



Annexure G(viii)

Herpetofaunal Study



GALAGO ENVIRONMENTAL



Fauna and Flora Specialists

PO Box 886

Irene, 0062

Tel: 012-345 4891

Fax: 086 675 6136

Email: Vanessam@lantic.net

Herpetofaunal Habitat Assessment

of

**PORTIONS 15 & 113 OF THE FARM
DOORNKLOOF 391JR (CROSS WISE)**

July 2012

Report author: **Mr. W.D. Haacke** (Pri. Sci. Nat: M.Sc)

TABLE OF CONTENTS

1.	INTRODUCTION	2
2.	OBJECTIVES OF THE HABITAT STUDY	3
3.	SCOPE OF STUDY	3
4.	STUDY AREA	3
5.	METHOD	5
6.	RESULTS	8
7.	FINDINGS AND POTENTIAL IMPLICATIONS	10
8.	LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE	10
9.	RECOMMENDED MITIGATION MEASURES	10
10.	CONCLUSION	10
11.	LITERATURE SOURCES	11

FIGURES:

Figure 1:	Locality map of the study area	4
Figure 2:	View westwards from near the southern border of Site A	5
Figure 3:	View of the Olifantspruit along the western edge of Site A	5
Figure 4:	View southwards underneath power lines across Site C	6
Figure 5:	View southwards across the eastern section of Site B	6
Figure 6:	Herpetofaunal sensitivity map	11

TABLES:

TABLE 1:	THE REPTILES AND AMPHIBIANS THAT COULD OCCUR ON THE SITE	9
----------	--	---

1. INTRODUCTION

Galago Environmental CC was appointed to undertake a reptile and amphibian habitat survey for the study site known as Cross Wise on Portion 15 and 113 of the farm Doornkloof 391 JR (elsewhere referred to as the study site), scheduled for residential development.

The objective was to determine which species might still occur on the site. Special attention had to be given to the habitat requirements of all the Red Data species which may occur in the area. This survey focuses on the current status of threatened herpetofaunal species occurring, or which are likely to occur, on the proposed development site and a description of the available and sensitive habitats on the site.

2. OBJECTIVES OF THE HABITAT STUDY

- To assess the current status of the habitat component and current general conservation status of the property;
- To provide lists of reptiles and amphibians which occur or might occur, and to identify species of conservation importance;
- To highlight potential impacts of the development on the herpetofauna of the study site; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

3. SCOPE OF STUDY

This report:

- Is a reptile and amphibian survey based on sightings and literature, with comments on preferred habitats;
- Comments on ecologically sensitive areas;
- Evaluates the conservation importance and significance of the site with special emphasis on the current status of resident threatened species;
- Offers recommendations to reduce or minimise impacts, should the proposed development be approved.

4. STUDY AREA

The study site consists of three blocks in the quarter degree grid cells 2528CC and 2528 CD, identified as A (35°53'42.25"S, 28°13'48.98"E), B (25°54'59.01" S, 28°14'47.39" E) and C (25°54'41.03" S, 28°13'55.72" E), which cover an area of 461 ha of Carltonville Dolomite Grassland (Mucina et al. 2006) east of the railway line, the M18 and the Olifantspruit, south of 23rd Street West, the southern border of the Farm Doornkloof 391 JR and to the west of the M57 road.

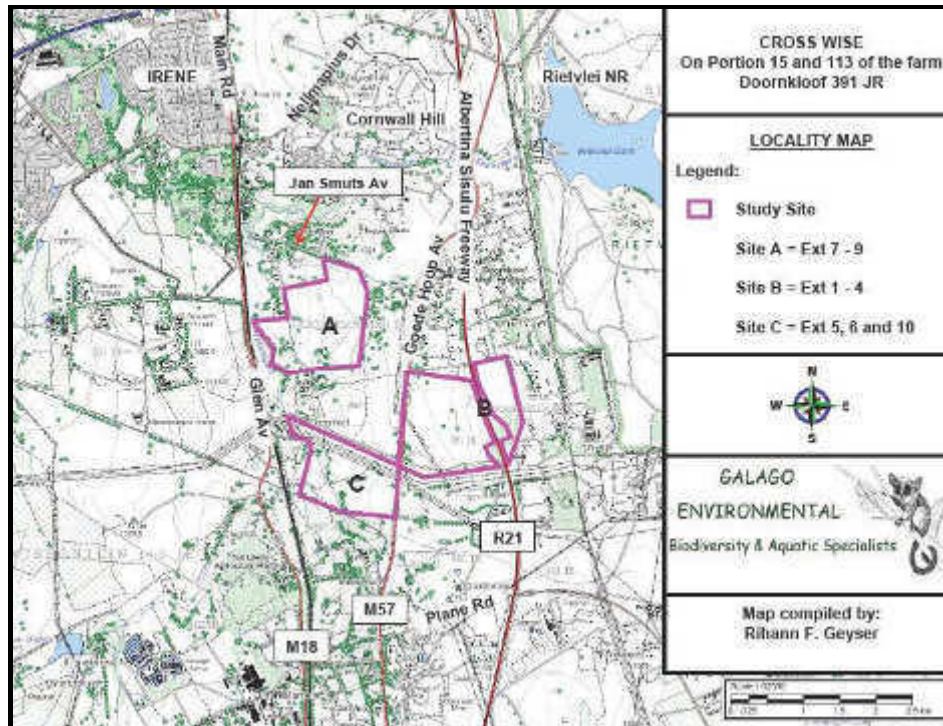


Figure 1: Locality map of the study area

The substrate of these sites consists of a mixture of quartzite, dolomite and chert, overlaid in parts by stony to rocky, clayey to sandy soil. The formation is prone to form sinkholes and open sinkholes were observed between Blocks A and C

The three sections of the study site have a certain similarity, as all are situated along a slope with a rocky crest. They are basically covered by grassveld with scattered gumtrees along the upper reaches. Site A (Figure 2) and a tip of Site C extend downhill as far as the Olifantspruit in the vicinity of which a riverine thicket of *Searsia pyroides*, *Acacia caffra*, *A. karroo*, *Celtis africana* as well as gumtrees and Wattle exists. The river is very polluted with debris and apparently soap suds (Figure 3). Site C is a fairly open piece of grassveld along a set of power lines running from west to east towards the Apollo exchange (Figure 4). Site B lies higher up on the ridge, east of the M57, extending as far as the R21 and continuing east of that highway to the edge of Sterkfontein Avenue (Figure 5).



Figure 2: View westwards from near the southern border of Site A across the Olifantspruit and its riverine woodland.



Figure 3: View of the Olifantspruit along the western edge of Site A, seriously contaminated with rubbish and soap suds.



Figure 4: View southwards underneath power lines across Site C (25°54'43.9" S, showing grassveld with *Acacia karroo*, Black Wattle and Gumtrees in the background.



Figure 5: View southwards across the eastern section of Site B parallel to the R21 highway, showing grassveld with an eastern fringe of Black Wattle.

5. METHOD

A site visit was conducted on 17 December 2011 in the company of two other specialists of the Galago Environmental team. During the visit the habitat types of the study site were observed and recorded in order to compile a possible species list of herpetofauna which might be associated with them. This was done with due regard to the known distribution of Southern African herpetofauna.

The 500 meters of adjoining properties were scanned for important faunal habitats.

5.1.1 Field Surveys

During the site visit it was endeavoured to identify reptiles and amphibians visually during random transect walks. Possible retreats (stumps or rocks) were inspected for any inhabitants. Amphibians may be identified by their calls but none were heard.

The site was approached via the M57. When reaching the overland power lines the westward track was followed past the cement pipe factory and the shooting range and an initial stop was made near the southern border of Site A (25°54'19" S, 28°14'01.7" E) (Figure 1) from where the area was inspected on foot as far as the Olifantspruit. The group reunited further north next to the corner of the Doornkloof suburb (25°53' 42" S, 28°13' 49"E), then turned back southwards as far as the track which runs parallel to the power lines. A local foot inspection of Site C was undertaken here (25°54'43.9" S, 28°14'10.5" E) (Figure 3). After viewing the main part of Site B while driving past it a further stop was made on the northern edge of the section east of the R21 (25°54'15.4" S, 28°15'32.0 E) (Figure 4) for a last on-foot inspection.

5.1.2 Desktop Surveys

As the majority of reptiles and amphibians are secretive, nocturnal and/or poikilothermic or seasonal, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of these species based on authoritative tomes, scientific literature, field guides, atlases and databases. This can be done irrespective of season.

The probability of occurrences of herpetofaunal species was based on their respective geographical distributional ranges and the suitability of on-site habitat. In other words, *high* probability would be applicable to a species with a distributional range overlying the study site as well as the presence of prime habitat occurring on the study site. Another consideration for inclusion in this category is the inclination of a species to be common, i.e. normally occurring at high population densities.

Medium probability pertains to a herpetofaunal species with its distributional range peripherally overlapping the study site, or required habitat on the site being sub-optimal. The size of the site as it relates to its likelihood to sustain a viable breeding population, as well as its geographical isolation is also taken into consideration. Species categorised as *medium* normally do not occur at high population numbers, but cannot be deemed as rare. A *low* probability of occurrence will mean that the species' distributional range is peripheral to the study site and habitat is sub-optimal. Furthermore, some herpetofauna categorised as *low* are generally deemed rare.

Based on the impressions gathered during this visit and records in the Transvaal Museum, the documentation of the herpetofauna of the then Transvaal by Dr N. H. G. Jacobsen (Unpublished Ph.D. thesis, University of Pretoria, 1989) and his internal report for the Gauteng Province (1995), the "Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland" (Minter, et al, 2004) and 'Virtual Museum' records (2011), the following list of species which may occur on this site was compiled. The vegetation type was analysed according to the standard handbook by Mucina and Rutherford (eds) (2006).

5.1.3 Specific Requirements

During the visit the site was surveyed and assessed for the potential occurrence of Red Data species such as:

- Giant Bullfrogs (*Pyxicephalus adspersus*). This species requires shallow temporary pools which last at least three weeks for the froglets to develop legs and absorb the tails in order to be able to disperse and burrow into the surrounding soil. The area in the bottom of the drainage valley next to the Olifantspruit appears suitable (2528CC), but in general the substrate of the area consists of dolomite which is overlaid with a thin layer of soil, which is not suitable for burrowing. It is thus assumed that this frog only occurs in very low numbers.
- Striped Harlequin Snake (*Homoroselaps dorsalis*). Although this species has been recorded from the western quarter degree grid cell (2528CC) no termitaria, which in moribund form are ideal retreats for this snake, were noticed. It is therefore assumed that it only occurs in low densities.
- Southern African Python (*Python natalensis*). This species has been recorded from the western quarter degree grid cell (2528CC) supposedly in the riverine thickets of the Olifantspruit. As this is at the southern end of the range of this snake, it is assumed that its presence is marginal in very low numbers.

6. RESULTS

Amphibians

Although the Giant Bullfrog has been recorded from this quarter degree grid cell the substrate in general is unsuitable, due to the presence of layers of dolomite just below the surface. The study site is therefore not suitable as dispersal area and previous records must be based on odd individuals which might have entered from the west across the Olifantspruit. Bullfrog habitat is only present at the bottom of the drainage valley amongst the riverine bush along the river, where the soil may be deeper. Due to the unsuitable substrate it serves no purpose to retain buffer zones in this area.

Table 1: The Reptiles and Amphibians that could occur on the site

SCIENTIFIC NAME	COMMON NAME	PROBABILITY OF OCCURRENCE
CLASS: AMPHIBIA	AMPHIBIANS	
Family: Bufonidae	Toads	
<i>Amietophryne gutturalis</i>	Guttural Toad	Low
<i>Amietophryne garmani</i>	Eastern Olive Toad	Low
<i>Schismaderma carens</i>	Red Toad	Low
Family: Pyxicephalidae	Common Frogs	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	Low (?)
<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	Low
CLASS: REPTILIA	REPTILES	
ORDER: SQUAMATA	SCALE-BEARING REPTILES	
Suborder: LACERTILIA	LIZARDS	
Family: Gekkonidae	Geckos	
<i>Lygodactylus capensis</i>	Cape Dwarf Gecko	Low
<i>Pachydactylus affinis</i>	Transvaal Thick-toed Gecko	Low
<i>Pachydactylus capensis</i>	Cape Thick-toed Gecko	Low
Family: Agamidae	Agamas	
<i>Agama distanti</i>	Distant's Agama	Low
Family: Scincidae	Skinks	
<i>Trachylepis capensis</i>	Cape Skink	Low
<i>Trachylepis punctatissima</i>	Speckled Skink	Low
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	Low
Family: Gerrhosauridae	Plated Lizards	
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	Low
Suborder: SERPENTES	SNAKES	
Family: Typhlopidae	Blind Snakes	
<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	Low
Family: Leptotyphlopidae	Thread Snakes	
<i>Leptotyphlops scutifrons</i>	Peters' Thread snake	Low
Family: Atractaspididae	African Burrowing Snakes	
<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	Low
<i>Aparallactus capensis</i>	Cape Centipede-eater	Medium
Family: Colubridae	Typical Snakes	
<i>Boaedon capensis</i>	Brown House Snake	Low
<i>Lycophidion capense</i>	Cape Wolf Snake	Low
<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	Medium
<i>Telescopus semiannulatus</i>	Eastern Tiger Snake	Low
<i>Psammophis brevirostris</i>	Short-snouted Sand Snake	Low
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Medium
Family: Elapidae	Cobras, Mambas, other Elapids	
<i>Hemachatus haemachatus</i>	Rinkhals	Low
Family: Viperidae	Adders	
<i>Causus rhombeatus</i>	Rhombic Night Adder	Low
<i>Bitis arietans</i>	Puff Adder	Low

7. FINDINGS AND POTENTIAL IMPLICATIONS

In general the the habitat systems on the study site will not favour any of the three Red Data herpetofaunal species mentioned above due to a lack of suitable habitat. If they should occur they are only likely to occur in very low numbers.

