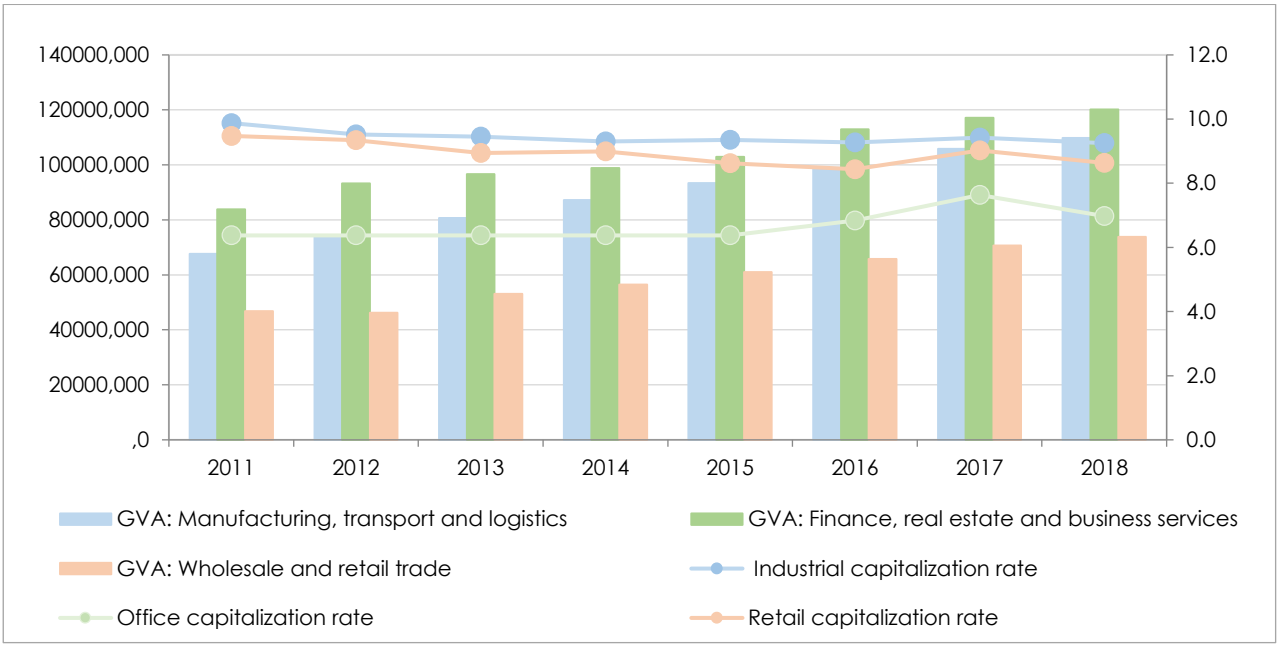


Figure 61: Cape Town's Gross Value Added (GVA) and Capitalisation rate , 2011 to 2018 (HIS Markit, 2019; South African Property Owners Association (SAPOA), 2019)

Figure 61 above shows the industrial, office and retail capitalization rates as well as the Gross Value Added (GVA) for the finance and business services sector; manufacturing, logistics and transport as well as whole sale and retail trade. The Gross Value Added (GVA) for industrial, office and retail space all followed a steady, though decelerating, upward trend from 2011 to 2018.

A cap rate is one type of measurement used in evaluating an investment, indicating **risk** and the **potential rate of return** for a prospective property. A low cap rates imply lower risk, higher value and a high cap rates imply higher risk, lower value. In figure 61 the capitalisation rates for office, industrial and retail property in Cape Town follow a similar trend between 2011-2015. From 2016 – 2017 the cap rates for all sub-segments increased despite a momentary upturn in 2017. The increase in 2017 may largely be explained by stagnating property prices, a consequence of Cape Town's water crises and the credit ratings downgrade.

9.3 District Analysis

9.3.1 Economic Characteristics

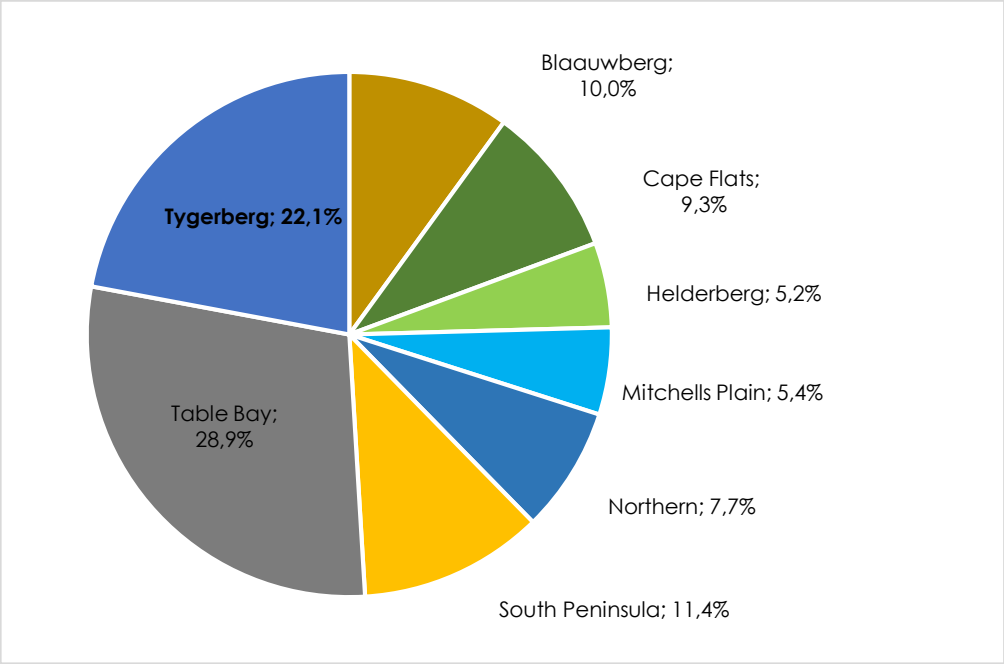


Figure 62: Employment contributions, 2018 (IHS Markit, 2019)

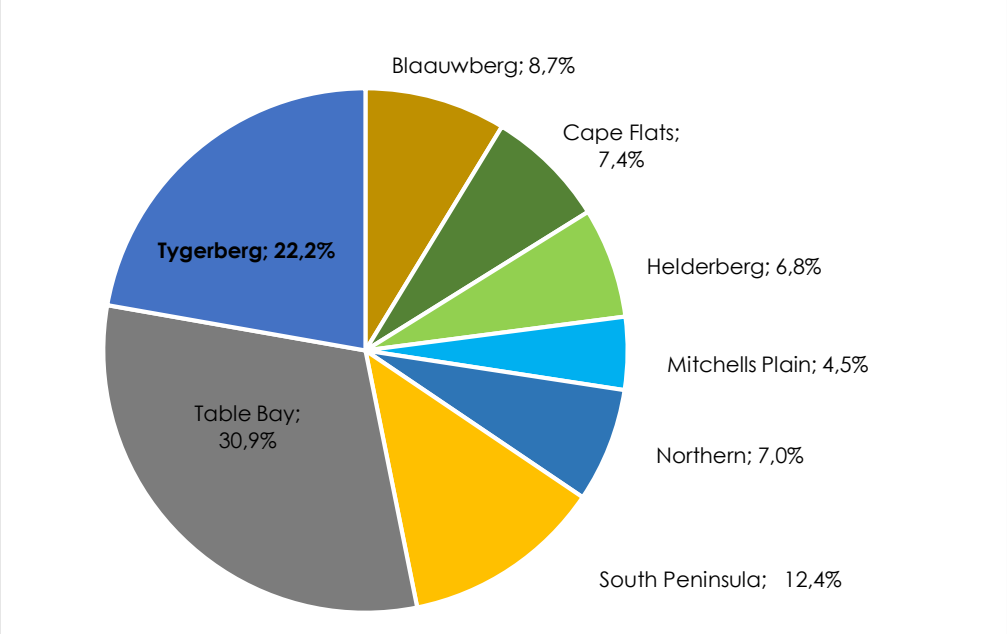


Figure 63: Gross geographic product (GGP) contributions at current prices, 2018 (IHS Markit, 2019)

The largest contributor to the gross geographic product (GGP)at current prices for Cape Town in 2018 was the Table Bay district (28,9%), an area characterized by the intense concentration of business and commercial activities. See Figure 63 above. This area also comprises of the main tourist areas of the city such as the CBD, the City Bowl and the Atlantic Seaboard as well as the significant economic infrastructure of the port, the Cape Town International Convention Centre and the V&A Waterfront. Tygerberg district, with a share of

22,1%, was the second largest district economy in 2018 and is largely dominated by finance, insurance, real estate and business services.

The top three districts in terms of employment are Table Bay (30,9%), Tygerberg (22,2%), followed by South Peninsula (12,4%). See Figure 62 above. However, the Mitchells Plain district had the lowest employment share at 4,5% (71 800 jobs) in 2018. This highlights the lack of employment opportunities as a result of low economic activity occurring within the district, although there is a growing labour force living within this area.

9.3.2 Economic Performance

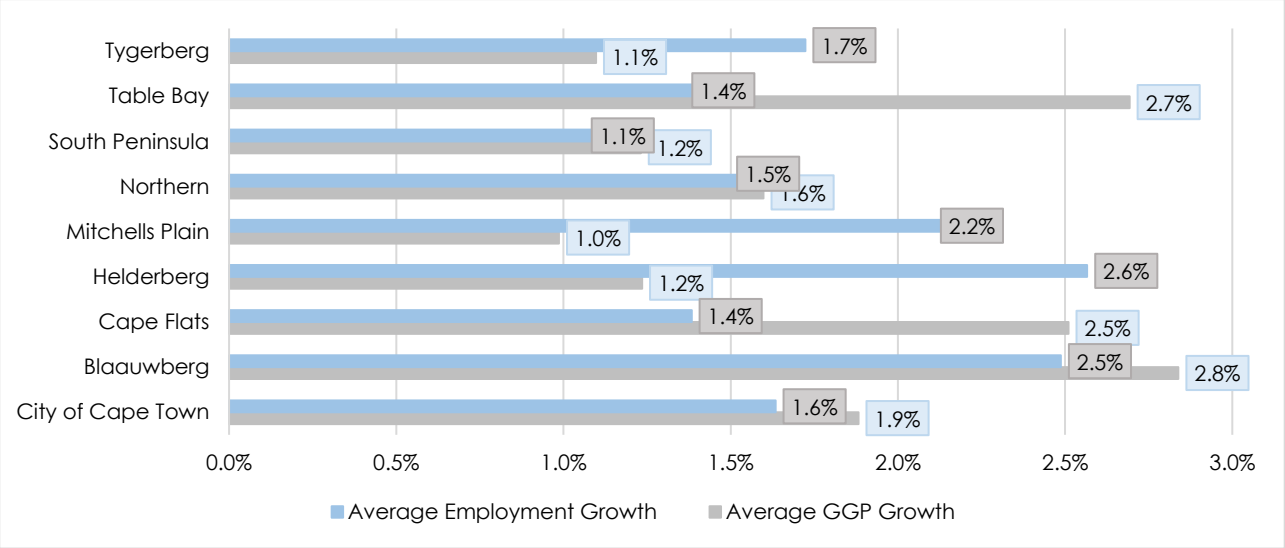


Figure 64: Average annual economic growth rates, 2009 to 2018 (source: IHS Markit, 2019)

The average annual growth rate of the Tygerberg District is shown in Figure 64 as 1.1% (although the average employment growth is higher at 1.7%) which is lower than the Metro's average growth rate of 1.9%. The South Peninsula reported GGP growth of 1,2% over the ten-year period, lower that the Metro average. The Helderberg district had the highest employment growth at 2,6%, closely followed by Blaauwberg at 2,5%, both areas surpassing the Metro's average employment growth rate of 1,6% over the ten-year period.

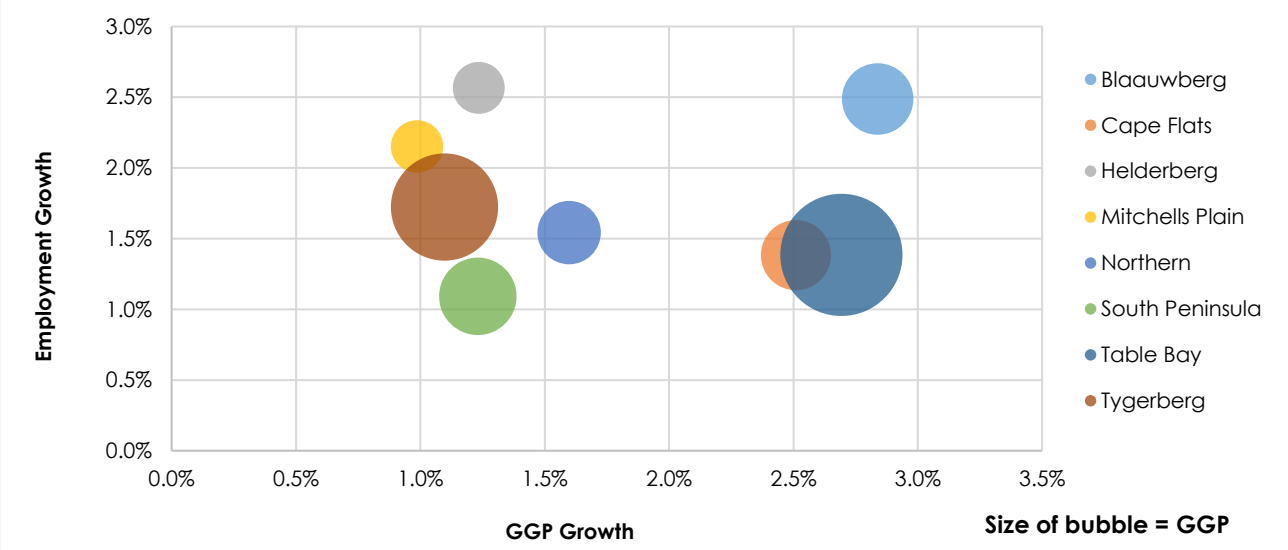


Figure 65: Performance comparison, 2018 (source: IHS Markit, 2019)

Figure 65 plots the average economic growth on the horizontal axis and average employment growth on the vertical axis. The size of the bubble is the relative size of the economy as measured by gross geographic product in 2018. The Tygerberg District grew relatively slower than Table Bay in terms of both GGP and employment over the ten-year period, despite the relatively smaller size of its output and employment levels when compared to Table Bay. It could be argued that the base from which Tygerberg district is measured is in all possibility much higher than those compared to, thus it still remains prominent in terms of creating employment opportunities.