In general the grassveld area is not suitable for Striped Harlequin Snake and African Python due to absence of termataria and lack of suitable vegetation cover. The river and riparian vegetation does not offer suitable habitat for the Giant Bullfrog. The wetland on site C could offer suitable breeding habitat for Giant Bullfrog and a buffer zone of 32 m from the edge of the wetland area on Site C should be suitable for this species. The general steep slope of the landscape prevents formation of pans and wetland areas and as a result is unsuitable for Giant Bullfrogs. Due to the rocky nature of the area and the hard and shallow soils Giant Bullfrog are unlikely to disburse into the grassland area.

8. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

The list compiled is based on records from these quarter degree grid cells as accumulated over nearly a century.

9. RECOMMENDED MITIGATION MEASURES

Mitigation measures proposed by the specialist:

- It is important to note that the trenches for the water pipeline and even those for sewage lines do not need to be wide, which means that the environmental damage caused by the actual digging can be reduced to a minimum. However, while they are open their presence will mean that wildlife of any size may fall into them, from where it will be difficult to escape and death may be caused by drowning, excessive exposure to the sun or by being buried alive during the final construction work.
- Environmental damage caused by these trenches may be kept to a minimum by good forward planning and thereby reducing the actual length of time that they are open. Possible damage to wildlife is in direct proportion to the time that these trenches are open and may destroy amphibian and reptilian species.
- The design of the stormwater lines is not known. If large diameter cement pipes are used and the trenches are closed again, potential danger become reduced by filling in the trenches. Open stormwater channels are dangerous, as they will continuously contribute to wildlife destruction.

10. CONCLUSION

In general the grassveld area is not suitable for Striped Harlequin Snake and African Python due to absence of termitaria and lack of suitable vegetation cover. The river and riparian vegetation does not offer suitable habitat for Giant Bullfrog. The wetland on site C could offer suitable breeding habitat for Giant Bullfrogs and a buffer zone of 32 m from the edge of the wetland area on Site C should be suitable for this species. The general steep slope of the landscape prevents formation of pans and wetlands and as a result is

unsuitable for the Giant Bullfrog. Due to the rocky nature of the area and the hard and shallow soils Giant Bullfrogs are unlikely to disperse into the grassland area.

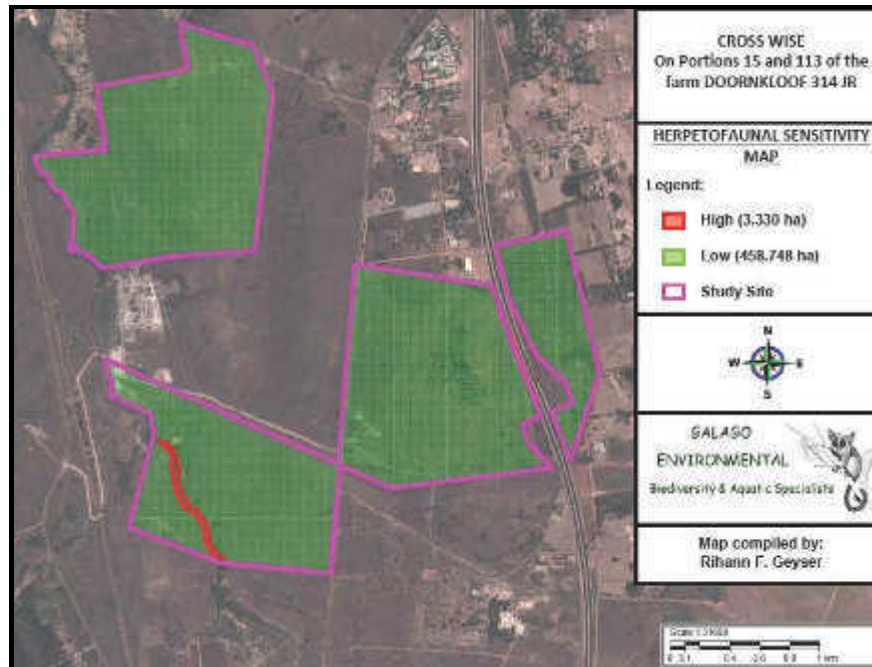
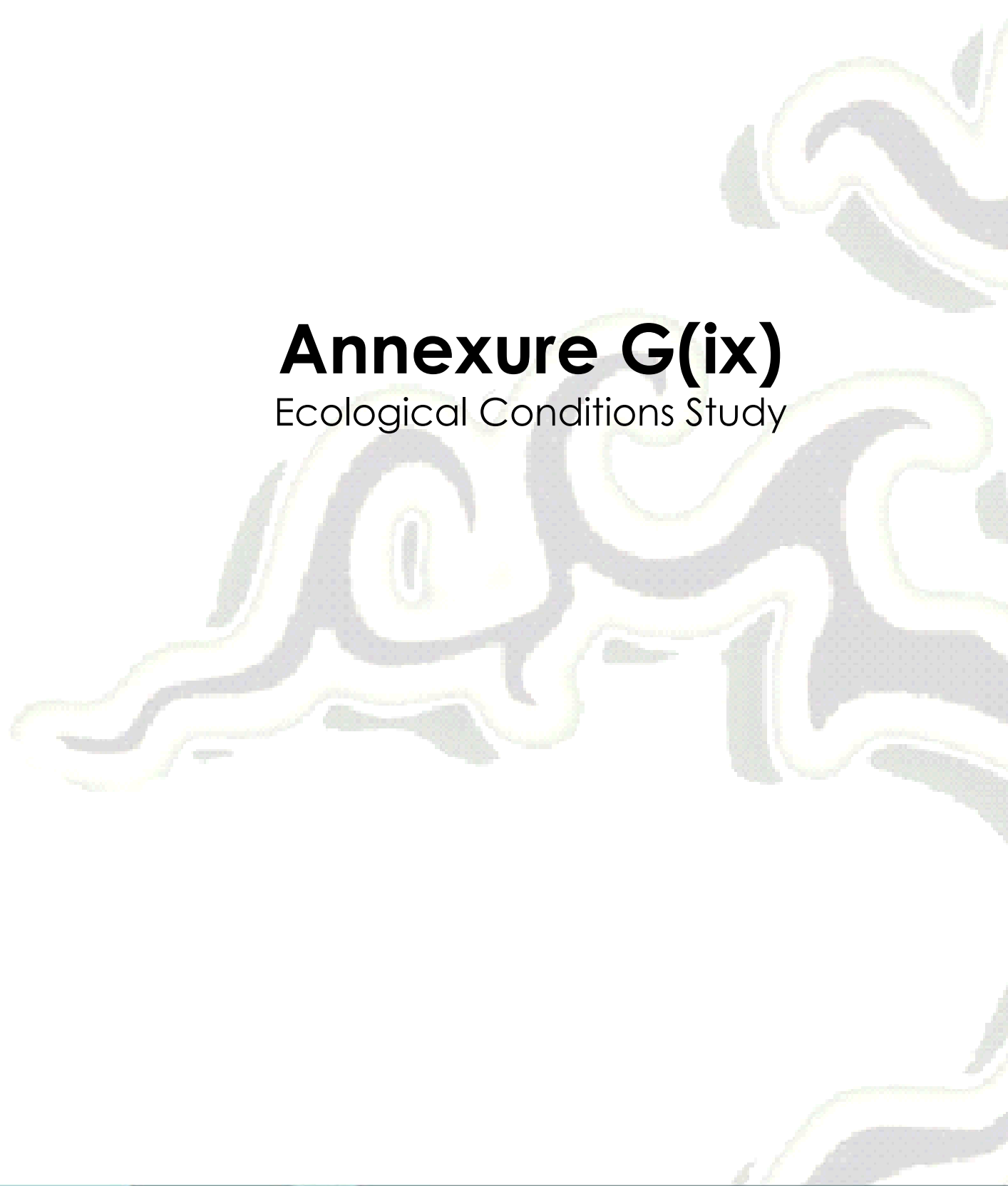


Figure 6: Herpetofaunal sensitivity map

11. LITERATURE SOURCES

- Branch, W.R. 1998. 'Field Guide to the Snakes and other Reptiles of Southern Africa'. 3rd edition. Struik Publishers, Cape Town. 399 pp., maps, 112 plates.
- Branch, W.R. 2002. 'The Conservation Status of South Africa's threatened Reptiles': 89 – 103. In:- G.H.Verdoorn & J. le Roux (editors), 'The State of Southern Africa's Species', Proceedings of a conference held at the Rosebank Hotel, 4 – 7 September 2001. World Wildlife Fund.
- Department of Environmental Affairs and Tourism. 2007. National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of Lists of Critically Endangered, Endangered, Vulnerable and Protected Species. Government Notices.
- Directorate of Nature Conservation, GDACE. 2008 and revised on February 2009. GDACE Requirements for Biodiversity Assessments, Version 2. Gauteng Provincial Government.
- Du Preez L. & V. Ccarruthers 2009. A complete guide to the Frogs of southern Africa. Struik Nature, Cape Town.
- Jacobsen, N.H.G. Dec.1989. A herpetological survey of the Transvaal. 3 Vols, 1621 pp., 266maps. (Unpublished Ph.D. Thesis).
- Jacobsen, N.H.G. 1995. 'The Herpetology of the Gauteng Province, - localities and distribution maps'. Pages not numbered. Internal Report, Chief Directorate of Nature and Environmental Conservation, Gauteng Province.
- Minter, L.R., M.Burger, J.A.Harrison, H.H.Braack, P.J.Bishop and D.Kloepfer, eds. 2004. 'Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland'. SI/MAB Series #9. Smithsonian Institution, Washington, DC.

Mucina, L. & Rutherford, M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
Virtual Museum 2011. Animal Demography Unit 2009 Department of Zoology - University of Cape Town.



Annexure G(ix)

Ecological Conditions Study



GALAGO ENVIRONMENTAL



Biodiversity Specialists

638 Turf Street

Wingate Park, 0181

Tel: 012-345 4891

Fax: 086 675 6136

Email: Vanessam@lantic.net

Ecological conditions of the ridge

of

**PORTIONS 15 & 113 OF THE FARM
DOORKLOOF 391JR (CROSS WISE)**

July 2012

Report author: Reinier Terblanche (M.Sc, Pr.Sci.Nat)

TABLE CONTENTS

1.	INTRODUCTION	3
1.1	Objectives of the habitat study.....	3
1.2	Scope of study.....	3
2.	STUDY AREA	3
3.	METHODS	4
3.1	Habitat characteristics	4
3.2	Vegetation assemblages (communities).....	4
3.3	Ecological conditions	5
3.4	Limitations	6
4.	RESULTS AND DISCUSSION	6
4.1	Outline of plant assemblage at the ridge at the site.....	8
4.2	General remarks.....	10
5.	CONCLUSION	10
6.	REFERENCES	12

FIGURES:

FIGURE 1:	LOCALITY MAP OF THE STUDY SITE.....	4
FIGURE 2:	VEGETATION ASSEMBLAGES (COMMUNITIES) AT THE RIDGE	7
FIGURE 3:	SENSITIVITY MAP OF THE RIDGE	11

TABLES:

TABLE 1:	LIST OF RIDGE VEGETATION ASSEMBLAGES AT THE SITE	6
TABLE 2:	SUMMARY OF CHARACTERISTIC SPECIES OF THE MAIN VEGETATION ASSEMBLAGES OF THE SITE.....	7

1. INTRODUCTION

A survey of ecological conditions was required for the ridges in the area known as Cross Wise on Portion 15 and 113 of the farm Doornkloof 391 JR (hereafter referred to as the study site). The survey focused on ecological conditions that should be taken into account in the impact study.

1.1 Objectives of the habitat study

The objectives of the habitat study on ecological conditions are to provide:

- An outline of the habitats that are present;
- An outline of vegetation assemblages (communities) present with an estimate of the dominant species that are present at rocky ridges;
- An estimate of the degradation;
- An outline of compositional aspects of exotic species, indigenous pioneer species and indigenous plant species of higher ecological status based on broad subjective observations and quantitative surveys;
- Estimates of degradation and impacts of disturbances on the vegetation; and
- Functional aspects of ecosystems at the site.

1.2 Scope of study

- A survey consisting of several visits to note key elements of habitats on the site and surveys of vegetation composition.
- Integration of literature and field observations to evaluate the ecological conditions on the ridge.