9.3.3 Sectoral trends

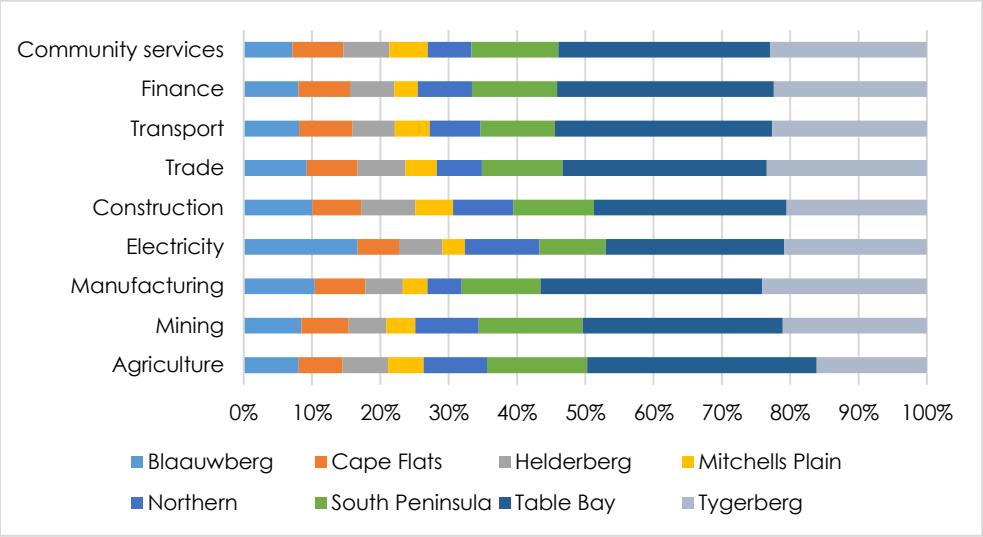


Figure 66: Gross Value Added (GVA) contribution by sector, 2018 (IHS Markit, 2019)

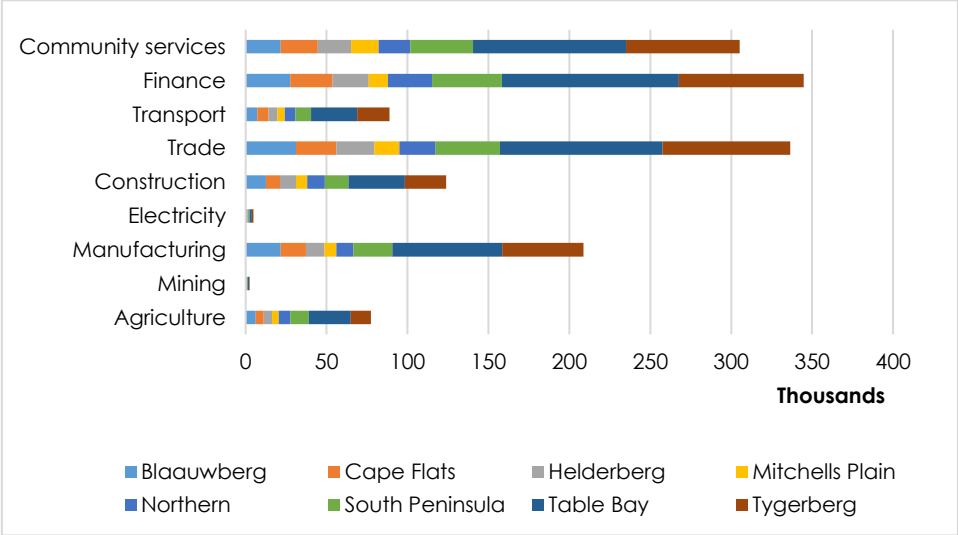
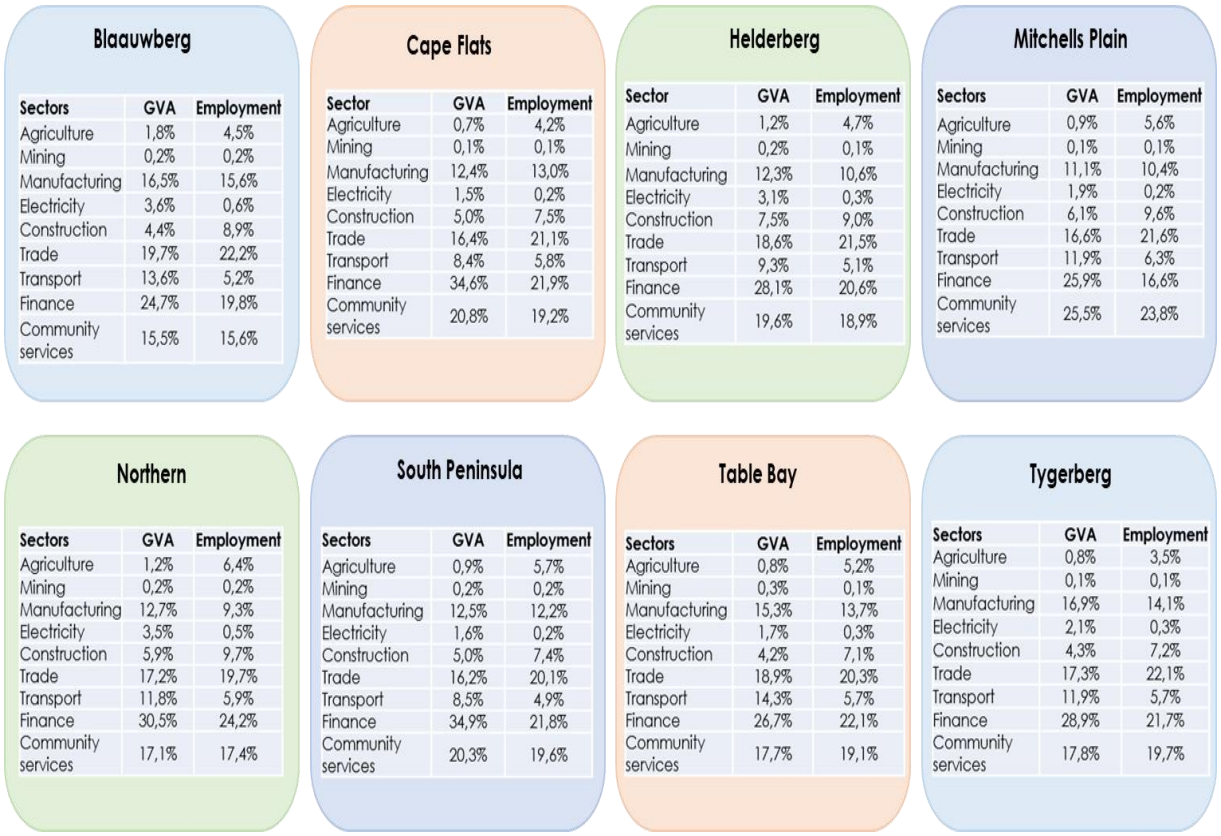


Figure 67: Employment contribution to Cape Town, 2018 (IHS Markit, 2019)

From the figures above, it is clear that Table Bay district is the main contributor to the total gross value added (GVA) of most sectors in Cape Town, followed by Tygerberg district. Table Bay district's contribution is especially pronounced in the transport (34,7%) and trade sectors (30,6%) – this is as a result of the district containing the city's port and also because it functions as the main retail hub in the city.[7] Employment trends, for the most part mirror the output trends, although Tygerberg district is seemingly more labour intensive (contributing more to employment than GVA) than Table Bay district. Mitchells Plain showed the lowest contribution to Cape Town's GVA across most sectors, largely attributable to this area's economy being highly reliant on the community services sector (public sector).

[7] The mining figures are for all districts are almost insignificant



Blaauwberg

Sectors	GVA	Employment
Agriculture	1,8%	4,5%
Mining	0,2%	0,2%
Manufacturing	16,5%	15,6%
Electricity	3,6%	0,6%
Construction	4,4%	8,9%
Trade	19,7%	22,2%
Transport	13,6%	5,2%
Finance	24,7%	19,8%
Community services	15,5%	15,6%

Cape Flats

Sector	GVA	Employment
Agriculture	0,7%	4,2%
Mining	0,1%	0,1%
Manufacturing	12,4%	13,0%
Electricity	1,5%	0,2%
Construction	5,0%	7,5%
Trade	16,4%	21,1%
Transport	8,4%	5,8%
Finance	34,6%	21,9%
Community services	20,8%	19,2%

Helderberg

Sector	GVA	Employment
Agriculture	1,2%	4,7%
Mining	0,2%	0,1%
Manufacturing	12,3%	10,6%
Electricity	3,1%	0,3%
Construction	7,5%	9,0%
Trade	18,6%	21,5%
Transport	9,3%	5,1%
Finance	28,1%	20,6%
Community services	19,6%	18,9%

Mitchells Plain

Sectors	GVA	Employment
Agriculture	0,9%	5,6%
Mining	0,1%	0,1%
Manufacturing	11,1%	10,4%
Electricity	1,9%	0,2%
Construction	6,1%	9,6%
Trade	16,6%	21,6%
Transport	11,9%	6,3%
Finance	25,9%	16,6%
Community services	25,5%	23,8%

Northern

Sectors	GVA	Employment
Agriculture	1,2%	6,4%
Mining	0,2%	0,2%
Manufacturing	12,7%	9,3%
Electricity	3,5%	0,5%
Construction	5,9%	9,7%
Trade	17,2%	19,7%
Transport	11,8%	5,9%
Finance	30,5%	24,2%
Community services	17,1%	17,4%

South Peninsula

Sectors	GVA	Employment
Agriculture	0,9%	5,7%
Mining	0,2%	0,2%
Manufacturing	12,5%	12,2%
Electricity	1,6%	0,2%
Construction	5,0%	7,4%
Trade	16,2%	20,1%
Transport	8,5%	4,9%
Finance	34,9%	21,8%
Community services	20,3%	19,6%

Table Bay

Sectors	GVA	Employment
Agriculture	0,8%	5,2%
Mining	0,3%	0,1%
Manufacturing	15,3%	13,7%
Electricity	1,7%	0,3%
Construction	4,2%	7,1%
Trade	18,9%	20,3%
Transport	14,3%	5,7%
Finance	26,7%	22,1%
Community services	17,7%	19,1%

Tygerberg

Sectors	GVA	Employment
Agriculture	0,8%	3,5%
Mining	0,1%	0,1%
Manufacturing	16,9%	14,1%
Electricity	2,1%	0,3%
Construction	4,3%	7,2%
Trade	17,3%	22,1%
Transport	11,9%	5,7%
Finance	28,9%	21,7%
Community services	17,8%	19,7%

Figure 68: Gross Value Added (GVA) and Employment contributions, 2018

Figure 68 illustrates the sectoral gross value added (GVA) and employment shares within each of the planning districts. It is apparent from the figures presented that the smaller district economies (Cape Flats, Mitchell's Plain) tend to be less diversified than the larger district economies: with proportionally less contribution from the manufacturing sector and greater reliance on community services[8]. Among the productive sectors, manufacturing is relatively more important to Tygerberg district's economy while Agriculture is relatively more important to Blaauwberg economy.

[8] Community services includes education; public administration and defence activities; health and social work and other service activities.

Table 19: Top Five sectors by location quotient in each district (detailed SIC) , 2018

Planning District	Rank	Sector	Location Quotient
Blaauwberg	1	Fishing, operation of fish farms	2,08
	2	Electricity, gas, steam and hot water supply	1,71
	3	Transport equipment	1,44
	4	Hotels and restaurants	1,24
	5	Fuel, petroleum, chemical and rubber products	1,22
Cape Flats	1	Education	1,33
	2	Other business activities	1,26
	3	Real estate activities	1,23
	4	Other service activities	1,16
	5	Finance and Insurance	1,12
Helderberg	1	Construction	1,56
	2	Electricity, gas, steam and hot water supply	1,44
	3	Hotels and restaurants	1,22
	4	Fuel, petroleum, chemical and rubber products	1,20
	5	Sale and repairs of motor vehicles, sale of fuel	1,20
Mitchells Plain	1	Education	2,02
	2	Public administration and defence activities	1,31
	3	Construction	1,27
	4	Real estate activities	1,25
	5	Health and social work	1,19
Northern	1	Electricity, gas, steam and hot water supply	1,63
	2	Construction	1,22
	3	Finance and Insurance	1,13
	4	Metal products, machinery and household appliances	1,13
	5	Sale and repairs of motor vehicles, sale of fuel	1,10
South Peninsula	1	Real estate activities	1,61
	2	Public administration and defence activities	1,16
	3	Education	1,12
	4	Other service activities	1,11
	5	Fishing, operation of fish farms	1,11
Table Bay	1	Air transport and transport supporting activities	1,28
	2	Land and Water transport	1,20
	3	Hotels and restaurants	1,18
	4	Wood and wood products	1,18
	5	Wholesale and commission trade	1,15
Tygerberg	1	Metal products, machinery and household appliances	1,27
	2	Finance and Insurance	1,24
	3	Furniture and other items NEC and recycling	1,21
	4	Food, beverages and tobacco products	1,21
	5	Textiles, clothing and leather goods	1,18

Source: IHS Markit, 2019.