2. STUDY AREA

According to Mucina & Rutherford (2006) the vegetation type that occurs in the study area is Carletonville Dolomite Grassland. Climate is strongly seasonal summer rainfall, with dry winters and a fairly high incidence of frost in the winter. The study site is situated in the Grassland Biome (Mucina & Rutherford, 2006). The vegetation in the study area varies from extensively modified to approaching pristine grassland (the latter refers to natural grassland). The site comprises three sections. Section B consists of a part east and west of the R21 highway which is secondary grassland that has been modified in the past. The western part of Section B comprises grassland on a flat area and slope and patches of alien invasive Eucalyptus trees (red river gum). Section C comprises a moderate to gentle slope. A riparian zone at a tributary of the Sesmylspruit is found at the western parts of Section C. Section A consists of rocky slopes and gentle foot-slopes of rocky ridges. Residential, agricultural and industrial developments are found adjacent and in between sections of the site.

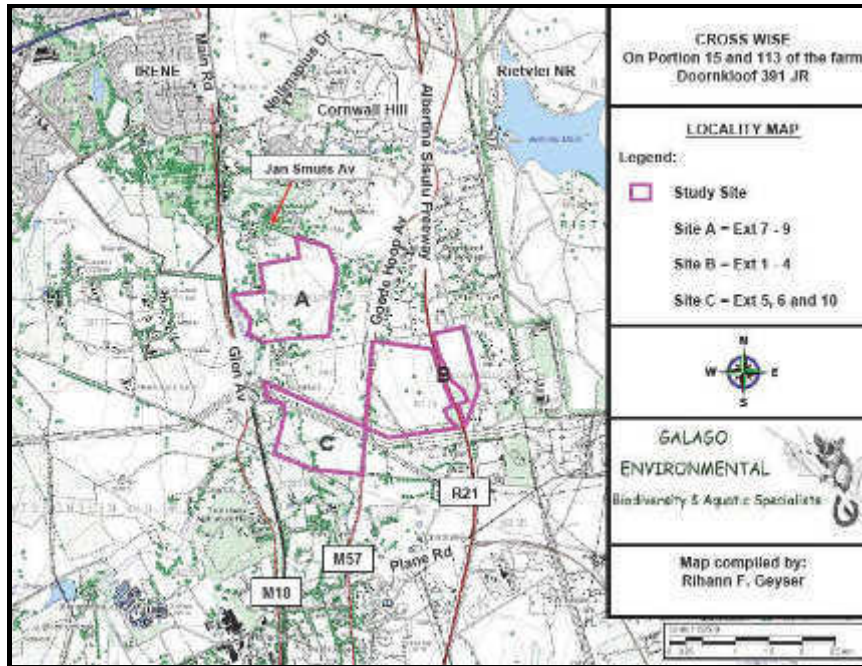


Figure 1: Locality map of the study site

3. METHODS

Surveys were conducted in December 2011 and April 2012 but a number of earlier visits to the larger area were also taken into account. A number of visits have been made in recent years to investigate invertebrate habitats in the Irene area. Most recent surveys were conducted on 1 April 2012, 16 December 2011, 12 December 2011, 14 January 2009, 22 January 2009, 12 November 2010, 16 December 2010 and 29 April 2011. Areas adjacent to the site were also visited.

The rocky hills at Irene and parts of the site have been visited over a number of years by R.F. Terblanche and also by J. du G. Harrison (see Marais & du G. Harrison, 2008) and Roos & Henning (2005) mainly to find invertebrates of particular conservation concern such as the fruit chafer beetle *Ichneostoma stobbiai*. Previous visits to the larger area which included parts of the site were done during November 2005, November 2006, November 2007 and December 2007 by R.F. Terblanche.

3.1 Habitat characteristics

The habitat was investigated by noting habitat structure (rockiness, slope, plant structure/physiognomy).

3.2 Vegetation assemblages (communities)

Relatively homogenous vegetation assemblages (communities) were identified based on overall appearance (mainly physiognomy) and composition (conspicuous dominant species). Transects consisting of 30 points each, at each consecutive metre along a 30m steel measuring tape, was applied in apparent representative parts of the relatively homogenous vegetation assemblages to establish dominant plant species in the grassland.

Identification of plant species during the species composition surveys were based on various literature resources, or where deemed necessary, by experts on certain taxonomic groups. Field guides such as those by Manning (2003), Smit (2008), Van Oudtshoorn (1999), Van Wyk and Malan (1998), Van Wyk and Van Wyk (1997), Van Wyk and Smith (2003),

Germishuizen (2003) and Pooley (1998) were used to identify plant species and find additional information about plant species. Retief and Herman (1997) were consulted to find information about diagnostic characteristics and the broad distribution of species. Main sources to obtain information about the status, origin and identification of problem plants and alien invasive plant species were Bromilow (2001) and Henderson (2001). Pfab (2002) as well as Pfab and Victor (2002) were used as the guideline for threatened, data deficient and near threatened plant species of the Gauteng Province. Updated information from GDARD was also consulted. For the most recent treatise of scientific names and broad distributions, Germishuizen, Meyer & Steenkamp (2006) were followed to compile the lists of species.

3.3 Ecological conditions

At the time of the present survey, the terms of reference for ecological conditions are not available in as much detail as the requirements for biodiversity studies. Here an approach has been followed to describe ecological conditions that are relevant to potential development or to note possible exclusion of any development.

The veld condition is often an important aspect of overall ecological conditions at a chosen site. The veld condition can be determined in various ways. Two techniques that are commonly used are the ecological index, which yields a veld condition index, and the occurrence or absence of key grass species (Bothma, 2002; Van Rooyen, 2002). Different veld condition assessment methods that have an ecological base have been proposed by various researchers in South Africa including Dyksterhuis (1949), Foran, Tainton & Booysen (1978), Hardy & Hurt (1989), Mentis (1983), Tainton (1988), Tainton, Edwards & Mentis (1980). These methods use key grass species or grass species with allocated ecological status to determine veld condition. Degradation models (Bosch & Gauch, 1991) can also be used to assess veld condition. Directly or indirectly, these methods are based more on responses of grass species to mega-herbivores and in addition at the higher rainfall areas also based on responses of grass species to fire. A good veld condition is therefore close to a good rangeland condition, which is not necessarily ideal for the conservation of smaller fauna and flora, especially at ridges where soils are naturally poor in nutrients. For the purposes of this study the application of these methods are doubtful to apply for three main reasons.

Firstly, natural grassland on rocky ridges may contain a low frequency or abundance of grass species that are of high ecological status in terms of grazing by megaherbivores, even though a patch may be ideal for rare flora and smaller fauna. For example a *Melinis nerviglumis* – *Aristida transvaalensis* community, which is inhabited by a number of grass species of lower ecological status, was found to include the ideal habitats of the rare and red-listed Heidelberg Copper butterfly, *Chrysoritis aureus* (Terblanche, Morgenthal & Cilliers, 2003). Threatened insect species often require habitats that are to some extent disturbed, for example the Brenton Blue Butterfly, *Orachrysops niobe* (Edge, Cilliers & Terblanche, 2008). Secondly, the diversity of indigenous forb species, and not necessarily grass species, is often of paramount importance for smaller fauna and flora. Thirdly, especially within and on the fringes of urban areas, pioneer forbs, shrubs and trees may be more important to indicate degradation of ecosystems than low ecological status grass species. Patches opened up by excavations do not necessarily follow the same succession pattern as patches that are opened up by overgrazing or fire.

Though not suitable for assessing ecological conditions in open grassland/savanna or rocky ridges the Riparian Vegetation Index method (Kemper, 2001) provided useful information that could be incorporated as guidance for ecosystems that are not wetlands as well. Vegetation adjacent to the rocky ridges has also been studied though the main focus remains the rocky ridges.

3.4. Limitations

It should be emphasized that the survey can by no means represent a full account of all the species and their abundances on the site. Full analyses, such as complete randomised sampling or detailed stratified random sampling, followed by detailed ordination analyses are not practical within the time constraint and objectives of the study. Survey methods and analyses were adapted to fulfil the objectives of the study within its practical limitations. The site was visited during December 2011 and April 2012 which comprises an optimal time of the year to document ecological conditions.

4. RESULTS AND DISCUSSION

Table 1 provides an outline of the main vegetation assemblages (communities) at the site with emphasis on the ridge vegetation. Only one community associated with the ridges at the site, has been identified.

Table 2 lists the species with a high fidelity to the vegetation assemblages locally at the site. Fidelity classes from preferential, selective to exclusive (Kent & Coker, 1992) are used here to indicate habitat specificity locally at the site. Some of the species with a high fidelity are widespread in Gauteng but can be locally indicative of unique ecosystems. In the case of this study some plant species with a high fidelity at certain rocky habitats also stands out as being particularly habitat specific in the regional and international context.

Table 3 provides a summary of the ecological conditions of the main vegetation assemblages at the rocky ridge.

Figure 1 illustrates of the main vegetation assemblage identified for the interpretation of ecological conditions at the ridge at the site.

Table 1: List of ridge vegetation assemblages at the site and a summary of the most dominant plant species recorded from each assemblage with 30m transect surveys (note: basal frequency). Most dominant species are listed as well as the relative frequency of other species combined.

Plant assemblage	Location in study area	General vegetation structure	Number of 30m transects used	Species	Relative frequency: percentage
<i>Loudetia simplex</i> <i>Tristachya biseriata</i> <i>assemblages</i>	Chert and quartzite rocky hills and slopes	Grassland with sparse tree cover	12	<i>Themeda triandra</i> <i>Loudetia simplex</i> <i>Tristachya biseriata</i> Other species	29 20 15 36
<i>Sporobolus festivus</i> – <i>Eragrostis chloromelas</i> <i>assemblage</i>	Lower dolomitic slopes west of chert/ quartzite section	Mosaic of tall and short grassland (shorter grass at shallow dolomitic rock patches)	6	<i>Themeda triandra</i> <i>Eragrostis chloromelas</i> <i>Sporobolus festivus</i> Other species	31 25 14 30
Exotic <i>Acacia/ Eucalyptus</i> patches	Scattered in the larger area where patches of exotic trees established	Tall exotic trees with poorly developed grass stratum	0	Mainly exotic <i>Acacia</i> species and exotic <i>Eucalyptus</i> species	Dominant

Table 2: Summary of characteristic species of the main vegetation assemblages of the site.

Description of plant assemblage*	Characteristic species with high degree of fidelity, including species that appear to be <u>locally</u> exclusive, selective or preferential <u>in the study area</u>		
	Species/ groups	Growth form	Fidelity
Loudetia simplex – Tristachya biseriata assemblage	<i>Loudetia simplex</i>	Grass	Selective
	<i>Melinis nerviglumis</i>	Grass	Preferential
	<i>Monocymbium ceresiiforme</i>	Grass	Selective
	<i>Tristachya biseriata</i>	Grass	Selective
	<i>Cheilanthes deltoidea</i> subsp. <i>silicicola</i>	Fern	Exclusive
	<i>Habenaria mossii</i>	Herb	Exclusive
	<i>Cleome conrathii</i>	Herb	Exclusive
Sporobolus festivus – Eragrostis chloromelas assemblage	<i>Sporobolus festivus</i>	Grass	Exclusive
	<i>Melolobium subspicatum</i>	Herb	Exclusive
	<i>Lotononis laxa</i>	Herb	Preferential
	<i>Habenaria kraenzliniana</i>	Herb	Exclusive
Exotic Eucalyptus/ Acacia patches	<i>Eucalyptus camaldulensis</i>	Tree	Not applicable: Occurrence not natural in many cases planted
	<i>Acacia decurrens</i>	Tree	
	<i>Acacia mearnsii</i>		

Characteristic species are here indicated to be those plant species that are rare or absent elsewhere at the site i.e. with a high degree of fidelity to certain vegetation communities at the site.

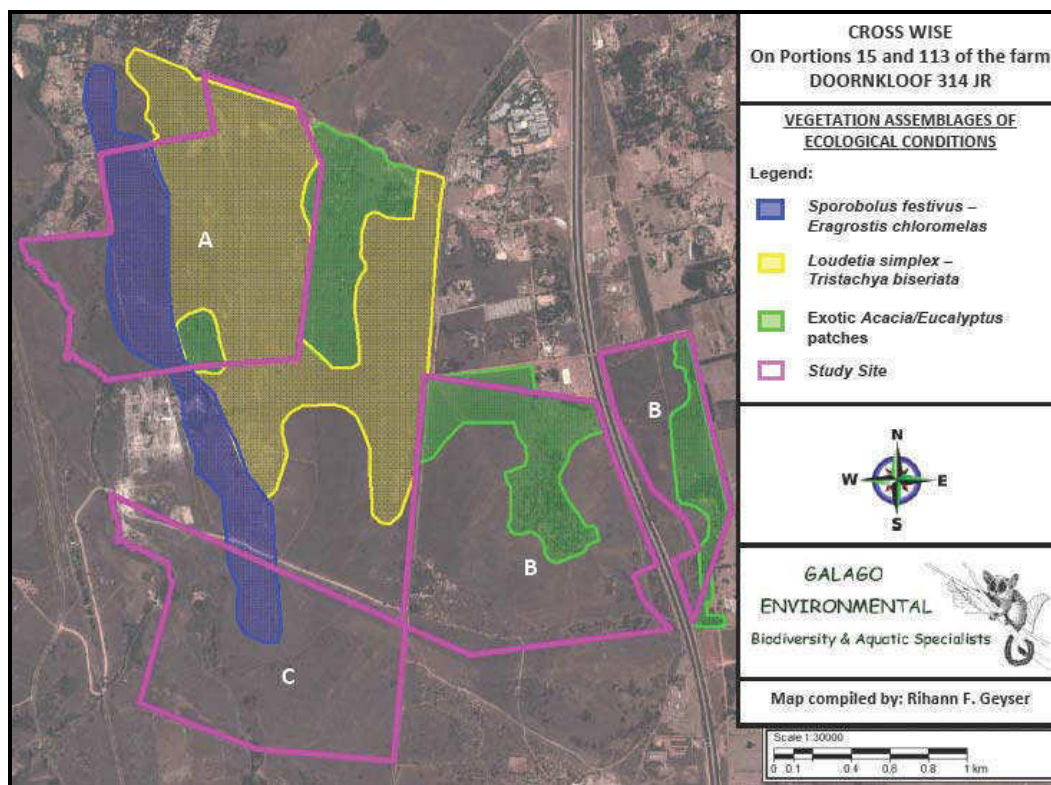


Figure 2: Vegetation assemblages (communities) at the ridge in terms of ecological conditions

Table 3: Summary of the ecological conditions of the main vegetation assemblages at the site. Categories: Very low, Low, Moderate, High, Very high, Confirmed.