While analysis at a broad sectoral level is useful, it is too aggregated a level to adequately understand the nuances of a regional economy. Table 19 undertakes a location quotient analysis utilising the more detailed 2-digit Standard Industrial Classification (SIC) codes. By comparing the relative share constituted by an industry in the respective district economies to its share in the city-wide economy, location quotient analysis provides an indication of the relative importance of industries to a district economy as compared to the Cape Town economy as a whole. The table ranks the top five industries by location quotient. It is important to note that having the highest LQ does not necessarily mean an industry is the largest contributor to the district economy nor that it is most strongly represented in that district. Caution should also be exercised when considering non-tradable sectors within small economies. For instance, the fact that Education has the highest

location quotient in Mitchell's Plain and Cape Flats is more a reflection of the weak economy in those areas rather than an indicator of them having a comparative advantage in Education.

9.4 The Informal Economy

The 'informal sector' commonly refers to the unregulated, non-formal portion of the market economy. Statistics South Africa uses an employment based definition for the sector, defining it broadly as comprising of employees working in establishments employing less than 5 employees who do not pay income tax, as well as own account workers whose businesses are not registered for either income tax or value-added tax. The term 'informal economy' is preferred to 'informal sector' as it reflects the broader scope of economic activities that take place informally.

The relatively low entry barriers in the informal economy, and its strong penetration in impoverished areas, means that it has the potential to increase economic inclusivity by of otherwise marginalised members of society.

9.4.1 Size of Informal Economy

Statistics South Africa estimates that 220 000 people were employed in the informal sector in Cape Town in the second quarter of 2019. This constituted 13.3 % of Cape Town's workforce, a significant amount.[9] Importantly, the benefit of the sector is predominantly in low-income communities, and it accounts for an estimated 5 percentage point reduction in the poverty rate.[10] The graph shows that the number of jobs in the informal economy has grown from 2015 to 2019, as has the share of jobs which are informal.

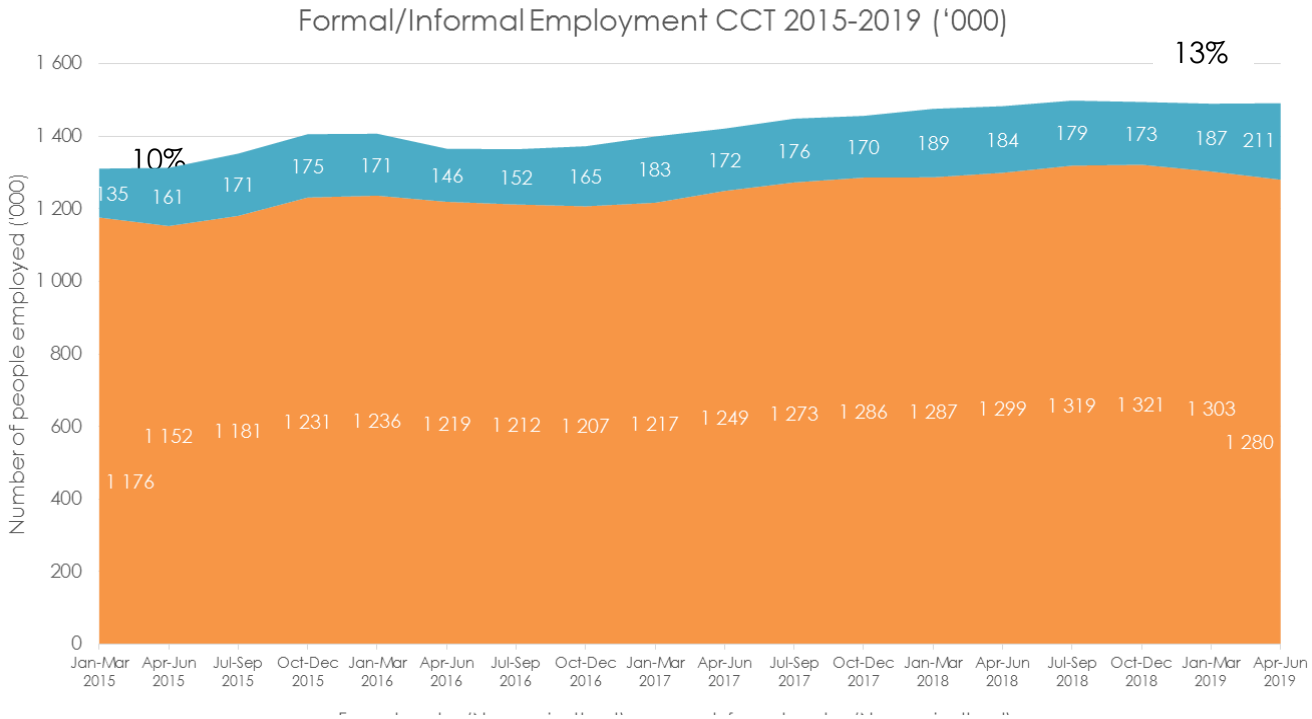


Figure 69: Formal vs Informal employment

[9] StatsSA, 2019, Quarterly Labour Force Survey
[10] GHS 2013

9.4.2 Employment Distribution

There is informal economic activity in almost all sectors, and particularly present in trade, transport services, community services, recycling, construction and manufacturing.

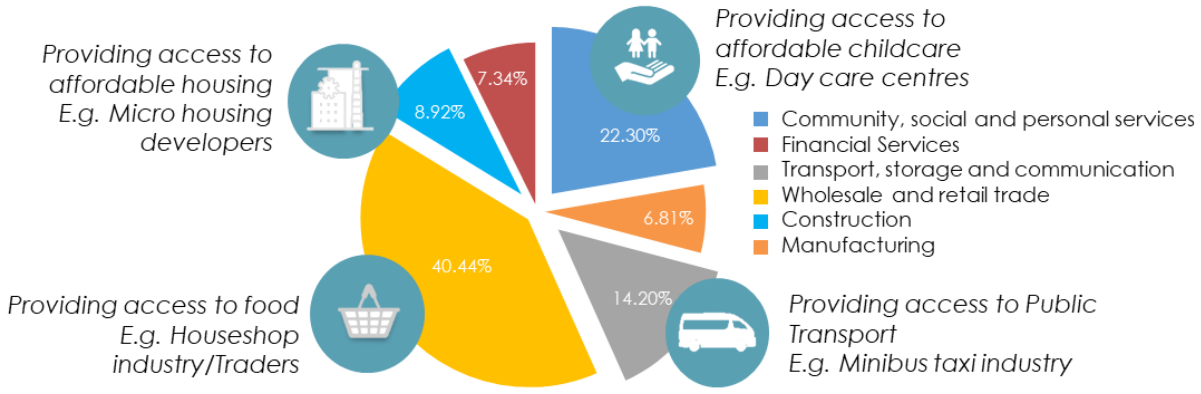


Figure 70: Industry distribution of informal sector employees in Cape Town (Source: Stats SA, QLFS Q2, 2019)

9.4.3 Opportunities and Constraints

As long as the population of Cape Town grows, through births and in-migration, at a higher rate than formal jobs are created, the informal sector will be an important avenue for generating livelihoods and reducing poverty. This is particularly true in a scenario where the bulk of new arrivals to the city or young residents entering the workforce in the city are low or semi-skilled. The informal economy has the potential to provide transitional employment for new arrivals to the city or new entrants to the labour market, and in some cases to provide sustained livelihoods. But there is a risk that many informal economy participants get stuck in low productivity, survivalist activities.

Cape Town's informal economy is comparatively small by emerging country standards, particularly in the context of high levels of unemployment in the formal sector. This presents an opportunity for economic growth.

As with the formal sector, a *lack of skills*, particularly relating to the operating of a business, is a key constraint to the growth of informal sector enterprises. Most informal businesses *battle to access growth markets and the capital* required to diversify and scale up their activities, and as a result are left to compete fiercely for market share at the local level servicing lower-income consumers, leading to low and precarious profit margins[11]. There is an opportunity for business support to be improved.

The conditions in which informal economy actors operate are often characterised by *low-quality urban spaces* with limited amenities and services such as bathrooms, shelter and storage facilities. Informal businesses are generally more affected by *crime and insecurity*, and the unregulated nature of the informal economy also increases opportunities for exploitation. The *regulations governing business licencing and other regulatory*

[11] Human Science Research Council (HSRC), 2018, *Township Economies Workshop Notes*

requirements, such as land use and building approvals are designed for formal businesses and often are not relevant to the realities of the informal sector. The costs associated with regulatory compliance represent a disincentive to formalisation, which may severely hamper the growth of informal enterprises.

A key challenge for the City in supporting informal sector development is the *scarcity of data* about the size, location and activities of the informal economy. Lack of information about the lived reality of those working informally and their priority needs is also a challenge. For this reason, further studies are being undertaken to assist in the preparation of the District Spatial Development Framework

9.5 PROPERTY MARKET

9.5.1 Market Performance

A cap rate is one type of measurement used in evaluating market performance and the viability of property investment in an area by indicating **risk** and the **potential rate of return** for a spatial area. The capitalization rate is the ratio of stabilized annual net operating income to purchase price. Thus, it measures income after deduction for operating expenses and normal vacancy, but before deducting financing charges and income taxes (*Ambrose and Nourse, 1993:221*). A low cap rates implies lower risk, higher value and a high cap rate implies higher risk, lower value. The following endogenous and exogenous factors influence the cap rate:

Table 20 and Figure 71 depicts the average capitalization in Tygerberg.

- **Market Value:** "The estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion" (Blackledge, 2009)
- **Gross rental income:** The total amount collected in rent and any related rental property income before any expenses are deducted; you can include rent for parking and other factors
- **Net operating income (NOI):** This is the annual income generated by an income-producing property after deducting all operating expenses
- **Operating expenses:** Expenses needed to operate the property which includes property taxes, rental property insurance, management fees, repairs, maintenance and miscellaneous things like accounting and legal fees
- **Occupancy rate:** The ratio of rented space to the total amount of available space and is typically used in multi-unit properties
- **Growth**
- **Operating expenses:** Expenses needed to operate the property which includes property taxes, rental property insurance, management fees, repairs, maintenance and miscellaneous things like accounting and legal fees
- **Supply vs. demand:** This is how many properties are available in the area and, typically, the lower the inventory, the higher the demand, which tends to lead to properties with lower cap rates
- **Property type/Asset class:** This is the type of property such as multifamily, apartment building, industrial or commercial property and typically residential properties have lower cap rates than commercial properties, because commercial properties tend to have higher rents
- **Rents that are above or below market**
- **Length of the lease term**
- **Financial strength/credit rating of the tenant**

Taking the above into account, the cap rate is considered to be a good indicator to assess property market performance.

Table 20: District Property Market (Mean) Indicators (City of Cape Town Non-Res Market Research : 2018)

Market Segment	Year	Average Cap Rate (%)	Average Operating costs (R/m²/month)	Average Gross market rental (R/m²/month)	Average Vacancy Rate (%)
Industrial	2012	10.3%	R5.70	R29.96	3.5%
	2015	10.0%	R6.61	R33.43	5.8%
	2018	9.4%	R13.90	R93.17	4.5%
Retail	2012	11.2%	R10.11	R50.93	3.5%
	2015	9.9%	R13.80	R61.59	5.0%
	2018	11.0%	R20.82	R134.04	6.2%
Office	2012	11.5%	R14.59	R58.07	5.0%
	2015	10.9%	R15.80	R68.84	9.0%
	2018	10.6%	R35.67	R213.33	9.4%

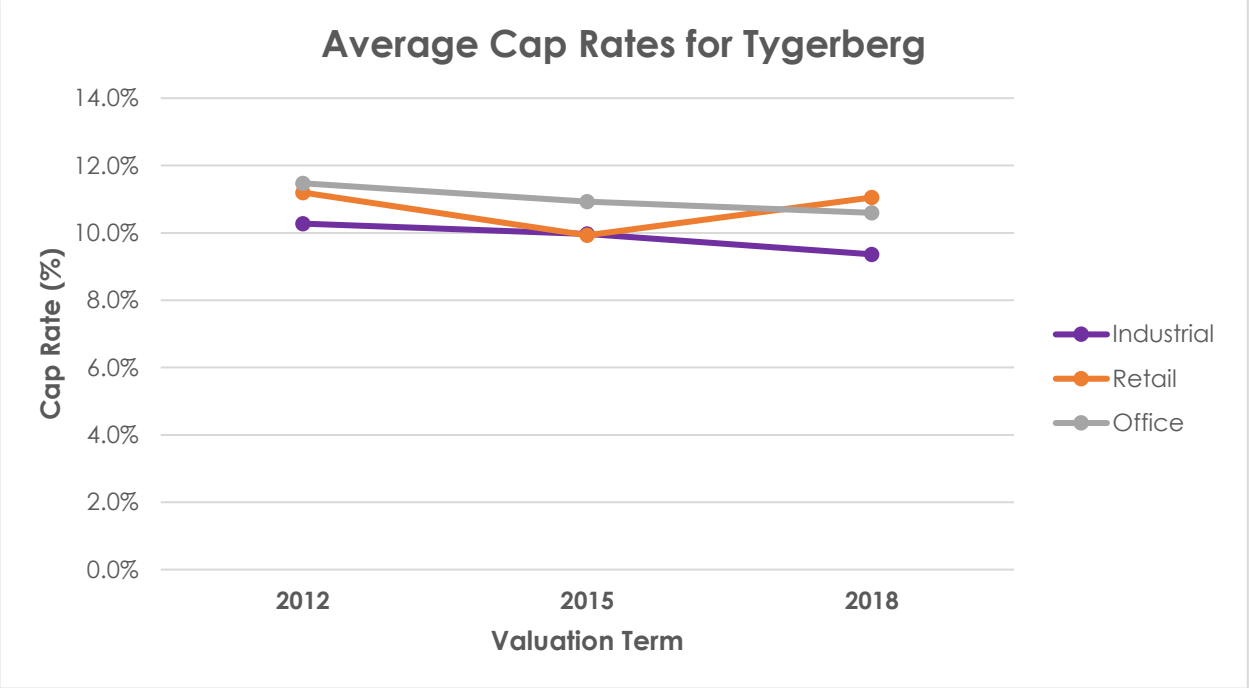


Figure 71: Average capitalisation rates per non-residential market segment (City of Cape Town Non-Res Market Research: 2018)

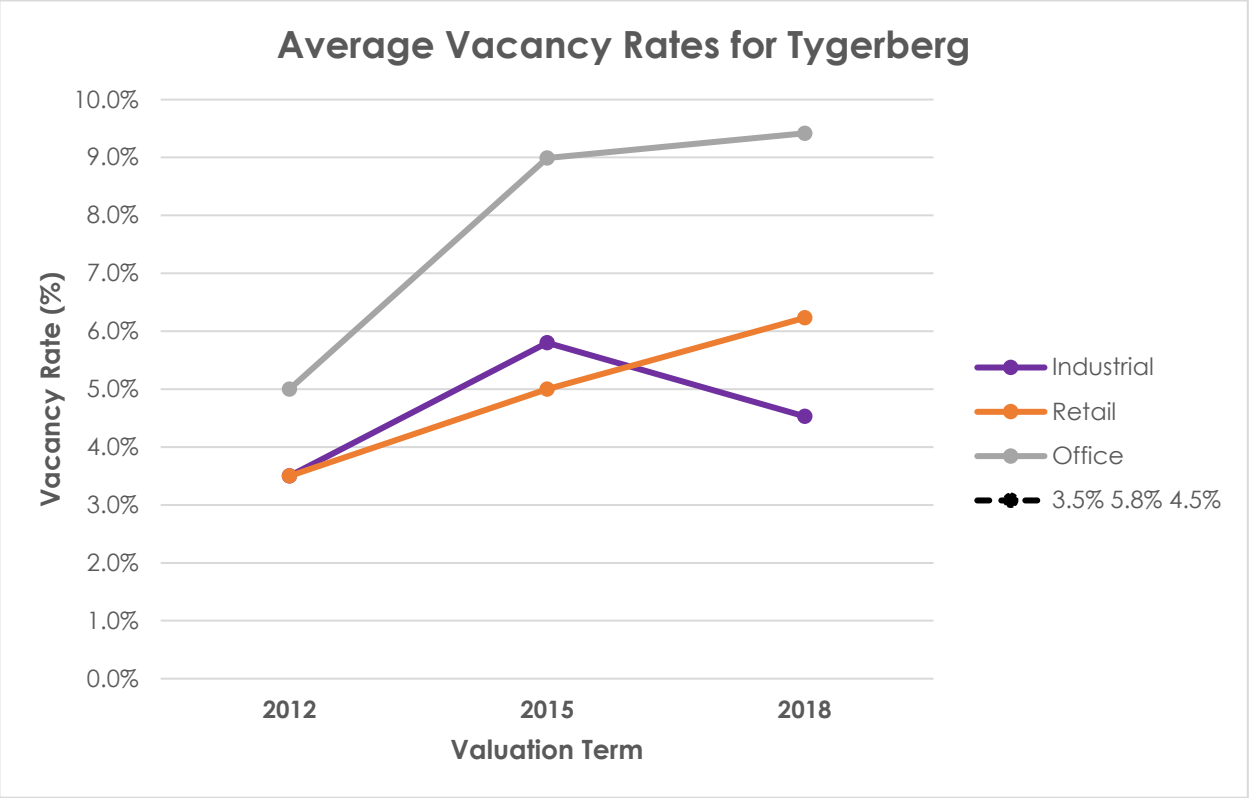


Figure 72: Average vacancy rates per non-residential market segment (City of Cape Town Non-Res Market Research : 2018)

9.5.2 Key Observations and Trends

The cap rate for shopping centers in the district varies between 8.8% and 9.5%.

i. Non-residential

a. Industrial:

The industrial sector in Tygerberg is following the National trend and outperforming other market segments. The average capitalisation rate for industrial properties steadily decreased over the last three valuation terms and had the lowest Cap rate in 2018, which indicates better market performance for industrial properties. This is reinforced by Figure 73 which shows a high growth in property values for industrial areas in the Tygerberg District. This supports national market indicators for industry and growth in the online retail market. Business Day reported in 2018 that high-tech warehouses and distribution centres are fast becoming the most sought-after property assets in SA, with listed counters and private groups positioning themselves to benefit from future growth in online shopping and companies establishing supply chains (https://www.businesslive.co.za). This indicates growing demand for well-located warehousing and distribution centres.

In terms of local market performance, the area has some strong location factors that make it desirable, particularly for the warehousing sector, the Airport industria area takes advantage of proximity to Cape Town international airport and has seen the strongest growth and performance with Cap rates between 8% and 9.5%. Other established industrial nodes in the District, including Sacks Circle, Epping 2, Parow industria, Stikland

and Kuils Rivier show more moderate performance profiles, with Cap rates around 9.5%-10.5%.

b. Street Front Retail:

Street front retail in the District has seen a dip in performance between 2015 and 2018 returning to 2012 levels of 11% Cap rates, a trend that is likely to continue on the back of economic downturn and in light of newer regional shopping center developments over that time period. In comparison to other market segments in the district, street-front retail is performing the weakest. It should be noted, however, that this section does not account for other retail typologies such as neighbourhood and regional shopping centres – which has a significant impact on the cumulative retail property market performance. Shopping center cap rates range from 8.8 % -9.8% in Cape Town.

Locally, street front retail in and around the Bellville CBD and Boston area have higher Cap rates- around 8.5%, however most of the District shows indicators of poorer performance of street front retail. This could be attributed to:

- persisting urban management challenges along 'high street' environments;
- up to 30% drop in train ridership resulting in overall reduction in foot-traffic and, by extension, street-front retain exposure in environments anchored by rail stations, and
- relatively low residential densities providing insufficient residential thresholds to support street-front retail.

c. Office

The office sector has seen Cap rates declining only slightly since 2012, with higher (average) vacancies and cap rates recorded for 2018. This is likely a result of economic downturn, and because some of the business nodes have a number of urban management challenges related to crime and grime and problem buildings.

The office market in Tygerberg is centered around the Voortrekker Rd corridor and generally shows little variation in Cap rates, with the exception of one or two smaller areas around Bellville station, Plattekloof and Cape Town International Airport showing better performance.