Community	<i>Loudetia simplex</i> – <i>Tristachya biseriata</i> assemblage	<i>Sporobolus festivus</i> – <i>Eragrostis chloromelas</i> assemblage	Exotic <i>Acacia/ Eucalyptus</i> patches
Probability of unique habitat of threatened plant species	Confirmed <i>Cheilanthes deltoidea</i> subsp. <i>silicicola</i> (VU) <i>Habenaria mossii</i> (EN)	Confirmed <i>Melolobium subspicatum</i> (VU)	Low
Unique habitat for plant species which are not threatened but of conservation concern	Confirmed <i>Cleome conrathii</i> (NT) <i>Lithops lesliei</i> subsp. <i>lesliei</i> (NT)	Confirmed <i>Habenaria kraenzliniana</i> (NT)	Low
Diversity of indigenous plant species	High	High	Moderate-Low
Unique habitat for threatened fauna	Confirmed <i>Ichnestoma stobbiai</i>	Confirmed <i>Ichnestoma stobbiai</i>	Low
Frequency of total indigenous plant species	High	High	Low
Grazing importance	Moderate	Moderate	Low
Connectivity, intactness	Moderate	Moderate	Low
*Ecologically negative edge effects from surrounding areas	High	High	Low
*Ecologically negative edge effects to surrounding areas	Low	Low	High (source of exotic species, replaces unique habitats)

- Ecologically negative edge effects are those edge effects that compromise the overall ecological function and integrity of an area.

4.1 Outline of plant assemblage at the ridge at the site

Vegetation at the rocky ridges that cross the study site could be divided in three assemblages/ communities/ vegetation units. An outline of the vegetation assemblages that have been identified, follows:

Loudetia simplex* – *Tristachya biseriata community (chert rocky ridges and rocky slopes)

Chert rocky outcrops and slopes are found east of the dolomitic foot-slopes. An interesting ecotone also exists at the intersection of these rock types at the slopes.

Grass species, such as *Themeda triandra*, *Loudetia simplex* and *Tristachya biseriata* are dominant in this grassland. However, typical of ecosystems with a high diversity, a wealth of other grass species are present, and the dominance of certain species are not clear throughout the assemblage (Table 1). In fact, a few “sub-communities” could have easily been identified, especially at the ecotone between this assemblage and the following plant assemblage. Most grass and forb species of this community are quite widespread in the region, but some, such as *Cheilanthes deltoidea* and *Habenaria mossii* are highly localised on a regional and international level (Table 2). Structurally this assemblage consists mainly of indigenous grassland with some scattered trees and shrubs, though the tree stratum is

poorly developed (Table 1). The absence of well-developed tree stratum means that fire and frost probably play an important role in maintaining the natural grassland.

Plant- and animal species of particular conservation concern are present in this *Loudetia simplex* – *Tristachya biseriata* assemblage. *Chelianthes deltoidea* subsp. *silicicola* (Klopper & Van Wyk) which is threatened and listed as VULNERABLE (Raimondo *et al.*, 2009) occurs in this plant assemblage. An ENDANGERED orchid species, *Habenaria mossii*, is present at the dolomite-chert zone, an ecotone between the *Loudetia simplex* – *Tristachya biseriata* assemblage and *Sporobolus festivus* – *Melolobium subspicatum* assemblage. In addition *Habenaria kraenzlineana*, a Near Threatened species, have also been found at this ecotone by Lemmer & Coetzer (2011). *Lithops lesliei* subsp. *lesliei*, a Near Threatened succulent, has also been found at an outlier of this plant assemblage. Presence of strong but highly localised subpopulations of *Ichnestoma stobbiai*, a threatened beetle species, have been confirmed at the ridges and lower down at the foot-slopes (see Terblanche, Harrison, Roos, Henning).

This unique plant assemblage is susceptible to edge effects from the nearby urban areas and also increasingly fragmented by urban developments. There are patches of exotic *Eucalyptus camaldulensis* trees, which occupy parts of the rocky grassland that should be eradicated (bar only the exotic trees that are used as a breeding site for bird species of particular conservation concern). Another concern is pine trees, *Pinus* sp., which are not yet as conspicuous, but apparently starting to establish in this rocky grassland.

Sporobolus festivus* – *Melolobium subspicatum community (grassland on shallow dolomite)

Landscape that forms the substrate for this plant assemblage consists of a flat plain or gentle slope where shallow dolomitic rock is present. Grass species, such as *Eragrostis chloromelas* and *Themeda triandra* dominate. *Sporobolus festivus* is also abundant and closely associated with the patches where dolomitic rock surface and soil is shallow. The species diversity of grasses and herbs in this plant assemblage appears to be high, therefore the reasonable number of “other species” even in the transect point surveys (Table 1). Most grass and forb species of this community are quite widespread in the region, but *Melolobium subspicatum* which frequents this habitat is highly localised, even on a regional and international level. Structurally this assemblage consists mainly of a mosaic of medium-tall and short indigenous grassland (Table 1).

Plant- and animal species of particular conservation concern are present in this *Sporobolus festivus* – *Melolobium subspicatum* plant assemblage. *Melolobium subspicatum* which is threatened and listed as VULNERABLE (Raimondo *et al.* 2009) is common in this plant assemblage (Lemmer & Coetzer, 2011). Another herbaceous species, *Cleome conrathii*, which is listed as Near Threatened (Raimondo *et al.*, 2009) occurs in this plant assemblage, whilst further south in the same plant assemblage an orchid species, *Habenaria kraenzlineana*, another Near Threatened entity is also present. *Ichnestoma stobbiai*, a threatened beetle species, has been confirmed at these foot-slopes and also at the intersection of the dolomitic and cherty rock types (Terblanche, Harrison, Roos, Henning).

Exotic Acacia/ Eucalyptus patches

Mixed alien vegetation consisting of patches of exotic Acacia/ Eucalyptus are scattered throughout the larger area. These exotic trees pose a threat to the threatened plant and animal species in Section A.

4.2 General remarks

High frequencies of alien invasive plant species at excavations or disturbed places at the ridges in the area reflect urban edge effects.

The grazing importance of the area appears to be moderate to high. Palatable grass species such as *Themeda triandra* has overall a high frequency. See Bosch & Kellner (1991), Tainton (1999) for more information on degradation models and veld assessment. The site is too small and isolated to be of particular relevance to mega-herbivores. Smaller animals may benefit from the conservation of the indigenous vegetation at the rocky ridges.

A burning programme should be applied in the natural grassland, but would not be without practical difficulties in such a fragmented area with fair concentration of residences and other developed areas. Research would probably enhance a burning programme in Section A.

Rocky outcrops at the site should be regarded as stepping stone corridors with rocky ridges elsewhere in the local area. Rocky ridges is important for a number of ecological processes, including its function as a controller of water inputs into wetlands, fire-protection for some species and different microclimates for certain fauna and flora (Samways, 1994; Lowrey and Wright, 1987; Pfab 2001).

5. CONCLUSION

- Transformation of vegetation owing to present excavations, scraping or other disturbances are clear at the site. Exotic weeds and annual pioneer grass species invade such disturbed patches.
- Overall Section B appears to be at ecologically the least sensitive area followed by Section C.
- Section A should be viewed as a no-go area for any development. Section A is situated at chert/quartzite ridges and slopes as well as lower dolomitic slopes. Plant and animal species of particular conservation concern are present at Section A. The plant species of particular conservation concern include *Habenaria mossii* (ENDANGERED), *Cleome conrathii* (Near Threatened), *Habenaria kreaszliniana* (Near Threatened) and *Lithops lesliei* subsp. *lesliei* (Near Threatened) (Raimondo *et al.*, 2009). The intersection between the dolomite and chert approaches a habitat which are confirmed on several occasions as suitable habitat for the rare and threatened fruit chafer beetle, *Ichnestoma stobbiai*. *Ichnestoma stobbiai* is an endangered fruit chafer (Scarabaeidae: Cetoniinae) that occurs in small habitat fragments of South Africa (Kryger & Scholtz, 2008). The adults of this species are short-lived and the females are flightless. Thus, the vagility of these beetles is extremely low (Kryger & Scholtz, 2008). The species *I. stobbiai* Holm, 1992 is thought to occur in a very restricted area in and around Gauteng Province and all habitat patches should be protected (Kryger & Scholtz, 2008; Deschodt, Scholtz & Kryger, 2009). Unlike most cetoniine larvae, the larvae of this species usually occur in dolomitic to cherty, well-drained soils (Deschodt, Scholtz & Kryger, 2009).
- A Class 3 rocky ridge is present at all sections. However parts of the rocky ridge at Section A in isolation approach a Class 1 scenario.
- Fire and frost probably play an important role in maintaining the grassland at the ridge and therefore a burning programme is desirable.
- In an increasingly urbanised area, the possible conservation importance value of rocky ridges is underlined at Section A in terms of remarkable diversity and as refuge for threatened species.
- Though a class 3 rocky ridge is present it is believed that near pristine patches of rocky ridge may still be conserved at Section A.
- Proper ecological planning and actions are urgent and include:

- The eradication of invasive exotic plant species at the site.
- Development of conservation infrastructure that would avoid the continuous trampling, excavations and informal dumping which are present in the area.
- The zoning of habitats where threatened species occur as a no-go area for *any* developments.

In terms of development it should be emphasised that the rocky ridges and the lower dolomitic slopes at the Section A site are of considerable conservation importance. These rocky ridges contain habitats which are in good enough condition for the conservation of smaller fauna as well as very interesting flora diversity.

Finally it can be concluded that the whole rocky ridge system which includes the chert outcrops and the shallow dolomitic rock, can, despite some transformation in the past, be regarded as highly sensitive (with at number of plant species of particular conservation importance as well as a highly localised beetle species of conservation concern). The indigenous floral diversity is also high and the mosaic of assemblages on a national scale quite unique.

It appears that the areas with shallow dolomite are not always marked as part of the rocky ridge. In this case it should be included as part of the rocky ridge, because the dolomitic rock not only intergrades with the chert at the intersection but also clearly contain unique and very habitat specific fauna and flora which results from the shallow dolomite rocks.

Though beyond the scope of this study, there is clearly a need for conservation planning and actions which address the larger Irene area. According to the available knowledge this Irene area contains a number of rocky ridges with apparent unique biodiversity assemblages and a number of highly localised organisms.