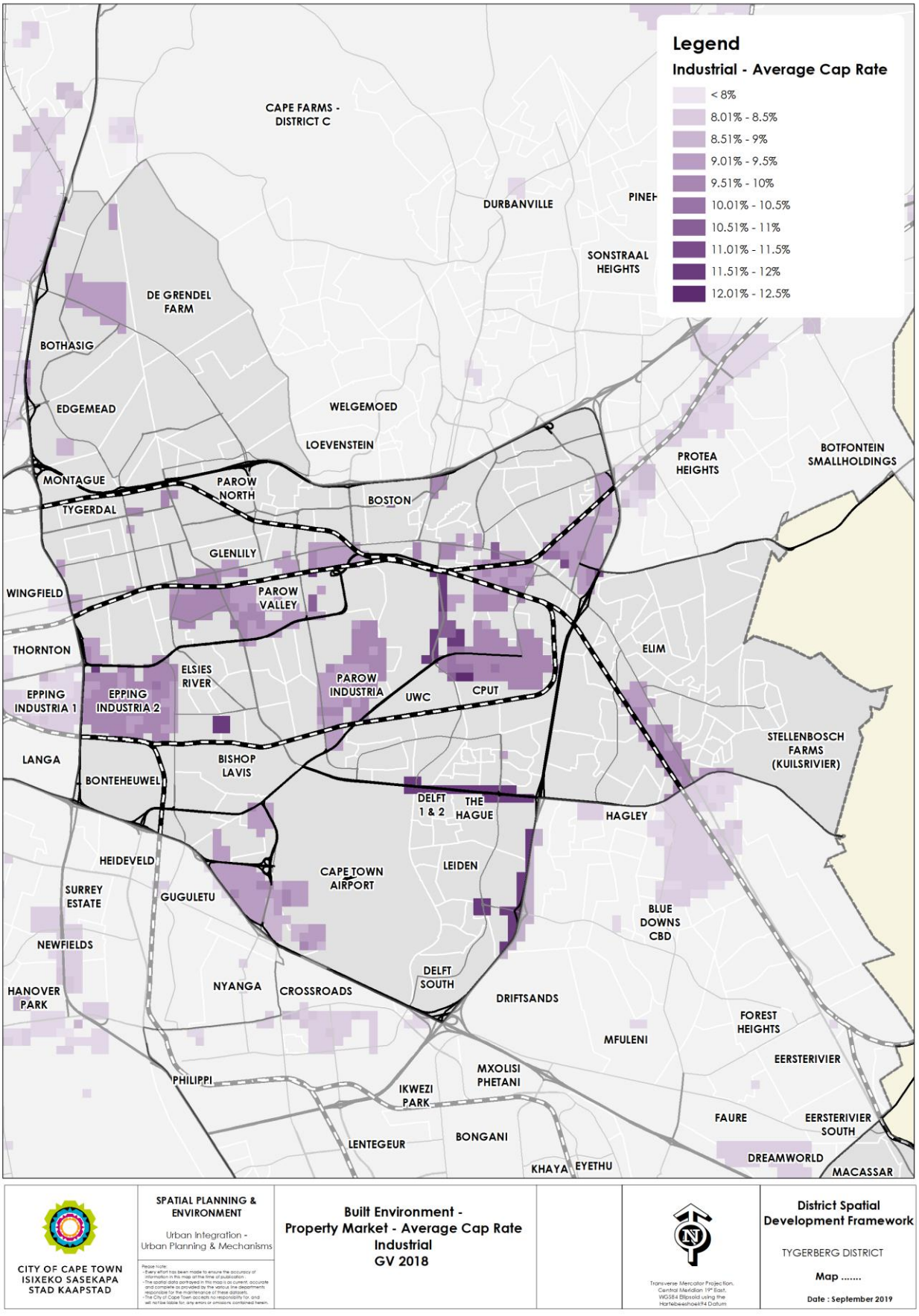


Figure 73: Average Cap Rates Per 4ha: Industrial Property Market

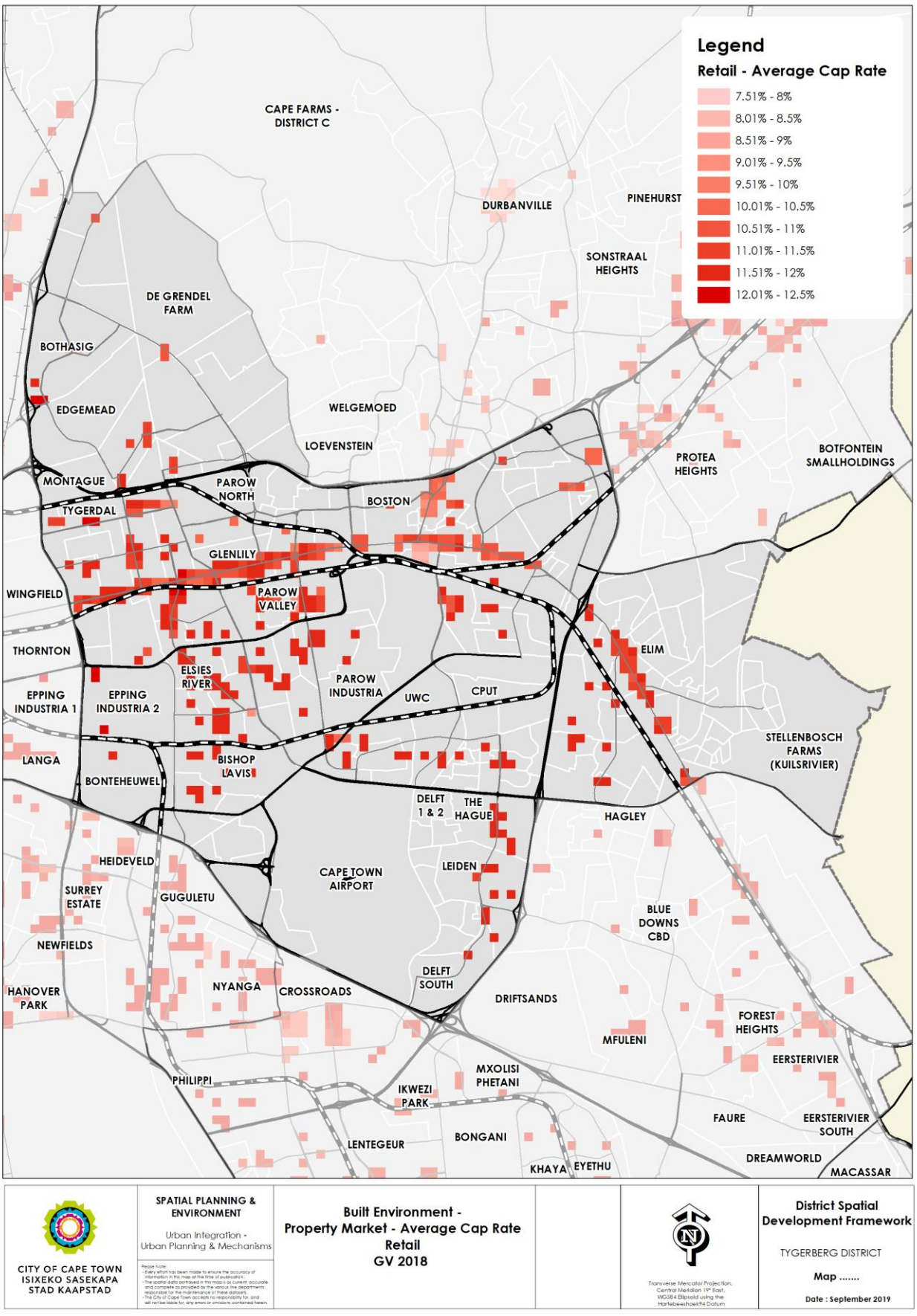


Figure 74: Average Cap Rates Per 4ha: Street Front Retail Property Market

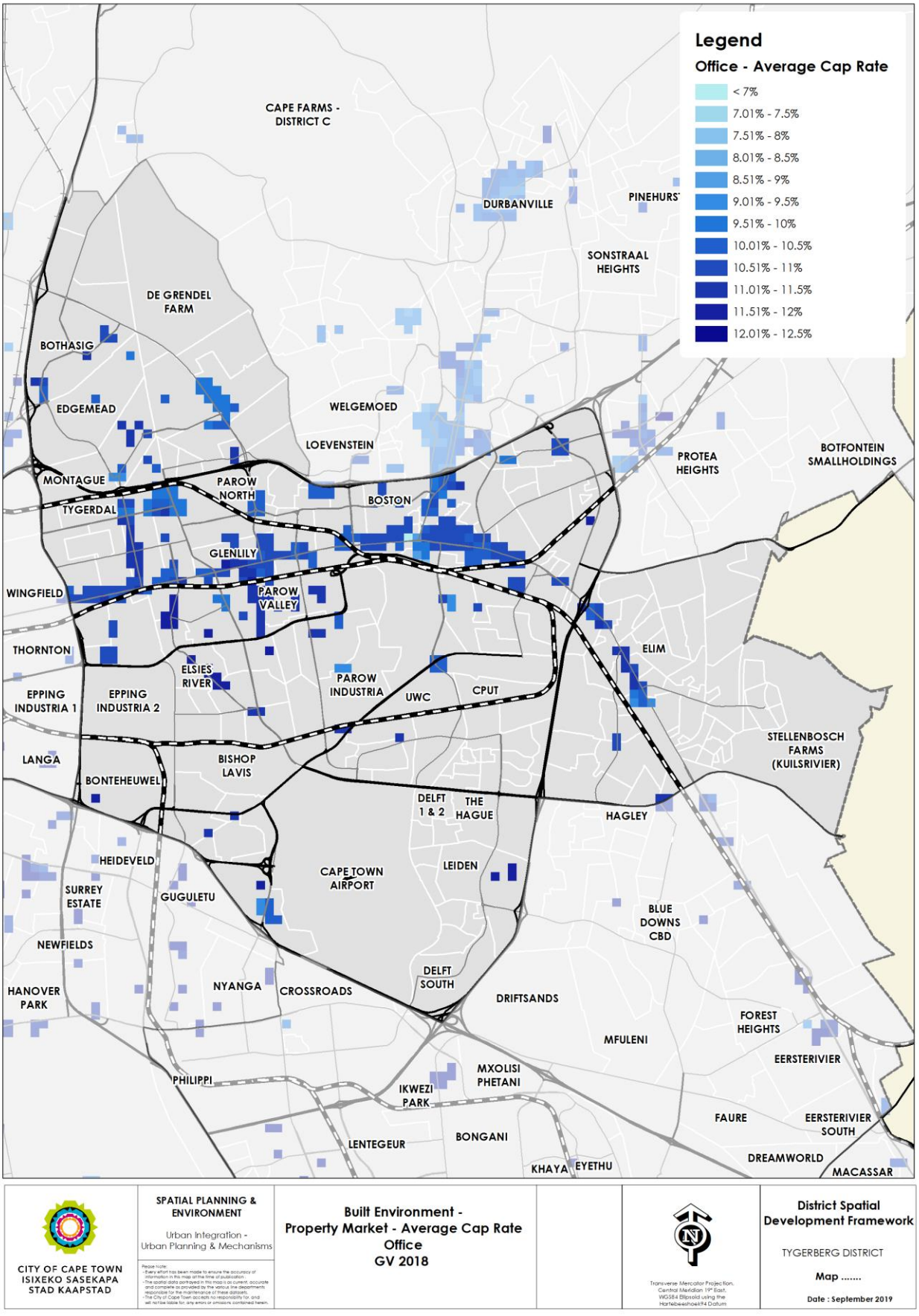


Figure 75: Average Cap Rates Per 4ha: Office Property Market

ii. Residential

a. Sales

Figure 76 shows suburbs where the most property sales have occurred between 2009 and mid-2018. Burgundy estate in the north of the District stands out as it's a new development fetching sales prices between R1.2 and R2.2 million (different typologies). Bonteheuwel has seen growth in the number of sales in the affordable housing market. It is also noted that the number of residential sales in Delft(Delft South and Leiden) seems to be on the higher side compared to other areas. It could be argued that the rise in sales numbers in Bonteheuwel and Delft could be due to properties previously owned by the City or constructed as part of the BNG housing programme have been transferred to private owners. In the established suburbs, Bothasig, Edgemead and Boston have seen a higher volume of sales with sales prices averaging between R2.3 and R2.7 million for single residential housing. Highest sales prices are achieved in the exclusive lifestyle estates closer to the agricultural areas near De Grendel (Baronetcy Estate) and Zevenwacht Estate reaching R9million for a single property in same cases. It must be noted that the data depicted in these figures excludes informal sales transactions which may be taking place in the areas of, for example Bishop Lavis and Delft where a number of backyard dwellings and informal dwellings may be transacted.

The area has a diverse property market offering more in the affordable middle income band than other Districts. Table 21 below depicts income bands likely to obtain end user financing and the amount they qualify for.

Table 21: Affordable Monthly Income Bands

Household Monthly Income	**Affordability** (assuming a bond on a 13% interest rate)
R22 000	**R560 000**.
R20 000	**R510 000**.
R18 000	**R460 000**

Figure 77 below depicts the Rand per m² of **[sales value (R)/size of land (m²)]** of land in Cape Town. This map indicates the concentration of properties with the highest sales value in the district. The Northern areas of the District and edges of rural areas show high land values. Much of the center of the District shows relatively affordable land less than R2000 per m².

b. Growth in Value

Figure 76 below depicts the City's growth in value per property over time, by calculating the percentage difference in value between the three City of Cape Town's municipal valuation terms (per property). All values were adjusted/deflated to 2016 Rand using the CPI (Consumer Price Index), to approximate real growth in value.

Most residential property values in the Tygerberg district grew in value dramatically over the time period between 60- 80%. Even higher growth in value was seen in the Edgemead and Bothasig areas. While generally lower around 20% -40% was seen in Bonteheuwel, Delft and the suburbs around Elsies River and Uitsig.

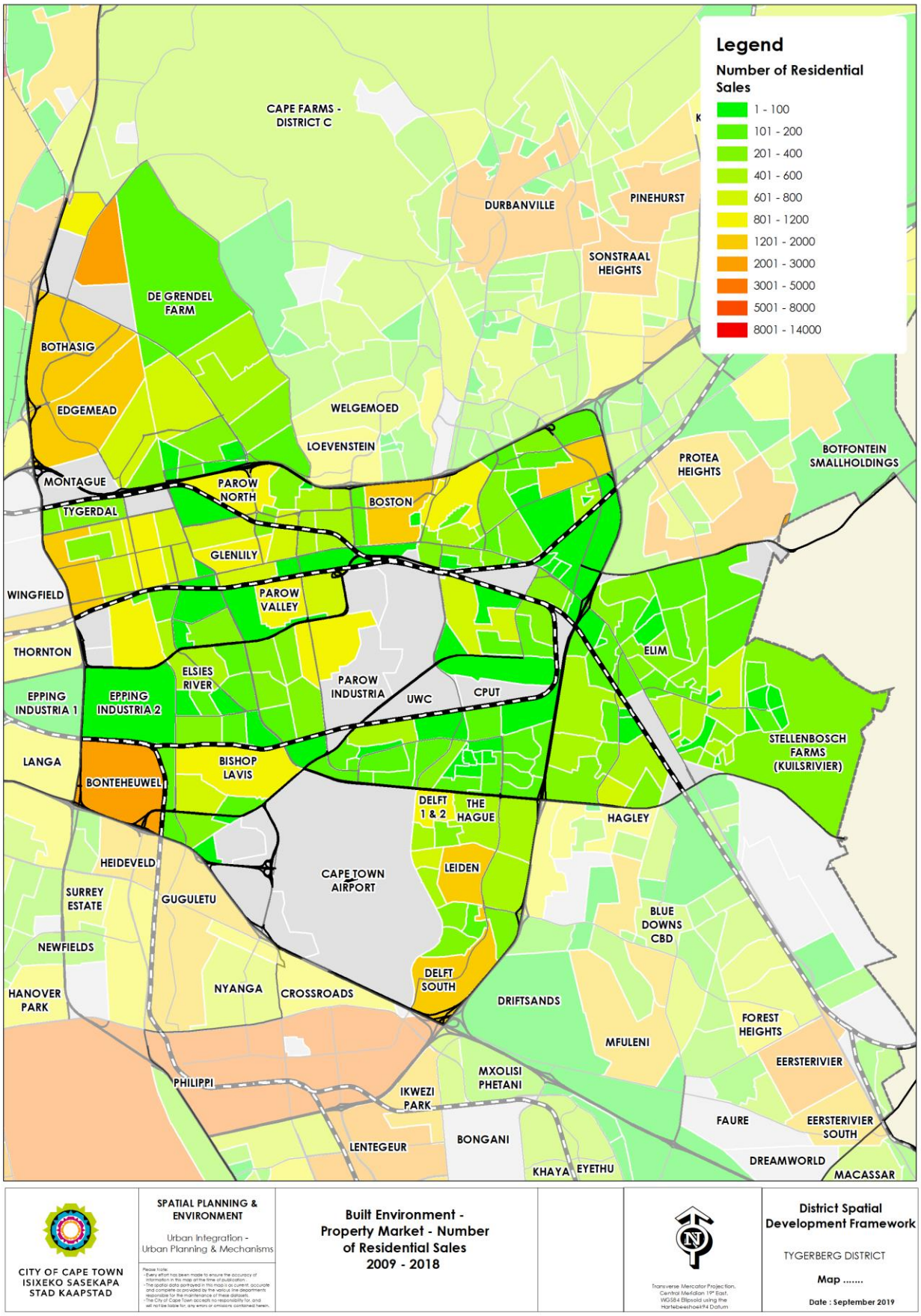


Figure 76: Number of Residential Sales per Suburb (2009-2018)

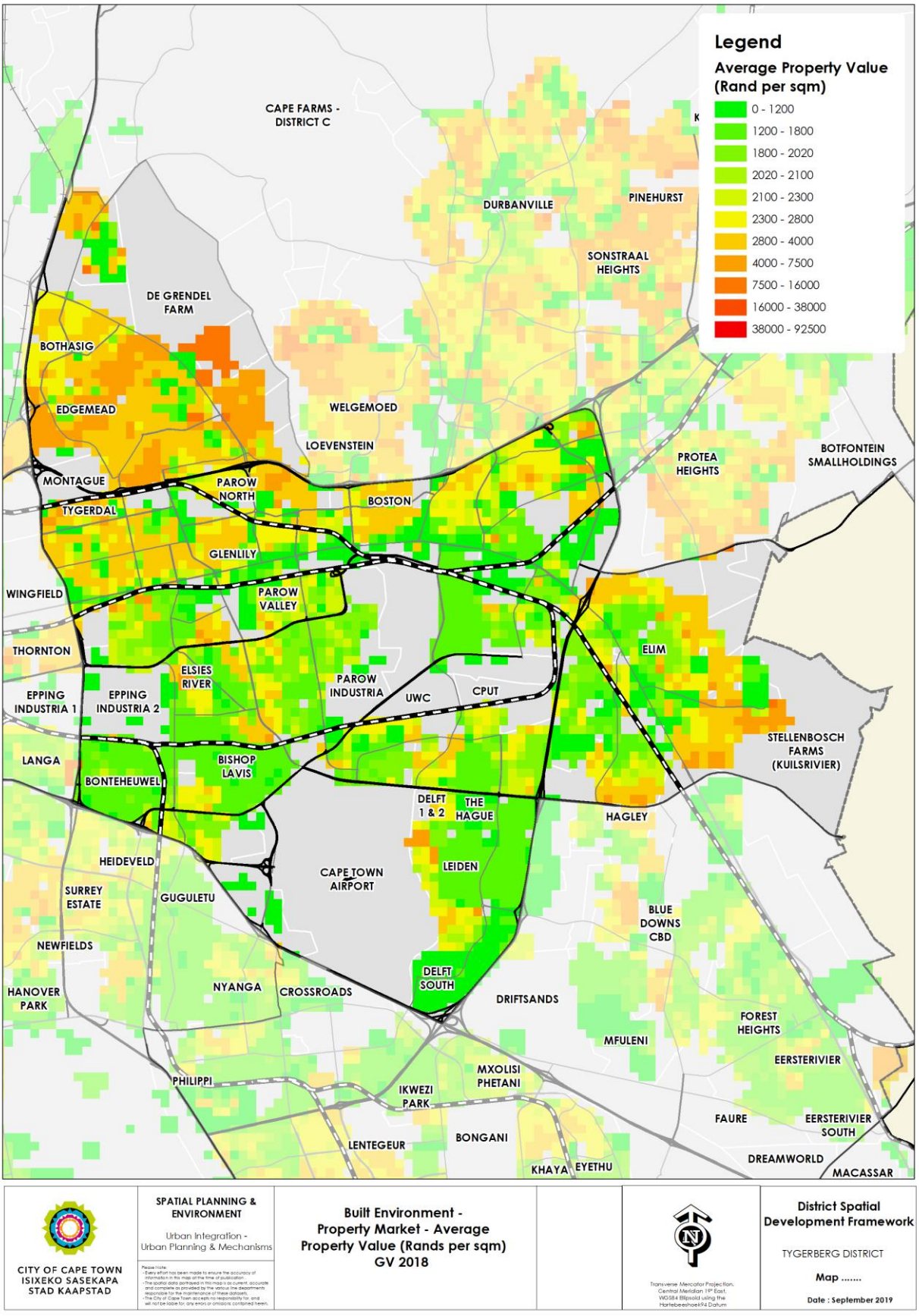


Figure 77: Value (R) per m²

9.6 KEY OPPORTUNITIES AND CONSTRAINTS

9.6.1 Opportunities:

The section that follows is a further discussion in order to assess the issues/ opportunities in the area.