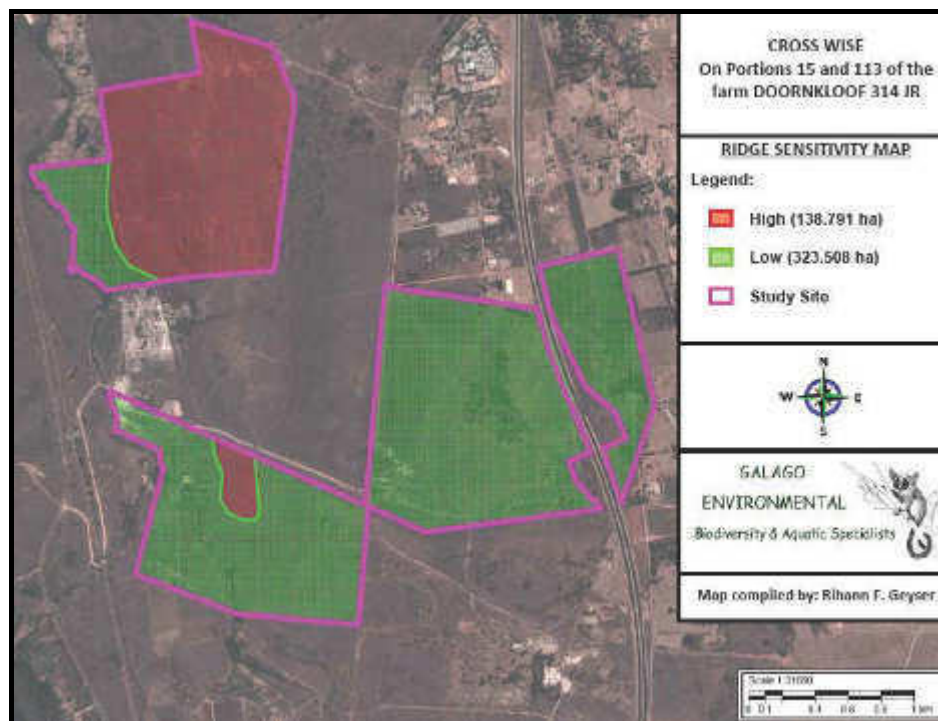


Figure 3: Sensitivity map of the ridge

6. REFERENCES

- Bosch, O.J.H. & Gauch, H.G. 1991. The use of degradation gradients for the assessment and ecological interpretation of range condition. *Journal of the Grassland Society of southern Africa* 8: 138-146.
- Bothma, J. du P. (ed.). 2002. Game ranch management. 4th ed. Van Schaik, Pretoria.
- Bromilow, C. 2001. Problem Plants of South Africa. Pretoria: Briza Publications. 258 p.
- Deschodt, C.M. Scholtz, C.H. & Kryger, U. 2009. *Ichneustoma stobbiai* Holm 1992 (Scarabaeidae: Cetoniinae), a range-restricted species of conservation concern. *African Entomology* 17(1): 43-50.
- Dyksterhuis, E.J. 1949. Condition and management of rangeland based on quantitative ecology. *Journal of Rangeland Management* 2: 104-115.
- Edge, D.A., Cilliers, S.S. & Terblanche, R.F. 2008. Vegetation communities at the Brenton Blue butterfly reserve. *South African Journal of Science* (in press).
- Foran, B.D., Tainton, N.M. & Booysen, P. de V. 1978. The development of a technique for assessing veld condition of three grassland types in Natal. *Proceedings of the Grassland Society of southern Africa* 13: 27-34.
- Germishuizen, G. 2003. Illustrated guide to the wild flowers of northern South Africa.
- Germishuizen, G., Meyer, N.L. & Steenkamp (eds) 2006. A checklist of South African plants. Southern African Botanical Diversity Network Report No. 41. SABONET, Pretoria.
- Hardy, M.B. & Hurt, C.R. 1989. An evaluation of condition assessment techniques in Highland Sourveld. *Journal of the Grassland Society of southern Africa* 6: 51-58.
- Henderson, L. 2001. Alien weeds and invasive plants. Plant Protection Research Institute handbook No. 12. Pretoria: Agricultural Research Council. 300 p.
- Kent, M. & Coker, P. 1992. Vegetation description and analysis: a practical approach. Wiley, New York.
- Kryger, U. & Scholtz, C.H. 2008. Phylogeography and conservation of the rare South African Fruit Chafer *Ichneustoma stobbiai* (Scarabaeidae: Cetoniinae). In: *Evolutionary Biology from concept to application IV*: 181-196.
- Lemmer, P. & Coetzer, L.A. 2010. Flora assessment of Road K105 and Alignments. Report for GDARD by Galago Environmental.
- Lowrey, T.K. & Wright, S. 1987. The flora of the Witwatersrand. Vol. 1: The Monocotyledonae. Witwatersrand University Press, Johannesburg.
- Manning, J. 2003. Photographic guide to the wildflowers of South Africa. Pretoria: Briza Publications. 352 p.
- Marais, V. & du G. Harrison, J. 2008. Invertebrate habitat assessment K105 and Alignments. Report for GDARD by Galago Environmental.
- Mentis, M.T. 1983. Towards objective veld condition assessment. *Proceedings of the Grassland Society of southern Africa* 18: 77-80.
- Mucina, L. & Rutherford, M.C. eds. 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. Pretoria: South African National Biodiversity Institute. 807 p.
- Mucina, L., Rutherford, M.C., and Powrie, L.W. eds. 2005. Vegetation map of South Africa, Lesotho and Swaziland, 1:1 000 000 scale sheet maps. Pretoria: South African National Biodiversity Institute.
- Mueller-Dombois, D. & Ellenberg, H. 1974. Aims and methods of vegetation ecology. Wiley, New York.
- Pfab, M.F. 2001. Departmental policy, final draft: development guidelines for ridges. GDACE: Directorate of Nature Conservation.
- Pfab, M.F. 2002. Priority ranking scheme for Red Data plants in Gauteng, South Africa. *South African Journal of Botany* (68): 299-303.
- Pfab, M.F. & Victor, J.E. 2002. Threatened plants of Gauteng, South Africa. *South African Journal of Botany* (68): 370-375.
- Pfab, M.F. & Victor, J. 2003. *Khadia beswickii*. In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <www.iucnredlist.org>. Downloaded on 11 January 2012.

- Pooley, E. 1998. A field guide to wild flowers: KwaZulu-Natal and the eastern region. Durban: Natal Flora Publications Trust (c/o Natal Herbarium). 630 p.
- Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama, P.A. (eds) 2009 Red list of South African Plants 2009. *Strelitzia* 25. South African National Biodiversity Institute, Pretoria. 668 p.
- Retief, E. & Herman, P.P.J. 1997. Plants of the northern provinces of South Africa: keys and diagnostic characteristics. *Strelitzia* 6. Pretoria: National Botanical Institute. 681 p.
- Samways, M.J. 1994. Insect conservation biology. Chapman & Hall, London
- Smit, N. 2008. A field guide to the Acacias of South Africa. Briza, Pretoria.
- South Africa. 2004. National Environmental Management: Biodiversity Act No. 10 of 2004. Pretoria: Government Printer.
- Tainton, N.M., Edwards, P.J. & Mentis, M.T. 1980. A revised method for assessing veld condition. *Proceedings of the Grassland Society of southern Africa* 15: 37-42.
- Terblanche, R.F., Morgenthal, T.L. & Cilliers, S.S. 2003. The vegetation of three localities of the threatened butterfly species *Chrysoritis aureus* (Lepidoptera: Lycaenidae). *Koedoe* 46(1): 73-90.
- Van Oudtshoorn, F. 1999. Guide to grasses of southern Africa. Pretoria: Briza. 288 p.
- Van Rooyen, N. 2002. Veld management in the savannas. In: Bothma, J. du P. (ed.). 2002. Game ranch management, 4th ed. 571-617. Van Schaik, Pretoria.
- Van Wyk, B. & Malan, S. 1998. Field Guide to the Wild Flowers of the Highveld. Cape Town: Struik. 353 p.
- Van Wyk, B. & Van Wyk, P. 1997. Field guide to trees of southern Africa. Cape Town: Struik. 536 p.
- Van Wyk, B.E. & Smith, G.F. 2003. Guide to the aloes of South Africa. 2nd ed. Pretoria: Briza Publications. 304 p.
- Van Wyk, B. & Van Wyk, P. 1997. Field guide to trees of southern Africa. Cape Town: Struik.
- Victor, J.E. & Pfab, M.F. 2005. *Khadia beswickii* (L.Bolus) N.E.Br. National Assessment: Red List of South African Plants version 2011.1. Accessed on 2012/01/11



Annexure G(x)

Heritage Impact Assessment



Phase 1 Heritage Impact Assessment Report

HERITAGE IMPACT ASSESSMENT FOR THE
PROPOSED CROSSWISE ESTATE EXTENSION 1 – 10

PREPARED BY:
G&A HERITAGE

PREPARED FOR:



CREDIT SHEET

Project Director

STEPHAN GAIGHER (BA Hons, Archaeology, UP)

Principal Investigator for G&A Heritage

Member of ASAPA (Site Director Status)

SAHRA Accredited Heritage Practitioner

Tel.: (015) 516 1561

Cell.: 073 752 6583

E-mail: stephan@gaheritage.co.za

Website: www.gaheritage.co.za

Report Author

STEPHAN GAIGHER

Disclaimer; Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. G&A Heritage and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.

SIGNED OFF BY: STEPHAN GAIGHER



MANAGEMENT SUMMARY

Site name and location: Crosswise Estate Extension 1 – 10.

Municipal Area: Tswane District Municipality

Developer: Gillyfrost 71 (Pty) Ltd.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa. 38A Voster Str. Louis Trichardt, 0920

Date of Report: 16 April 2012

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the proposed development of the Crosswise Estate Extensions 1 - 10. The proposed development will be situated on Portions 20, 317 and 318 as well as the remainders of Portion 15 and 113 of the farm Doornkloof 391 JR. This area is located in the present area of Irene, near the city of Pretoria. The total size of the proposed development is 397.5 ha. It will be a mixed use zoning with residential, commercial, industrial & retirement village.

A preliminary layout has been drawn to lead the study; however this could be altered to some extent to avoid any identified heritage sites.

A literature study did not indicate the existence of any paleontological deposits in the specific area however it is being proposed that, should bedrock be affected; that a paleontological study should be initiated.

The purpose of this heritage impact assessment is to outline the cultural heritage sensitivity of the proposed development area and to advise on mitigation should any heritage sites or landscapes be affected.

Findings

Although a scattering of informal structures were identified throughout the study area, no sites of heritage significance could be identified.

The area adjacent to the development site does however have a strong historic association with the late Jan Smuts and the Jan Smuts Museum is located only 500m south of the boundary of the proposed development. The Irene Concentration Camp was also located close to the site. This lends a strong historic character to this landscape.

Recommendations

It is recommended that the development take into account the historic character of this area as well as its association with Jan Smuts – one of our most prominent statesmen ever – and the South African War through the Irene Concentration Camp and that this character is reflected and preserved in its design and layout. It is further recommended that a visual impact assessment be performed to gauge the possible visual impacts that the development might have on the museum and the cultural landscape.

16/04/2012

Fatal Flaws

No fatal flaws were identified.

TABLE OF CONTENTS

Introduction	8
Background Information	10
Proposed Crosswise Estate Project	10
Project Description.....	10
Site Location	11
Alternatives Considered.....	11
Methodology	11
Evaluating Heritage Impacts.....	11
Assessing Visual Impact.....	12
Regional Cultural Context	13
Paleontology	13
Stone Age.....	13
Iron Age	13
The Historic Era	14
Cultural Landscape.....	14
Assessment of Impacts	19
Impact Statement.....	19
Paleontological sites	19
Archeological Sites	19
Built Environment.....	19
Cultural Landscape.....	20
Resource Management Recommendations	21
Conclusion.....	22
References Cited.....	23
Methodology	26
Inventory	26

16/04/2012

Site Surveying.....	26
Survey Sampling.....	26
Systematic Survey Sampling.....	27
Judgemental Survey Sampling.....	27
Assessment.....	27
Site Evaluation.....	27
Significance Criteria.....	27
Assessing Impacts.....	28

LIST OF ABBREVIATIONS

Bp	Before Present
EIA	Early Iron Age
ESA	Early Stone Age
Fm	Femtometre (10^{-15} m)
GPS	Geographic Positioning System
HIA	Heritage Impact Assessment
LIA	Late Iron Age
LSA	Late Stone Age
MYA	Million Years Ago
MSA	Middle Stone Age
NHRA	National Heritage Resources Act no 22 of 1999
SAHRA	South African Heritage Resource Agency
S&EIR	Scoping & Environmental Impact Reporting
Um	Micrometre (10^{-6} m)
WGS 84	World Geodetic System for 1984

HERITAGE IMPACT REPORT

HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED CROSSWISE ESTATE EXTENSIONS 1 – 10 PROJECT.

INTRODUCTION

Legislation and methodology

G&A Heritage was appointed by *Bokomosa Environmental Consultants and Landscape Architects cc*, to undertake a heritage impact assessment for the proposed Crosswise Estate Extension 1 - 10. Section 27(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage impact assessment is undertaken for:

- (a) construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) construction of a bridge or similar structure exceeding 50 m in length; and
- (c) any development, or other activity which will change the character of an area of land, or water –
 - (1) exceeding 10 000 m² in extent;
 - (2) involving three or more existing erven or subdivisions thereof; or
 - (3) involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or
- (d) the costs of which will exceed a sum set in terms of regulations; or
- (e) any other category of development provided for in regulations.

A heritage impact assessment is not limited to archaeological artefacts, historical buildings and graves. It is far more encompassing and includes intangible and invisible resources such as places, oral traditions and rituals. A heritage resource is defined as any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes the following:

- (a) places, buildings, structures and equipment;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological sites;
- (g) graves and burial grounds, including –
 - (1) ancestral graves,
 - (2) royal graves and graves of traditional leaders,
 - (3) graves of victims of conflict (iv) graves of important individuals,
 - (4) historical graves and cemeteries older than 60 years, and
 - (5) other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
- (h) movable objects, including ;
 - (1) objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;
 - (2) ethnographic art and objects;
 - (3) military objects;
 - (4) objects of decorative art;
 - (5) objects of fine art;
 - (6) objects of scientific or technological interest;
 - (7) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and

- (8) any other prescribed categories, but excluding any object made by a living person;
- (i) battlefields;
 - (j) traditional building techniques.