As the Tygerberg district primarily falls within the reservation area being called the 'urban core', where intensification as well as diversification of land use are to be supported, a basic understanding of the economic energy in the district is required. In this regard, the content from the draft document: VRC: Integration Zone: Strategy and Investment Plan: Baseline Assessment (2014) has been utilized in the section below:

Firstly, it should be accepted that the district boundaries are merely administrative boundaries, and each district functions within a wider space economy.

The fact that identified 'Opportunity areas' in the district include the Sacks's Circle industrial area, Elsies River- and Beaconvale industrial areas, as well as the Bellville CBD area, which includes the Bellville PTI were identified, based on different directives such as property values, vacancy rates, etc, raises the question whether there is demand in the market to redevelop in these areas, or not. The area around Durban Road, between the N1 Freeway and Voortrekker Road is also included. The identification of these areas further raises questions regarding future development directives for these areas.

In broad terms, the following variables impacting on the growth and or decline of these areas should be understood:

- Almost one of 5 formal (note that 15% of overall employment in the city is informal in nature) jobs in the metropolitan area is located in the Voortrekker Road corridor, and almost 34% of the 183 000 jobs located here are attributable to the industrial sector. It can therefore be concluded that the local economy has a high level of reliance on industrial incomes.
- Another issue that needs to be answered is whether the principles of conventional urban regeneration with emphasis on promoting mixed use development instead of the segregation of land uses, should be promoted. In this regard, the focus of reducing commuter trips at a more micro- scale and creating a vibrant public environment, should also be considered.
- The Voortrekker Corridor is host to 25% of Cape Town's industrial and 11% of its commercial property base respectively.
- When assessing building development statistics (2010-2013) and focusing on employment- generating activities, it is clear that commercial development, especially office development happened in the nodes north of the corridor along the mobility corridor of the N1 freeway, i.e. Century City and Tyger Valley, whilst industrial development happened along the belt to the south of the corridor, i.e Airport Industria, Philippi Industria, Parow industrial area and LaBelle/ Cecil Morgan Grounds. The question is whether the lack of vacant land and greenfield development attributed to the non- investment, or if other problems, such as the lack of urban management, relating to maintenance and security also contributed.

- When the nature of the links between nodes within the corridor, and those externally to the corridor, be assessed, the conclusion is that the internal links are mutually reinforcing, whilst the outward links to peripheral nodes appear to be largely competitive. There is also a stark contrast when the performance of the nodes within the corridor is compared to those outside of the corridor, i.e. the performance outside the corridor was much higher than that inside the corridor, which showed a similar lower performance.
- The question arises whether there is positive potential, over time, for spill- over effects once push effects such as high rentals and congestion (for example) in the nodes along the high mobility routes, start to negatively affect consumers. The assumption is that this may not happen in the short- to medium term, as developers and other institutions, still have a variety of options to, for example, curb negative impacts such as congestion.
- When land values in the industrial nodes are assessed, it has transpired that the highest land values are in the nodes located to the west, i.e. Ndabeni, whereas Sack's Circle and Elsies River Industrial nodes are the cheapest. The suggestion is therefore that the land values here are depressed for locational reasons. It is further confirmed that the supply of vacant industrial land is not a significant determinant of land values or building development.
- Both office and street front retail rentals are significantly lower in the corridor, even when compared to more poorly located nodes such as Mitchell's Plain. This confirms a lack of demand for space in the area, which is confirmed by high levels of office vacancy in the Bellville area.
- When building completion trends (2005-2013) are analysed, it transpired that industrial developers have generally avoided industrial and mixed use areas abutting Voortrekker Road. New office development continues to be concentrated in nodes such as Tyger Valley and Century City. See graph below.
- The development of new retail space has flat lined, with the exception of Bellville, suggesting that Bellville is being repositioned away from office node and towards a more mixed use node including offices, retail, government services, public facilities amongst others. The proximity of tertiary education institutions has also seen an increase in student housing in the area. See map below.
- When building plan submission trends (only 2012-2013)/ demolition permit data (2005- 2012) is analysed, it seems as if industrial development interest has strengthened in Parow Industria, Epping & Sack's Circle, but not in Elsies River industrial area. Goodwood and Parow areas have shown a considerable increase in the redevelopment of buildings for commercial development. See map below.
- It can be argued that the Voortekker Road corridor enjoys a relatively favourable level of accessibility to surrounding areas, with the area only marginally affected by congestion.
- The question is however, what causes the lack of development/ investment in especially the industrial areas, such as Elsies River. It is stated in the draft documentation that: "There are mounting indications that this dramatic escalation in violent crime is having a grave impact on the study area's ability to retain higher-order economic activity." While this still holds true for the most part in Elsies River,

the recent initiation of the Elsies River/Beaconvale CID has had a positive effect on overall industrial value as evidenced by the cap rate reductions in the area.

- When the categories of land use in the corridor were analysed (2014), it was found that retail activities continue to be concentrated along Voortrekker Road, and that there is a notable presence of retail in nodes formally regarded as industrial, such as Elsies River industrial area, that include Beaconvale.

9.6.2 Constraints:

No large tracks of vacant land are available within the district for greenfield development. One could argue that underutilised properties such as Tygerberg and Stikland Hospitals should be noted, but properties such as this is not readily available for development in the shorter term. Therefore, the focus for the short – medium term will have to be on smaller pockets of vacant and available land for infill development and the intensification of existing uses through redevelopment of existing (under)developed properties.

E: RISKS

10 RISKS

Urban developments are subject to a certain amount of risk, for example construction faults, traffic accidents or exposure to hazardous substances. In the context of the District plan, the focus is on avoiding, mitigating or reducing the risk of disaster, by guiding development away from known hazards or in a way that the risk of being exposed to disasters[12] is lessened.

This chapter outlines the current and future risks to the Tygerberg District that have associated levels of impact **on the intensity and location of future urban development** in the area.

10.1 GUIDING POLICY ON RISK AND RISK MANAGEMENT:

The IDP focus area "The Safe City" reflects on the management of disasters and risks. The City emphasises integrated planning and governance in disaster risk management, and the need to build the City's resilience to risks (i.e. the ability to recover from disastrous events).

The City's Disaster Risk Management Plan, embedded in the IDP, considers the City's response to disaster impacts, relief, rehabilitation, reconstruction, and preparedness.

The City's Resilience Strategy (2019) notes that chronic stresses such as unemployment, congestion and poverty weaken the City's ability to cope with shocks. All communities of the city have a degree of vulnerability to risk, the Disaster Risk Management Plan identifies 70 hazards and risks that the City must respond to. Approximately 25 of these risks could occur across the City, for example drought and rainfall reduction, service disruptions, traffic accidents, the transportation of hazardous substances, terrorism or construction faults.

Stresses which increase vulnerability are disproportionately experienced by communities experiencing inadequate shelter, poverty and unemployment and especially the urban poor living in informal settlements. The servicing, disaster response and development of vulnerable areas and informal settlements is a priority across the City for building resilience.

Spatial planning must ensure that new developments both avoid and do not exacerbate risk and where historic urban development is exposed to risk and hazard, it is mitigated. Similarly, the direction of spatial planning under a high-resilience framework ensures that the built environment is developed to bring about low-carbon opportunities, and meaningfully mitigate against climate change and buffer against increasing costs of fossil fuels. Doing so in the immediate future reduces the cost of implementing climate adaptation measures in the long-term.

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[12] The definition of a **disaster** is: "a progressive or sudden, widespread or localised, natural phenomena or human-caused occurrence which –
(a) causes or threatens to cause -
(i) death, injury or disease;
(ii) damage to property, infrastructure or the environment; or
(iii) disruption of a community; and
(b) is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using only their own resources" (Disaster Management Act, 57 of 2002)

Sub-Strategy Appropriately Protect the Citizens of Cape Town from Risk Areas	
Policy Statement	What this Means/Requires
Policy 10 **Enable resource-efficient development**	The City can guide spatial development in a way that encourages the public and private sector to utilise sustainable practices and technologies that assist in reducing carbon emissions, reduce energy and water demand, promote public transport, non-motorised transport and support the recycling of water and waste materials.
Policy 10 **Direct urban growth away from risk areas**	Hazardous areas are either already determined through proclamations/ law or specialist studies, or will be determined as part of the EIA processes or pre-submission consultations processes, where appropriate.
Policy 22 **Discourage urban growth in areas at risk from natural hazards/coastal processes which are expected to be amplified by climate change impacts.**	Areas vulnerable to climate change and natural hazards and risks have broadly defined through specialist studies or will be determined by future specialist studies.

The Disaster Risk Management Plan for Cape Town evaluates known hazards in terms of the following[13]:

Measurement Criteria for each Hazard Assessed	**Criteria's Assessment Rating**	**Integration of factors to determine the Relative Priority**	**Hazards Relative Priority Rating**
Probability of Occurrence	Very Likely		
	Likely		
	Possible		
	Unlikely		
Maximum impact/ Severity & Consequences	Extreme		Very High Priority
	Moderate		High Priority
	Insignificant		Medium Priority
Vulnerability of Community and/or Environment and/or Economy	Very Vulnerable		Lower Priority
	Vulnerable		
	Small Vulnerability		
	Good		

[13] Further description of the methodology and ratings prescribed is contained in the City of Cape Town Disaster Risk Management Plan

Manageability/Coping Capacity by Responders to offset Hazards Impact and Vulnerabilities	Adequate	[redacted]	
	Basic		
	Poor		

10.2 RISKS IN THE TYGERBERG DISTRICT

Taking the aforementioned guiding policy into the account the following section identifies the types of risk and the level of exposure to risks at the district scale, **referencing those risks that impact on the permissible intensity and location of future urban development.** The hazard evaluation above is referenced where possible. In addition, the relevant principles that apply when considering the allocation of development rights and possible exceptions are identified.

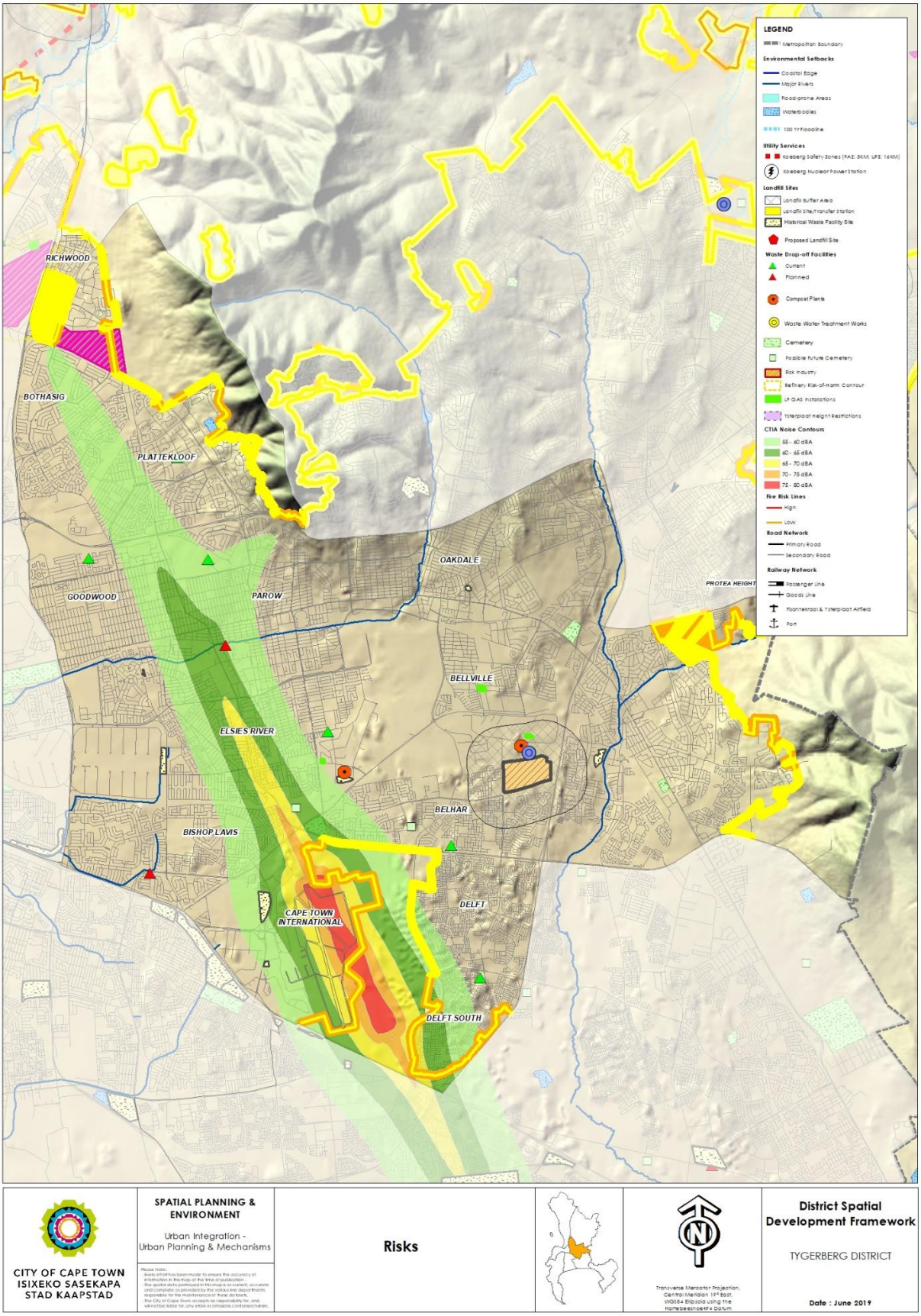

Figure 78: Integrated biophysical and built environment risks

10.2.1 Natural Risks

10.2.1.1 Wild Fire

Fire lines indicate the interface between the wild lands vegetation and urban areas, high risk indicates where there are larger volumes of combustible vegetation. The areas around the urban edge are at risk, with longer response times for emergency services exacerbating this risk.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
Very Likely	Moderate	Vulnerable	Adequate	High	Consideration should be given to reducing the risk and to the operational needs of the City's fire services. In cases where development is permitted, conditions should ensure access for fire fighting vehicles and that building materials and landscaping do not exacerbate risk.

10.2.1.2 Flood Risk

The presence of waterbodies 1:100 year flood lines, relative elevation and indicative sea level rise modelling reveal the areas with higher probability for flood inundation occur.

The District's settlements are for the most part relatively higher in elevation and therefore will experience this risk to a lesser degree, with the exception of developed areas on the banks of major rivers.

The relative elevation map reveals areas where water will flow faster with potential to inundate and create risk either annually or perenially.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
Likely	Moderate	Very Vulnerable	Good	High	Careful management of development to avoid developing in high flood risk areas, to protect the environmental integrity of aquatic resources and to ensure that permitted development enhances the aesthetics and character of the adjacent watercourses / wetlands.

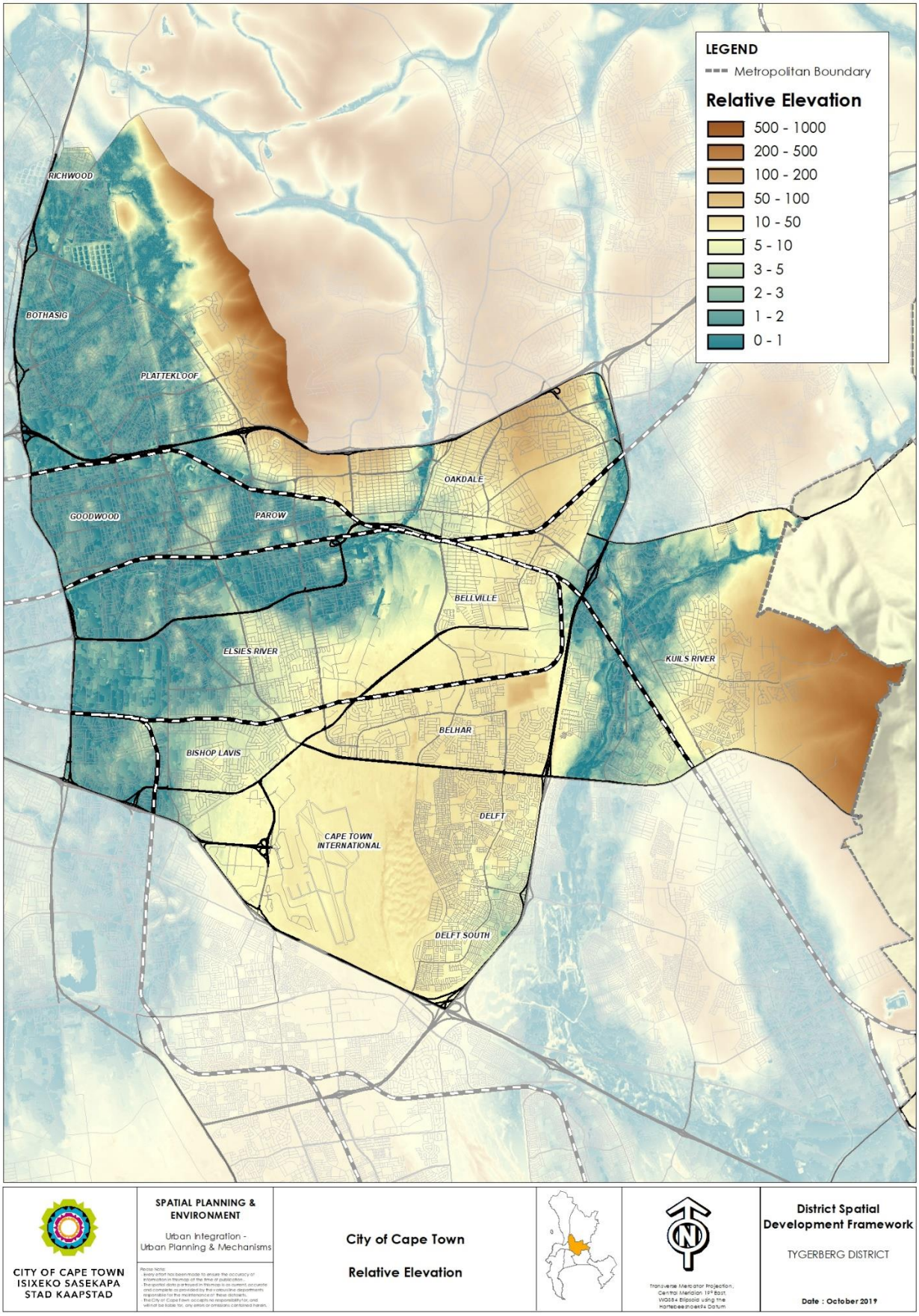

Figure 79: Relative elevations

10.2.2 Built Environment Risks

10.2.2.1 Cape Town International Airport Noise Contours

Airport noise presents a hazard in this District, in which a number of settlements are located in the flight path where noise from planes exceeds 55db. The intensification of development must be avoided and measures taken to protect the surrounding population from this risk.

10.2.2.2 Cemeteries, solid waste disposal sites and waste water treatment works:

Exclusion buffers exist around land fill and waste disposal sites to protect surrounding populations from hazards and nuisances. Historic sites also exclude certain types of development for a period of time determined in the waste management regulations. Smaller sites and drop off facilities present fewer nuisances and hazards but may have an impact on neighbouring property uses. Cemeteries also act as development moderators.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
n/a	n/a	n/a	n/a	n/a	No inappropriate development in waste sites or buffer areas.

10.2.2.3 Risk Industry

Oil storage facilities near Richmond present a risk of accidental release of hazardous materials or explosion. The assessment of probability below is based on the chance of release of hazardous material across the entire City and not just this facility

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
Likely	Moderate	Vulnerable	Adequate	High	Intensity of urban development to be moderated according to evacuation needs and emergency response capacity.

10.2.2.4 Infrastructure Availability

The availability of infrastructure influences the type of development that can occur, higher infrastructure capacity can include a higher intensity of land use. Infratructure needs to accommodate the growth and demand that will allow cost recovery and a more efficient urban form.

Aging and inadequate infrastructure is a risk throughout the District. See map "Slight and Severe Lack of Capacity."

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
n/a	n/a	n/a	n/a	n/a	Development shouldn't occur where bulk infrastructure services are stressed. Infrastructure should build in redundancy in areas where development in prioritised.

10.2.2.5 Structural Fire Informal Settlements:

Informal settlements and backyard dwellings are often built at extremely high densities and are unable to meet building standards for fire risk reduction. All informal settlements. The reasons for informal settlement fires and methods for reducing risk are complex and site specific requiring an integrated response. From a spatial planning perspective, community planning initiatives such as reblocking and maintenance access routes for emergency services are interventions that may reduce risk.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
Very Likely	Extreme	Very Vulnerable	Adequate	Very High	Access for fire services needs to be maintained Working with informal settlement communities to manage risks and adapt buildings.

10.2.2.6 Structural Fire Formal Settlements:

Fire in formal settlements is a risk across the district, particularly when exposed to high temperatures and high winds. The prevalence of older buildings in the District and more vegetated suburbs also contributes to this risk. In general however a higher degree of building standard compliance and clearer access routes for emergency mean that there is less vulnerability than informal settlements experience.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
Very Likely	Extreme	Vulnerable	Adequate	Very High	Maintaining access for fire services and maintenance of water access points. Compliance with buildings standards and urban design to reduce fire risk. Encouraging maintenance of trees and vegetation in private properties.

10.2.2.7 Heat and heat islands

All areas of the city are at risk from increased heat due to climate change, including increased heat waves (defined as 3 or more days in a row of temperatures higher than 32°C) and high heat days (defined as a temperature of higher than 35°C). Dense urban areas with low levels of green vegetation are most at risk of heat impacts and can be several degrees hotter than those areas not subject to the heat island effect.

Fire risk is anticipated to increase over time due to increased temperatures, increased drying, and higher wind speeds caused by climate change.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
Likely	Moderate	Vulnerable	Adequate	Lower	Careful management of development to ensure the equitable distribution of green space, reduce the loss of exiting green vegetation, and ensure that areas targeted for densification include sufficient green space and public spaces and facilities that are designed for cooling.

10.2.2.8 Unmanaged Land Occupation/Unregulated Development

Vacant and unmanaged land is seen as an opportunity for many households with inadequate housing and structures are illegally. Occupation of city owned and private land threatens the availability of land reserved for other uses such as future human settlements or social service provision they may also place households at risk of flood, fire or other risks depending on the location. Unregulated and dense development in informal settlements can result in building forms and conditions that are vulnerable to risks of heat or fire and are not able to access infrastructure and services.

Rating of Probability	Rating of Maximum Impact	Vulnerability Rating	Coping Capacity	DRM Priority Rating	Development Principles and Exceptions
n/a	n/a	n/a	n/a	n/a	Refer to human settlements policy and means to address affordable housing demand across the City. Aim for effective land use management and enforcement across the City.

10.2.3 Climate Change Hazard, Vulnerabilities, and Risks - Overview

A climate change hazard, vulnerability, and risk study has been conducted for the City which identified six key climate hazards which the city must adapt to. These hazards are:

- Decrease in rainfall
- Change in seasonality of rainfall
- Increased mean, maximum, and minimum temperatures
- Increased number of heat waves and very hot days
- Increased wind strength
- Sea-level rise increased and coastal erosion

It is important to note that many of the climate impacts that Cape Town currently experiences and will experience into the future are due to high levels of vulnerability and low levels of resilience, rather than due to particularly extreme climate hazards or events.

10.2.3.1 Vulnerability and Impact

Vulnerability is due to several factors, including physical and geographical vulnerability (i.e. proximity to high risk areas such as the coast or flood-prone areas), social vulnerability (i.e. low levels of resilience and adaptive capacity), the legacy of poor planning decisions (i.e. infrastructure or services located in high risk areas), and the adaptive capacity of local (and other spheres of) government (i.e. the ability of government to take action to address risks).

These climate hazards are anticipated to have a range of negative impacts on the city, including but not limited to the following impacts:

- Drought and water scarcity due to decreased rainfall
- Increased wildfire and urban fire risk due to increased heat and wind
- Heat stress and other related health impacts including mental health impacts
- Loss of biodiversity due to climatic changes that these systems are not adapted to
- Coastal erosion and coastal storm damage due to sea level rise and a change in coastal system dynamics
- Flooding, due to high vulnerability and poor drainage, even within a context of lower overall rainfall
- Damage to City infrastructure due to flooding, sea level rise, heat, wind, or drought.
- Food insecurity due to damage to agriculture, especially in key food growing regions outside of Cape Town which are projected to experience more severe climatic changes
- City-scale economic losses due to major events such as droughts
- Loss of livelihoods associated with natural resources such as flower selling or urban agriculture
- Increased rural urban migration due to impacts on rural livelihoods, leading to increased informality and backlogs in basic service provision
- Increased resource costs due to scarcity e.g. water and food
- Potential for civil unrest or protest action

A climate hazard, vulnerability, and risk study has been completed which has mapped climate hazards, vulnerability/resilience, and overall climate risk (hazard+vulnerability = risk). Hazard and risk mapping has been done for the baseline period (1960 – 1991), the mid-future (2021-2050) and the far future (2070-2099), while vulnerability/resilience mapping was absed on current data. The climate projections are based on a low climate-mitigation scenario and are in line with the current global trend in which carbon emissions are increasing over time. For the purposes of the district planning process, the mid-future assessment is presented below.

Figure 80 shows a consolidated map of all climate hazards (harms) for the mid-future period, including rainfall changes, temperature changes, heat islands, flood risk, coastal inundation risk, and wind speed change. In mountainous areas, and other naturally vegetated areas risk pertains largely to increased fire risk. Heat island effects are seen in dense urban areas while flood risks are seen in low lying areas around water bodies.

Figure 81 shows a composite score for resilience in the present day based on a weighted analysis of the social, economic, and environmental factors listed in the table below:

Indicator	**Description**	**Weighting**
Crime Rate	Total number of crimes by police precinct area	5
Electricity for Lighting	Percentage of households with acces to electricity for lighting	4
Flushing Toilets	Percentage of households with flush toilets (main sewerage connection and septic tanks)	4
Median Household Income	Median household income	5
Range of household income within 3km	Measure of income disparity in different neighbourhoods: maximum minus minimum household income within a 3km radius	4
Higher Education	Percentage of people over the age of 20 with higher education	4
Employment opportunities within 1km	Measure of employment opportunies , ranked zoning areas by potential formal employment areas assessed in a 1km radius	5
Employment variety within 1 km	Measure of job diversity opportunties: distance from multiple zoning areas related to employment opportunities assessed within a 1km radius	5
Refuse collection	Percentage of households without municipal refuse collection services	3
Tap Water	Percentage of households without access to tap water	5
Toilet Facilities	Percentage of households without access to toilet facilities	5
Population Density	Number of people living in the area relative to the size of the area	4
Tap Water Inside Houses	Percentage of Households with tap water inside their house	4
Travel Time to Hospitals	Estimated time to travel to the nearest hospital	3

Travel Time to Police Stations	Estimated time to travel to the nearest police station	3
Travel Time to nearest Spring	Estimated time to travel to the nearest spring	1
Travel Time to CBD	Estimated time to travel to the CBD	5
Employment Rate	Percentage of people unemployed in the formal sector	4
Weekly Solid Waste Collection	Percentage of households with weekly solid waste collection services	4
Jobs: Population Density	Measure of job opportunities relative to population densities	5

It should be noted that resilience can be seen as the corollary to vulnerability, and therefore areas of high resilience will have relatively low vulnerability, and vice versa.