A **'place'** is defined as:

- (a) A site, area or region;
- (b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
- (c) a group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'Structures' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'Archaeological' means:

- (a) material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- (b) rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation; and
- (c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;
- (d) features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Paleontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;

- Limited field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- It was assumed that the site layout as provided by Bokomosa is accurate.
- We assumed that the public participation process performed as part of the Scoping and Environmental Impact Reporting (S&EIR) process was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

Table 1. Impacts on the NHRA Sections

Act	Section	Description	Possible Impact	Action
National Heritage Resources Act (NHRA)	34	Preservation of buildings older than 60 years	None	None
	35	Archaeological, paleontological and meteor sites	No impact	None
	36	Graves and burial sites	None	None
	37	Protection of public monuments	None	None
	38	Does activity trigger a HIA?	Yes	HIA

Table 2. NHRA Triggers

Action Trigger	Yes/No	Description
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes	Access roads to new area as well as upgrading of existing roads
Construction of a bridge or similar structure exceeding 50m in length.	No	N/A
Development exceeding 5000 m ²	Yes	Crosswise Estate Extension 1-10
Development involving more than 3 erven or sub divisions	No	N/A
Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years	No	N/A
Re-zoning of site exceeding 10 000 m ²	No	N/A
Any other development category, public open space, squares, parks or recreational grounds	No	N/A

BACKGROUND INFORMATION

PROPOSED CROSSWISE ESTATE PROJECT

PROJECT DESCRIPTION

This project proposes the development of Extension 1 – 10 of the Crosswise Estate. This will be developed in four sections.



SITE LOCATION

The study area is located on Portion 20, 317 & 318 as well as the remainder of Portion 15 and Portion 113 of the farm Doornkloof 391 JR. One of the portions is located to the east of the R21 road while the rest is located to the west of the R21 between the R21 and the M18 highways. The total size of the development is 397.5 ha. The site is roughly halfway between Pretoria and Kempton Park.

ALTERNATIVES CONSIDERED

- No alternatives were considered.

METHODOLOGY

This study defines the heritage component of the S&EIR process being undertaken for the Crosswise Estate Extension 1 - 10. It is described as a first phase (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

After plotting of the site on a GPS the areas were accessed using suitable combinations of vehicle access and access by foot.

The proposed study area is divided into four sections. The first section is a narrow band on the eastern side of the R21 highway. Thereafter the other four sections are all between the R21 and the M18 highways.



Sites were documented by digital photography and geo-located with GPS readings using the WGS 84 datum.

Further techniques (where possible) included interviews with local inhabitants, visiting local museums and information centers and discussions with local experts. All this information was combined with information from an extensive literature study as well as the result of archival studies based on the SAHRA provincial databases.

Geological maps guided investigations into the paleontological riches of the area.

ASSESSING VISUAL IMPACT

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV Architects and The Department of Environmental Affairs and Development Planning (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalised. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimise the visual impact.



It is possible that a large development such as this could have a negative impact on the historic identity of the Irene area. It is therefore recommended that a cultural specific visual impact assessment be performed before the development continues.

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

REGIONAL CULTURAL CONTEXT

PALEONTOLOGY

The paleontology of Eastern Gauteng is less well researched than that of the Western Gauteng areas. The discovery of the Sterkfontein skeletons put this area in the forefront of paleontology worldwide. The rule of “absence of evidence is not evidence of absence” should however be applied to this area. Taken the rich paleontology of Western Gauteng it is conceivable that similar finds could be made in the east of Gauteng

STONE AGE

No substantial number of Stone Age sites from any period of the Stone Age is known to exist in this area – primarily as a result of a lack of research and general ignorance amongst the layman in recognizing stone tools that often may occur on the surface of the earth. However, it is possible that the first humans in the Irene area may have been preceded by *Homo erectus*, who roamed large parts of the world during the Acheulian period of the Early Stone Age, 500 000 years ago. The forbear of *H. erectus*, *Australopithecus*, considered to be the earliest ancestor of humans, lived in the Blaauwbank Valley around Krugersdorp (today part of the Cradle of Humankind – a World Heritage Site) several million years ago.

During the Middle Stone Age, 200 000 years ago, modern man or *Homo sapiens* emerged, manufacturing a wider range of tools, with technologies more advanced than those from earlier periods. This enabled skilled hunter-gatherer bands to adapt to different environments. From this time onwards, rock shelters and caves were used for occupation and reoccupation over very long periods of time. Two Middle Stone Age sites at the Withoek Spruit (Brakpan) were researched 17 years ago, but no information on this discovery has been published.

The Late Stone Age, considered to have started some 20 000 years ago, is associated with the predecessors of the San and Khoi Khoi. San hunter-gatherer bands with their small (microlithic) stone tools may have lived in Eastern Gauteng, as a magnificent engraving site near Duncanville attests to their presence in Vereeniging, south of, but close to Ekurhuleni. Stone Age hunter-gatherers lived well into the 19th century in some places in SA, but may not have been present in the Tswane area when the first European colonists crossed the Vaal River during the early part of the 19th century. Stone Age sites may occur all over the area where an unknown number may have been obliterated by mining activities, urbanization, industrialization, agriculture and other development activities during the past decades.

IRON AGE

A considerable number of Late Iron Age, stone walled sites, dating from the 18th and the 19th centuries (some of which may have been occupied as early as the 16th century), occur along and on top of the rocky ridges of the eastern part of the Klipriviersberg towards Alberton. These settlements and features in these sites, such as huts, were built with dry stone, reed and clay available from the mountain and the Klip River (Mason 1968, 1986).

The Late Iron Age sites within Ekurhuleni’s south-western border are a ‘spill-over’ from a larger concentration which are located further towards the west, in the Witwatersrand, while large concentrations of stone walled sites are also located directly to the south of Ekurhuleni, in the mountainous area around the Suikerbosrand in Heidelberg. The stone walled settlements are concentrated in clusters of sites and sometimes are dispersed over large areas making them vulnerable to developments of various kinds. A site consists of a circular or elliptical outer wall that is composed of a number of scalloped walls facing inwards towards one or more enclosures. Whilst the outer scalloped walls served as dwelling quarters for various family groups, cattle, sheep and goat were stock in the

centrally located enclosures. Huts with clay walls and floors were built inside the dwelling units. Pottery and metal items are common on the sites. However, iron and copper were not produced locally on these sites.

THE HISTORIC ERA

In 1841 the Erasmus family arrived and settled in the area that would later become Centurion. Daniel Jacobus Erasmus settled on the farm Zwartkop, Daniel Elardus Erasmus on the farm Doornkloof and Rasmus Elardus Erasmus developed the farm Brakfontein. Several of the suburbs like Erasmia, Elardus Park, Zwartkop and Doornkloof were named after the original owners of the land and their properties.

In 1849 Rev Andrew Murray visited the farm Doornkloof and christened 129 babies, heard the confession of their faith of 29 new members of the Reformed Church and the next day, 29 December 1849, celebrated Holy Communion.

In the battle for Rooihuiskraal took place in 1881 at the place where the existing historical terrain is situated. A commando under the leadership of DJ Erasmus Jnr. defeated Col Gildea, the Officer Commanding of the Pretoria Garrison.

Eight years later Alois Hugo Nelmapius bought the northern and north-eastern portions of the farm Doornkloof and named it after his daughter Irene, who died 1961.

During the Anglo-South African War the Irene Concentration Camp was established in 1901 on the farm Doornkloof, north of the Hennops River. The Irene Primary School was also established in the camp. The town of Irene was established in 1902 when Van der Bijl laid out 337 erven on the farm. Dr E G Jansen, later Governor General of South Africa, bought the house in which he lived. The farm also has a close relationship with a former Prime Minister of South Africa, Gen. J C Smuts.

Centurion developed from the initial Lyttelton Township that was marked out on the farm Droogegrond in 1904. Lyttelton Manor Extension 1 was established in 1942. These two townships initially resorted under the Peri Urban Board in Pretoria. They acquired a Health Committee consisting of six members in 1950 and in 1955 a town committee was elected. City Council status was awarded to the town in 1962 and this council had control over an area of 777 ha.

After the inclusion of a number of townships and farming areas, the area over which the city council exerted legal control grew to 6 220 ha and in 1973 this area was enlarged to 20 000 ha.

Lyttelton was renamed after the former Prime Minister, Hendrik Verwoerd to become the City of Verwoerdburg in 1967. After the elections of 1994 the Verwoerdburg City Council and the Rantesig local area committee were disbanded and a new local authority consisting of Verwoerdburg, Rantesig, Erasmia, Laudium, Christoburgh and Claudius came into being. The name Centurion was accepted in 1995 by the City Council.

CULTURAL LANDSCAPE

The Doornkloof farms and associated townships have a strong historic character which is reflected in the buildings and other infrastructure of the area.

The Smuts House Museum

Home to General Jan Smuts for over 40 years, Doornkloof in Irene, southeast of Pretoria, is a unique museum that reveals much about the life and the spirit of this great statesman. Soldier, scholar, statesman and philosopher, General Jan Christiaan Smuts was one of South Africa's most remarkable leaders, an enigmatic and multifaceted person who was never fully understood by his countrymen. But despite his fame and many talents, Smuts was at heart a simple man who yearned for peace and simplicity.

It was at Doornkloof, a modest wood-and-iron farmhouse in the veld outside the village of Irene, that he found the tranquility he craved; a place where, surrounded by his many children and grandchildren, he could indulge his passionate interest in botany.



Doornkloof, now called Smuts House Museum, has been preserved for future generations as a living memorial to the man known to everyone as 'Oubaas', housing many relics and mementos that offer fascinating insights into his extraordinary career.



This picturesque village of Irene, with its deep green meadows and hay-scented air, slumbers in its own little time capsule, a peaceful haven that seems oddly out of place on the industrialized Highveld. The road out of the village to Doornkloof winds through deep-shaded avenues of plane trees, poplars and old oaks; after about 2 km, you come to the gates of Doornkloof, where you will catch a glimpse of the old house through the trees.

The Irene Concentration Camp

The Irene Concentration Camp was opened on 2 November 1900; the intention being that it would be one of the camps that would house the Boer women and their children; that had been driven from their land by the British "scorched earth" policy during the Anglo Boer War of 1899-1902. Tragically the conditions in this camp, and most like it, were primitive and very little notice was taken by the authorities of the deaths that were caused by their lack of interest in the unfortunate inmates of the camps. The situation in Irene was also compounded by two uncaring and officious camp commandants who ironically were Afrikaners themselves.

It took women like Emily Hobhouse to raise public awareness about the situation in the camps, to a point where a commission of 6 women under Mrs. Millicent Fawcett was established, who went and inspected and made recommendations about improving the camps and the lot of those inside of them. Many other people took it upon themselves to assist where possible and often the dedication of medical staff and volunteers was all help there was. Of particular note are Henrietta Armstrong who kept an unofficial diary about the camp, as well as Hansie Van Warmelo and Hester Cilliers.

By the time public opinion had swelled enough to force action it was too late for the thousands of women and children who lost their lives. Approximately 4000 women and 23000 children died in these camps as a result of exposure, disease, starvation and a lack of medical care. There is no accurate figure available



as to how many Africans died in the camps, where they were housed, or even who they were or where they came from.

This particular garden of remembrance site is on the site of the camp cemetery. The generally accepted number of dead is 1149, but it is possible that many more are buried here. The cemetery is a national heritage site, under the protection of the SA Heritage Resource Agency.

MEASURING AND EVALUATING THE CULTURAL SENSITIVITY OF THE STUDY AREA

In 2003 the SAHRA compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

TYPE OF RESOURCE

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

TYPE OF SIGNIFICANCE

1. HISTORIC VALUE

It is important in the community, or pattern of history

- Important in the evolution of cultural landscapes and settlement patterns
- Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

2. AESTHETIC VALUE

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

3. SCIENTIFIC VALUE

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

4. SOCIAL VALUE

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

DEGREES OF SIGNIFICANCE

1. RARITY

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

2. REPRESENTIVITY

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

The table below illustrates how a site's heritage significance is determined

Spheres of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific Community			

What other similar sites may be compared to this site?

ASSESSMENT OF IMPACTS

IMPACT STATEMENT

PALEONTOLOGICAL SITES

No paleontological sites of high value could be identified. Paleontological sites could be affected if bedrock was to be disturbed during excavation activities.

Mitigation

Paleontological monitoring during excavation activities where bedrock is to be disturbed.

ARCHEOLOGICAL SITES

No sites of archaeological value were identified during the study.

Mitigation

It is recommended that possible unmarked or unidentified sites be taken into consideration during the construction activities and that the recommendations at the end of this section be applied to such sites. The public participation process should also investigate the possibility of unmarked graves in the area.

BUILT ENVIRONMENT

Some modern structures associated with farming were identified on the site these include;

- Brick sheds with corrugated roof (modern)
- Barb-wire fences (modern)
- Dirt roads (modern)
- Footpaths

The remains of a bridge approach were identified on the Rietvlei River near the third section. The build structure seems to be of modern origin. The bridge structure falls just outside of the study area; however it was felt prudent to mention it in this report due to the historic nature of this area.



Mitigation

None of the structures with the exception of the roads and fences will be affected by the development activities.

CULTURAL LANDSCAPE

The following landscape types were identified during the study.