Figure 82 shows an assessment of risk relative to resilience, based on figures 80 and 81; in this figure areas with high exposure to harms and low resilience will have the highest risk rating while those with low exposure to harms and high resilience will have the lowest risk rating.

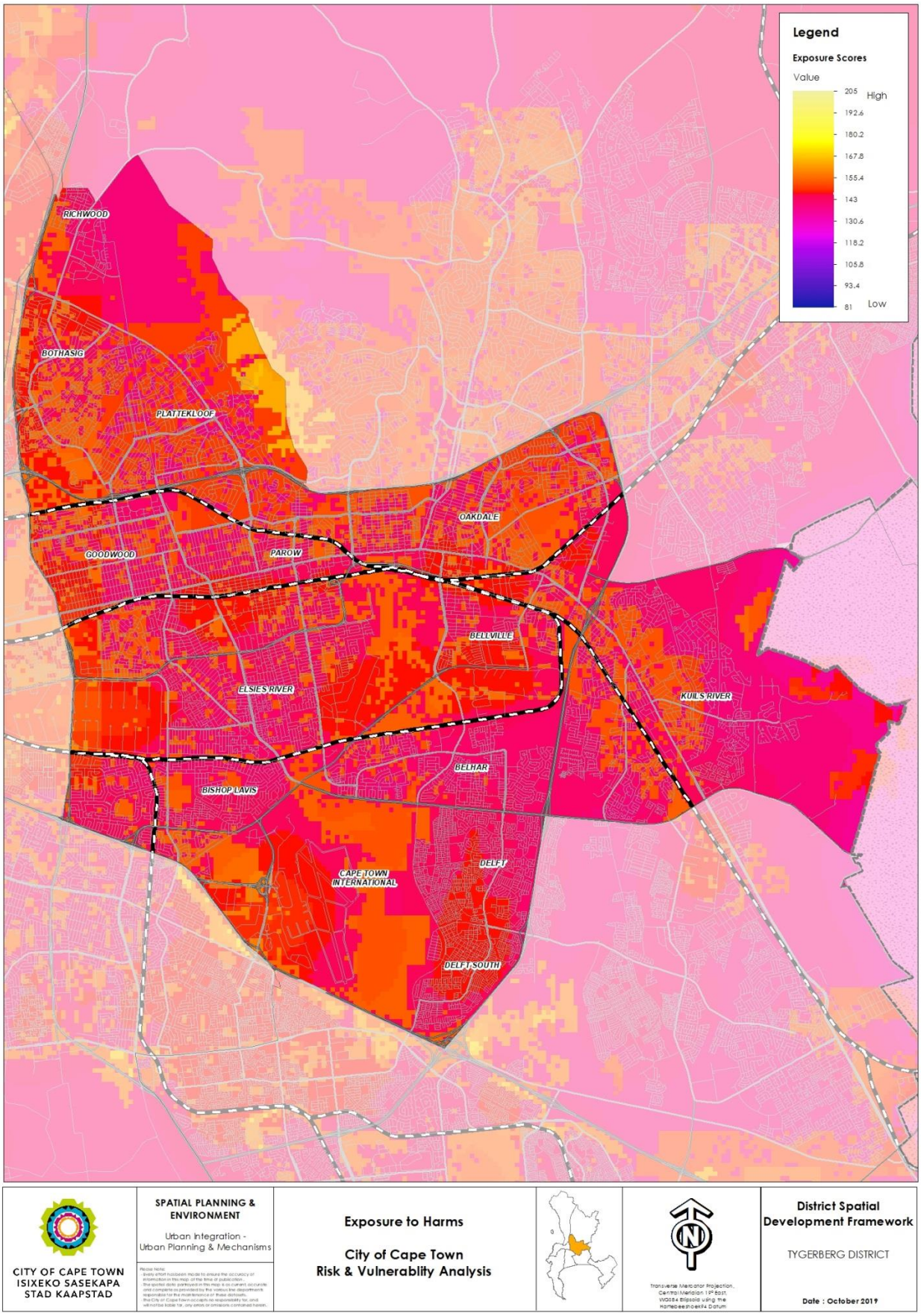

Figure 80: Exposure to climate hazards

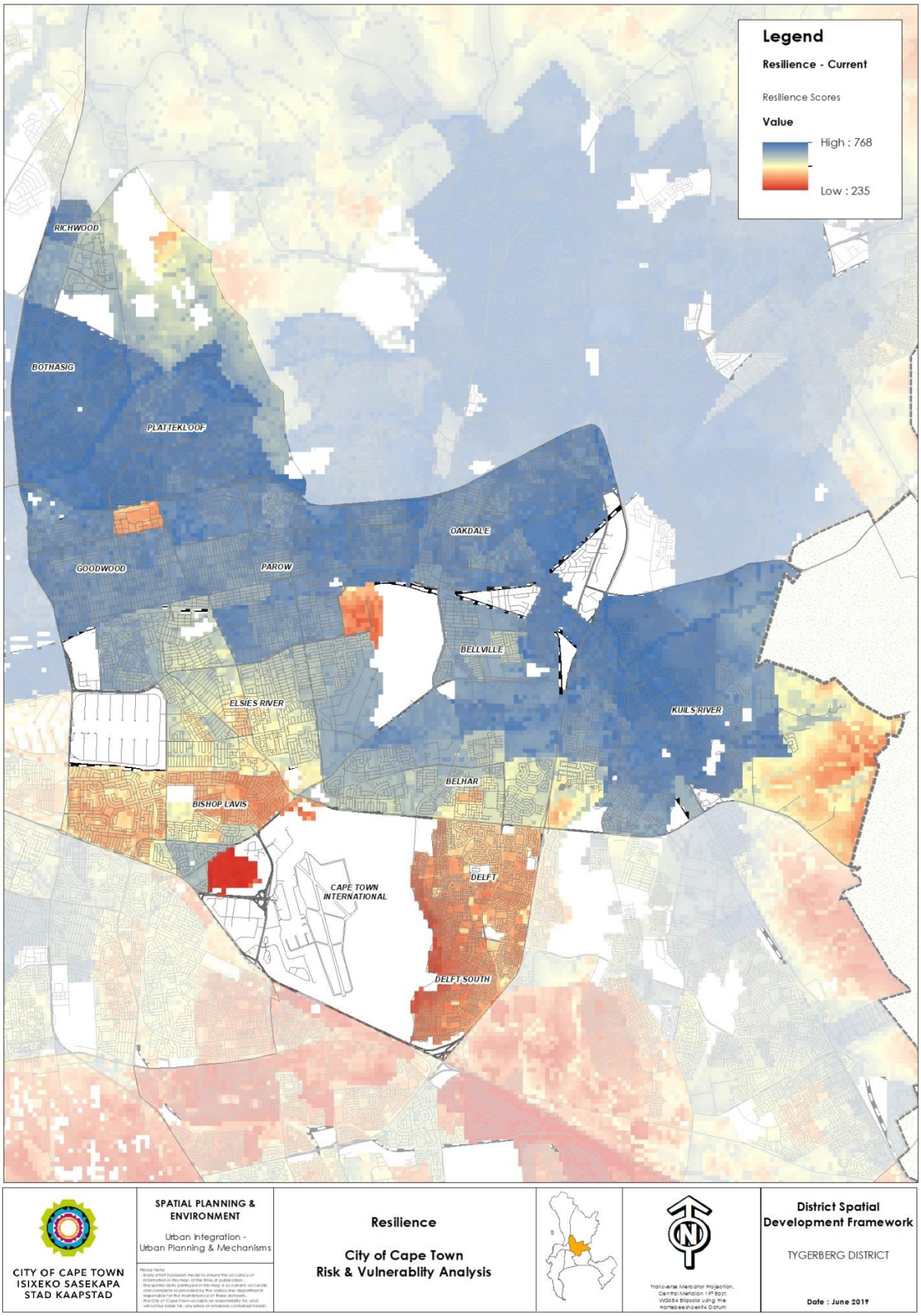

Figure 81: Levels of resilience in relation to climate hazards

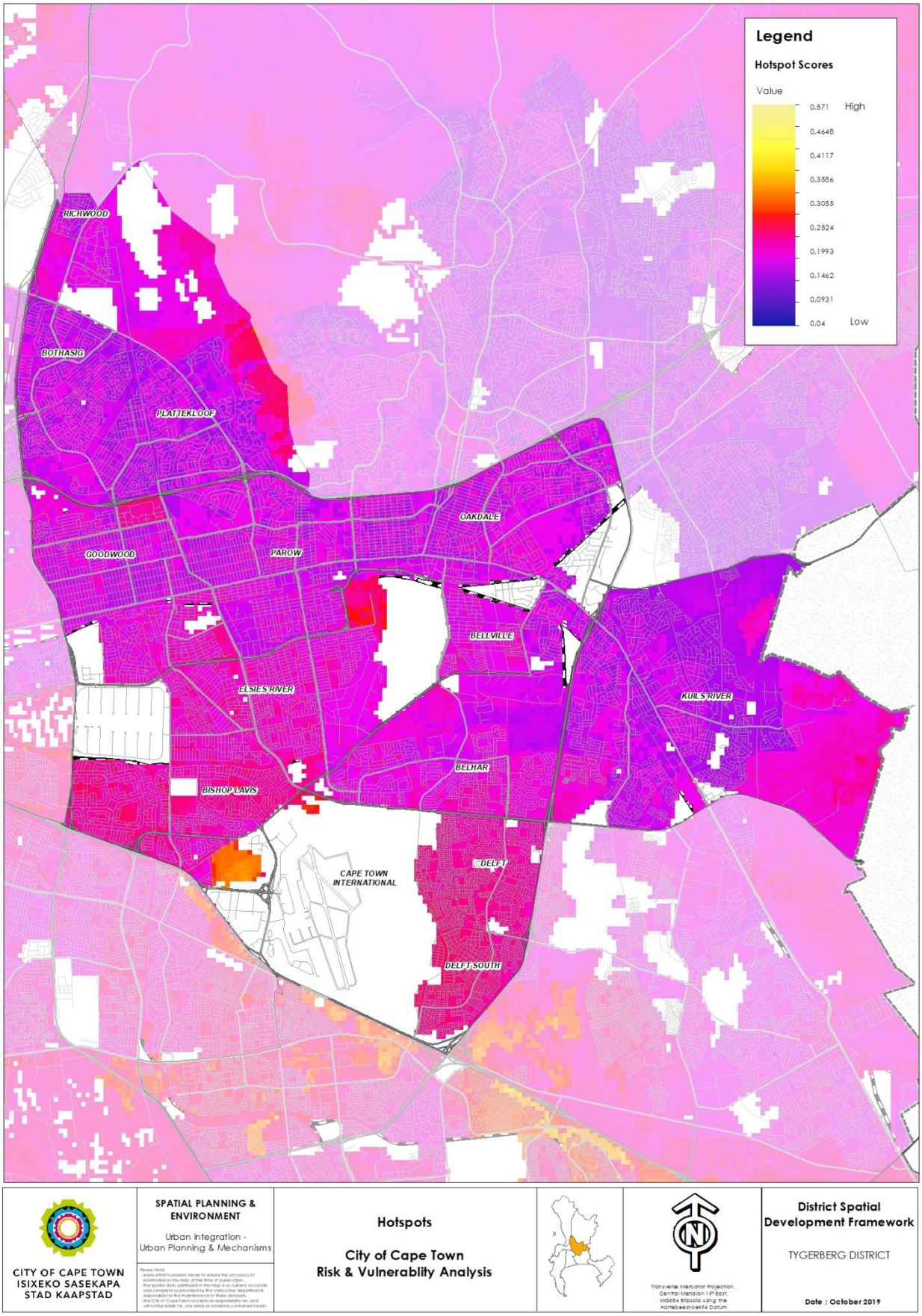

Figure 82: Climate risk hotspots

10.2.3.2 Implications:

Vulnerable areas and risk hotspots indicate areas that will need to be prioritised for resilience building, public sector interventions and support. Most areas in the District show either higher resilience or less exposure than other parts of the City, and are resourced to cope with threats. The Southern parts of the District have greater vulnerability, including the areas of Delft, Belhar and Bishop Lavis.

10.3 KEY OPPORTUNITIES AND CONSTRAINTS

The following table identifies opportune **(encouraged)** and constrained **(discouraged)** areas for development in the Tygerberg District, informed by the aforementioned risk assessment.

Risk	**DRM Priority Rating**	**Impact Radius**	**Discouraged Types of Development**	**Encouraged Types of Development**
waste disposal sites	n/a	800m	Residential Development within buffer	Non-Residential development; Circular economy related industry and commerce
Cemetery	n/a			Open space uses
Flood Risk, Storm Surge exposure	High	Informed by 1:100 year flood lines	Intensification of urban development	Green infrastructure programmes to defend nearby infrastructure, non-motorised transport Water Sensitive Urban Design Open space recreation
Wild Fire	High	Fire lines	Development outside the range of existing service response times.	Fire Breaks Development that incorporates fire protection measures. Erosion prevention in aftermath of fires.
Structural Fire	High	Entire City but higher in informal settlements	Building materials and built forms that allow the spread of fire.	n/a applies to developed areas
Heat wave	Lower	Entire City	Planning built areas with no green spaces, shade cover or tree cover.	Appropriate urban and landscape design mechanisms for cooling. Access to cool social facilities during heat waves.