Landscape Type	Description	Occurrence still possible?	Identified on site?
1 Paleontological	Mostly fossil remains. Remains include microbial fossils such as found in Baberton Greenstones	Yes, sub-surface	No
2 Archaeological	Evidence of human occupation associated with the following phases – Early-, Middle-, Late Stone Age, Early-, Late Iron Age, Pre-Contact Sites, Post-Contact Sites	Yes, sub-surface	No
3 Historic Built Environment	<ul style="list-style-type: none"> - Historical townscapes/streetscapes - Historical structures; i.e. older than 60 years - Formal public spaces - Formally declared urban conservation areas - Places associated with social identity/displacement 	No	No
4 Historic Farmland	<p>These possess distinctive patterns of settlement and historical features such as:</p> <ul style="list-style-type: none"> - Historical farm yards - Historical farm workers villages/settlements - Irrigation furrows - Tree alignments and groupings - Historical routes and pathways - Distinctive types of planting - Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting. 	Yes	Yes <ol style="list-style-type: none"> 1. Furrows, pathways. Eucalyptus trees. 2. Smuts House Museum at Doornkloof
5 Historic rural town	<ul style="list-style-type: none"> - Historic mission settlements - Historic townscapes 	No	No
6 Pristine natural landscape	<ul style="list-style-type: none"> - Historical patterns of access to a natural amenity - Formally proclaimed nature reserves - Evidence of pre-colonial occupation - Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages - Historical structures/settlements older than 60 years - Pre-colonial or historical burial sites - Geological sites of cultural significance. 	No	No
7 Relic Landscape	<ul style="list-style-type: none"> - Past farming settlements - Past industrial sites - Places of isolation related to attitudes to medical treatment - Battle sites - Sites of displacement, 	Yes	No
8 Burial grounds and grave sites	<ul style="list-style-type: none"> - Pre-colonial burials (marked or unmarked, known or unknown) 	Yes	No

	<ul style="list-style-type: none"> - Historical graves (marked or unmarked, known or unknown) - Graves of victims of conflict - Human remains (older than 100 years) - Associated burial goods (older than 100 years) - Burial architecture (older than 60 years) 		
9 Associated Landscapes	<ul style="list-style-type: none"> - Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes - Sites associated with displacement & contestation - Sites of political conflict/struggle - Sites associated with an historic event/person - Sites associated with public memory 	No	No
10 Historical Farmyard	<ul style="list-style-type: none"> - Setting of the yard and its context - Composition of structures - Historical/architectural value of individual structures - Tree alignments - Views to and from - Axial relationships - System of enclosure, e.g. defining walls - Systems of water reticulation and irrigation, e.g. furrows - Sites associated with slavery and farm labour - Colonial period archaeology 	No	No
11 Historic institutions	<ul style="list-style-type: none"> - Historical prisons - Hospital sites - Historical school/reformatory sites - Military bases 	Yes	The Irene Concentration Camp.
12 Scenic visual	<ul style="list-style-type: none"> - Scenic routes 	Yes	The Irene farm landscape.
13 Amenity landscape	<ul style="list-style-type: none"> - View sheds - View points - Views to and from - Gateway conditions - Distinctive representative landscape conditions - Scenic corridors 	No	No

Mitigation

It is recommended that the development designs take into account the positive and negative characteristics of the existing cultural landscape types and that they endeavor to promote the positive aspects while at the same time mitigating the negative aspects. The historic nature of the area should be taken into account. It is recommended that a visual impact assessment should be performed to determine the impact of this development on the cultural landscape. It is also further recommended that a copy of this report be made available to the Centurion Heritage Society for comments.

RESOURCE MANAGEMENT RECOMMENDATIONS

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to

the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

CONCLUSION

The area investigated is strongly associated with the recent history of South Africa and specifically with the South African War as well as the life of South African Prime Minister Jan Smuts. Large scale developments could significantly detract from the heritage significance of this area. No sites of heritage significance could be identified in the study areas, however due to its close proximity to important sites such as the Irene Concentration Camp and the Smuts House Museum it is further recommended that a cultural specific visual impact assessment be performed. It is also recommended that should bedrock be affected during trenching activities that a palaeontologist be appointed to monitor the construction activities.

REFERENCES CITED

- Arts and Culture Task Group, (1995), Draft report for the Ministry of Arts, Culture, Science and Technology. Pretoria: ACTAG.
- Bewsher, P K, & De Jong, R C, (1997), Ecotourism and cultural resource management. Document prepared for the SA Wildlife College. Pretoria: Centre for Ecotourism.
- Canadian Parks Service, (1989). Proposed policy.
- Cultural Institutions Act, No 119 of 1998.
- De Jong, R.C., (1992). Draft policy guidelines for cultural resource management in nature conservation and forestry areas in South Africa. Pretoria: National Cultural History Museum (unpublished)
- De Jong, R.C., (2011). Heritage Impact Assessment Revision 2 in Connection with Amendments to the Middelburg Water Reclamation Project, Steve Tswete Local Municipality, Mpumalanga. Unpublished HIA report.
- Department of Arts, Culture, Science and Technology, (1996). White Paper on Arts, Culture and Heritage. Pretoria: SA Communication Service.
- DEAT, (1996). White Paper on the Development and Promotion of Tourism in South Africa. Pretoria: The Department.
- DEAT, (1998). A national strategy for Integrated Environmental Management in South Africa. Discussion document. Pretoria: The Department.
- DEAT, (1998). White Paper on environmental management policy for South Africa. Government Gazette, Vol 395, No 18894, 15 May 1998.
- Department of Public Works, (1998), White Paper 1997. Public Works towards the 21st century. Government Gazette, Vol 391, No 18616, 14 January 1998.
- Entries on towns in the *Standard Encyclopedia of Southern Africa*, published by Nasou, 1970-1976 (11 volumes).
- Eskom Heritage website
- Files in Gauteng Office of SAHRA, Northwards, Parktown, Johannesburg
- Galla, A, (1996), Shifting the paradigm. A plan to diversify heritage practice in South Africa. Cape Town: South African Museums Association.
- Gauteng Department of Economic Affairs and Finance, (1997). Gauteng Tourism White Paper. Johannesburg: The Department.
- Hall, C.M, & McArthur, S. (eds), (1996). Heritage management in Australia and New Zealand. Draft publication.
- Harrison, R, (1994). Manual of heritage management. Oxford: Butterworth Heinemann.
- Jote, K, (1994). International legal protection of cultural heritage. Stockholm: Juristförlaget.
- Mason, R. (1986). Origins of Black People of Johannesburg and the Southern Western Central Transvaal AD350-1880. Occasional Paper No. 16 of the Archaeological Research Unit.
- Musa, (1994). Museums for South Africa: Intersectoral investigation for national policy. Pretoria: MUSA Secretariat.
- National Heritage Council Act, No 11 of 1999.
- National Heritage Resources Act, No 25 of 1999.

16/04/2012

- National Research Foundation, Nexus database of current and completed research projects
- Republic of South Africa, (1996). Constitution of the Republic of South Africa, Act 108 of 1996. Government Gazette, Vol 378, No 17678, 18 December 1996.
- Ross, M. (1996). Planning and the heritage. Policy and procedures. Second edition. London: E & FN Spon.
- SAHRA website <http://www.sahra.org.za>
- UNESCO, (1983). Conventions and recommendations concerning the protection of the cultural heritage. Paris: UNESCO.
- US National Parks Service, (1988). Management Policies.

APPENDIX A

GENERAL METHODOLOGY

METHODOLOGY

INVENTORY

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984*).

SITE SURVEYING

Site surveying is the process by which archaeological sites are located and identified on the ground. Archaeological site surveys often involve both surface inspection and subsurface testing. For the purposes of heritage investigations, *archaeological sites* refer to any site with heritage potential (i.e. historic sites, cultural sites, rock art sites etc.).

A systematic surface inspection involves a foot traverse along pre-defined linear transects which are spaced at systematic intervals across the survey area. This approach is designed to achieve representative area coverage. Alternatively, an archaeological site survey may involve a non-systematic or random walk across the survey area. Subsurface testing is an integral part of archaeological site survey. The purpose of subsurface testing, commonly called "shovel testing", is to:

- (a) assist in the location of archaeological sites which are buried or obscured from the surveyor's view, and
- (b) help determine the horizontal and vertical dimensions and internal structure of a site.

In this respect, subsurface testing should not be confused with evaluative testing, which is a considerably more intensive method of assessing site significance (*King, Thomas F., 1978*).

Once a site is located, subsurface testing is conducted to record horizontal extent, depth of the cultural matrix, and degree of internal stratification. Because subsurface testing, like any form of site excavation, is destructive it should be conducted only when necessary and in moderation.

Subsurface testing is usually accomplished by shovel, although augers and core samplers are also used where conditions are suitable. Shovel test units averaging 40 square cm are generally appropriate, and are excavated to a sterile stratum (i.e. C Horizon, alluvial till, etc.).

Depending on the site survey strategy, subsurface testing is conducted systematically or randomly across the survey area. Other considerations such as test unit location, frequency, depth and interval spacing will also depend on the survey design as well as various biophysical factors. (*Lightfoot, Keng G. 1989*).

SURVEY SAMPLING

Site survey involves the complete or partial inspection of a proposed project area for the purpose of locating archaeological or other heritage sites. Since there are many possible approaches to field survey, it is important to consider the biophysical conditions and archaeological site potential of the survey area in designing the survey strategy.

Ideally, the archaeological site inventory should be based on intensive survey of every portion of the impact area, as maximum area coverage will provide the most comprehensive understanding of archaeological and other heritage resource density and distribution. However, in many cases the size of the project area may render a complete survey impractical because of time and cost considerations.

In some situations it may be practical to intensively survey only a sample of the entire project area. Sample selection is approached systematically, based on accepted statistical sampling procedures, or judgementally, relying primarily on subjective criteria (*Butler, W., 1984*).

SYSTEMATIC SURVEY SAMPLING

A systematic sample survey is designed to locate a representative sample of archaeological or heritage resources within the project area. A statistically valid sample will allow predictions to be made regarding total resource density, distribution and variability. In systematic sample surveys it may be necessary to exempt certain areas from intensive inspection owing to excessive slope, water bodies, landslides, land ownership, land use or other factors. These areas must be explicitly defined. Areas characterized by an absence of road access or dense vegetation should not be exempted. (*Dunnell, R.C., Dancey W.S. 1983*).

JUDGEMENTAL SURVEY SAMPLING

Under certain circumstances, it is appropriate to survey a sample of the project area based entirely on professional judgement regarding the location of sites. Only those areas which can reasonably be expected to contain archaeological or heritage sites are surveyed.

However, a sufficient understanding of the cultural and biophysical factors which influenced or accounted for the distribution of these sites over the landscape is essential. Careful consideration must be given to ethnographic patterns of settlement, land use and resource exploitation; the kinds and distribution of aboriginal food sources; and restrictions on site location imposed by physical terrain, climatic regimes, soil chemistry or other factors. A judgemental sample survey is not desirable if statistically valid estimates of total heritage resource density and variability are required (*McManamon F.P. 1984*).

ASSESSMENT

Assessment studies are only required where conflicts have been identified between heritage resources and a proposed development. These studies require an evaluation of the heritage resource to be impacted, as well as an assessment of project impacts. The purpose of the assessment is to provide recommendations as to the most appropriate manner in which the resource may be managed in light of the identified impacts. Management options may include alteration of proposed development plans to avoid resource impact, mitigative studies directed at retrieving resource values prior to impact, or compensation for the unavoidable loss of resource values.

It is especially important to utilize specialists at this stage of assessment. The evaluation of any archaeological resource should be performed by professionally qualified individuals.

SITE EVALUATION

Techniques utilized in evaluating the significance of a heritage site include systematic surface collecting and evaluative testing. Systematic surface collection is employed wherever archaeological remains are evident on the ground surface. However, where these sites contain buried deposits, some degree of evaluative testing is also required.

Systematic surface collection from archaeological sites should be limited, insofar as possible, to a representative sample of materials. Unless a site is exceptionally small and limited to the surface, no attempt should be made at this stage to collect all or even a major portion of the materials. Intensive surface collecting should be reserved for full scale data recovery if mitigative studies are required.

Site significance is determined following an analysis of the surface collected and/or excavated materials (*Miller, C.L. II, 1989*).

SIGNIFICANCE CRITERIA

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are provided in Appendix B and Appendix C. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information which, if properly recovered, will enhance understanding of Southern African human history is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population (*Smith, L.D. 1977*).

ASSESSING IMPACTS

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

- (a) destruction or alteration of all or part of a heritage site;
- (b) isolation of a site from its natural setting; and
- (c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future

opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined in Appendix D:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. (*Zubrow, Ezra B.A., 1984*).

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the surveyors to evaluate the relative importance of sites found. Furthermore GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a **Garmin Colorado** GPS (WGS 84- datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development. It may also be referred to as archaeological testing' (DAHGI 1999a, 27).

'Test excavation should not be confused with, or referred to as, archaeological assessment which is the overall process of assessing the archaeological impact of development. Test excavation is one of the techniques in carrying out archaeological assessment which may also include, as appropriate, documentary research, field walking, examination of upstanding or visible features or structures, examination of aerial photographs, satellite or other remote sensing imagery, geophysical survey, and topographical assessment' (DAHGI 1999b, 18).

Scientific Significance

(a) Does the site contain evidence which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

- internal stratification and depth
- chronologically sensitive cultural items
- materials for absolute dating
- association with ancient landforms
- quantity and variety of tool type
- distinct intra-site activity areas
- tool types indicative of specific socio-economic or religious activity
- cultural features such as burials, dwellings, hearths, etc.
- diagnostic faunal and floral remains
- exotic cultural items and materials
- uniqueness or representativeness of the site
- integrity of the site

(b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

(c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?

- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

(d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

Public Significance

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site

- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?

Ethnic Significance

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

- ethnographic or ethno-historic reference
- documented local community recognition or, and concern for, the site

Economic Significance

(a) What value of user-benefits may be placed on the site?

- visitors' willingness-to-pay
- visitors' travel costs

Scientific Significance

(a) Does the site contain evidence which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?

(b) Does the site contain evidence which can make important contributions to other scientific disciplines or industry?

Historic Significance

(a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?

(b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?

(c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?

(d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

Indicators of Impact Severity

Magnitude

The amount of physical alteration or destruction which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts which result in a totally irreversible and irretrievable loss of heritage value are of the highest severity.

Duration

The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

Diversity

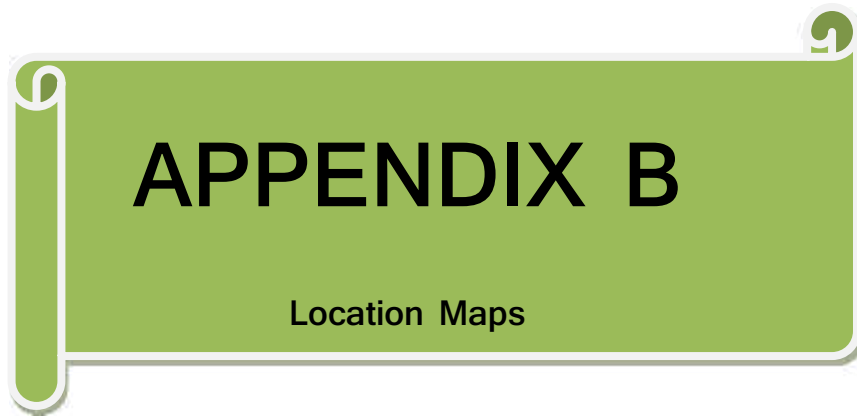
The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

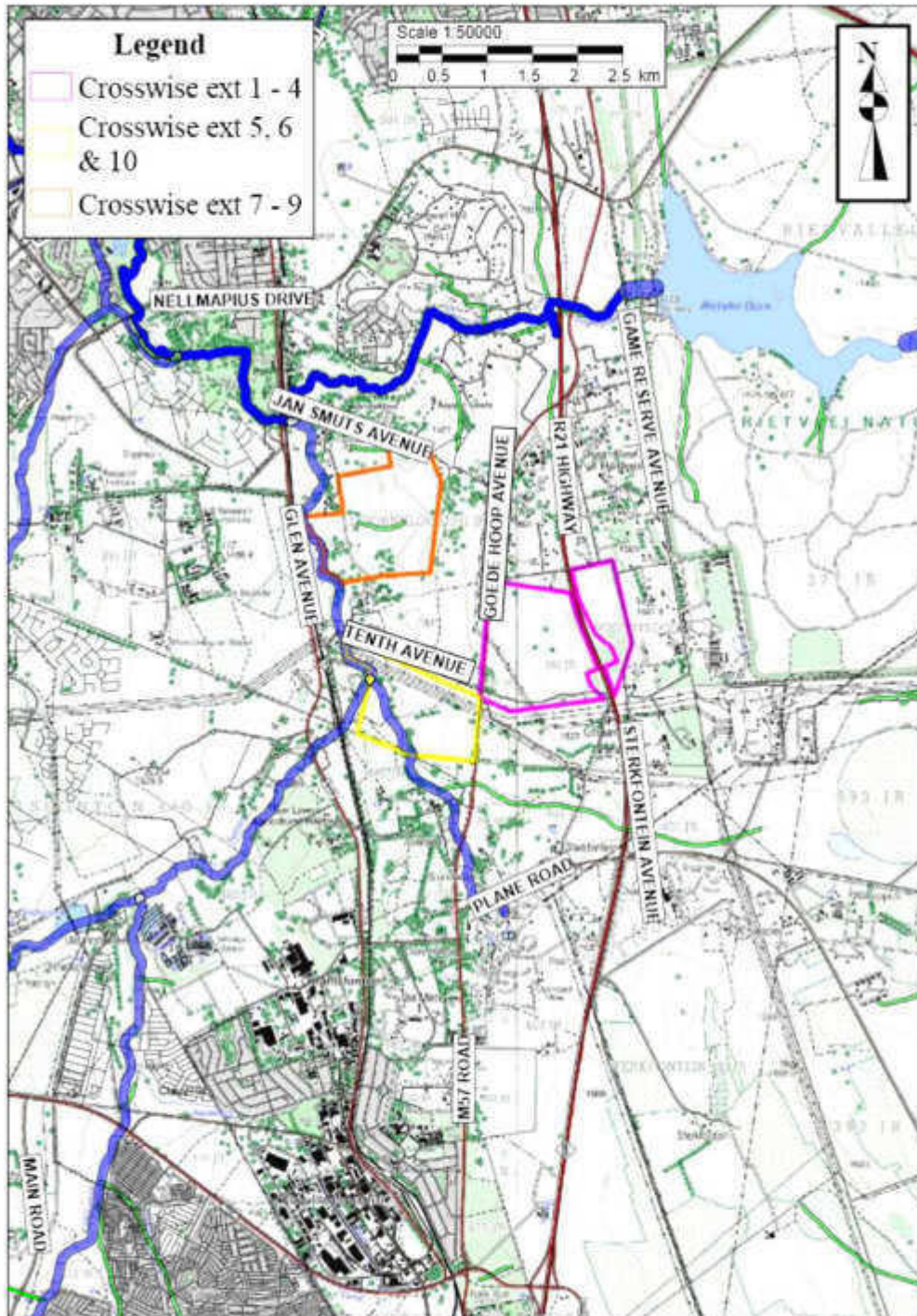
The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.



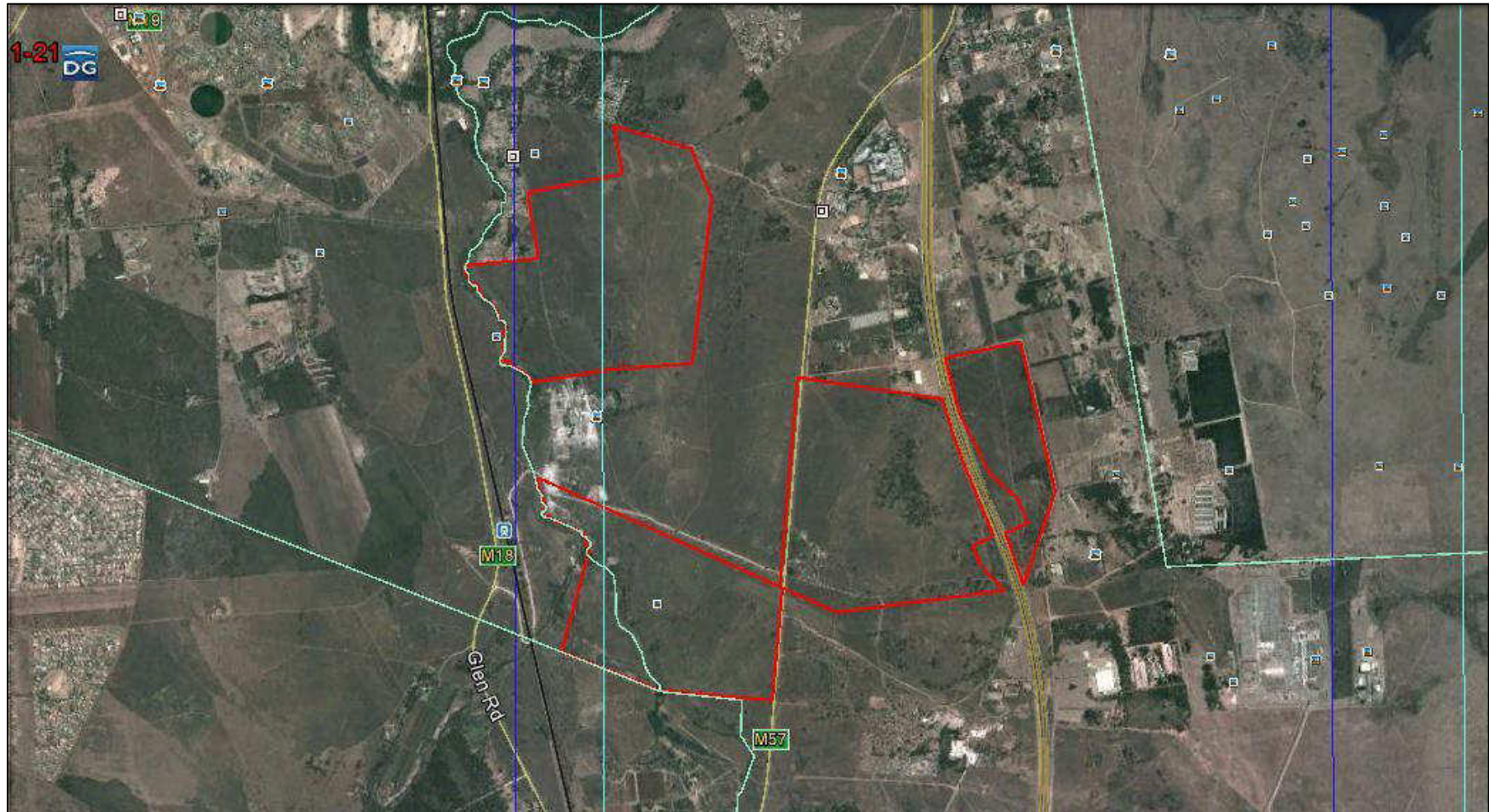
APPENDIX B

Location Maps

Location Map for the Crosswise Estate HIA



Aerial View of the Proposed Crosswise Estate





Annexure G(xi)

Agricultural Potential Study





REPORT

AGRICULTURAL POTENTIAL SURVEY: PROPOSED CROSSWISE DEVELOPMENT, GAUTENG PROVINCE

February 20th, 2013

**Compiled by:
J.H. van der Waals
(PhD Soil Science, Pr.Sci.Nat)**

Member of:
Soil Science Society of South Africa (SSSSA)
Soil Science Society of America (SSSA)

Accredited member of:
South African Soil Surveyors Organisation (SASSO)

Registered with:
The South African Council for Natural Scientific Professions
Registration number: 400106/08

Declaration

I, Johan Hilgard van der Waals, declare that I –

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



J.H. VAN DER WAALS
TERRA SOIL SCIENCE

TABLE OF CONTENTS

1.	INTRODUCTION.....	1
1.1	Terms of Reference	1
1.2	Agricultural Potential Background	1
2.	BRIEF DESCRIPTION OF THE SURVEY AREA	2
2.1	Survey Area Boundary.....	2
2.2	Survey Area Physical Features.....	2
3.	METHOD OF SOIL AND AGRICULTURAL SURVEY	2
3.1	Phase 1: Land Type Data	2
3.2	Phase 2: Topographic Parameters.....	2
3.3	Phase 3: Satellite Image Interpretation	3
3.4	Phase 4: Site Visit and Soil Survey	4
4.	SURVEY RESULTS	4
4.1	Phase 1: Land Type Data	4
4.2	Phase 2: Topographic Parameters.....	6
4.3	Phase 3: Satellite Image Interpretation	9
4.4	Phase 4: Site Visit and Soil Survey	10
5.	AGRICULTURAL POTENTIAL.....	16
5.1	Agricultural Potential of the Site	16
5.2	Soil Potential Linked to Current Land Use and Status.....	16
5.3	Cost-benefit Analysis	16
5.4	Current Activities / Developments / Buildings	17
5.5	Surrounding Developments / Land Uses / Activities Within a 500 m Radius	17
5.6	Current Status of Land.....	17
5.7	Possible Land Use Options for the Site.....	17
6.	CONCLUSIONS AND RECOMMENDATIONS.....	17

Agricultural Potential Survey – Proposed Crosswise Development, Gauteng Province

1. INTRODUCTION

1.1 TERMS OF REFERENCE

Terra Soil Science was appointed by **Bokamoso** to conduct an agricultural potential survey/assessment of the proposed Crosswise development sites in the Gauteng Province.

1.2 AGRICULTURAL POTENTIAL BACKGROUND

The assessment of agricultural potential rests primarily on the identification of soils that are suited to crop production. In order to qualify as high potential soils they must have the following properties:

- Deep profile (more than 600 mm) for adequate root development,
- Deep profile and adequate clay content for the storing of sufficient water so that plants can weather short dry spells,
- Adequate structure (loose enough and not dense) that allows for good root development,
- Sufficient clay or organic matter to ensure retention and supply of plant nutrients,
- Limited quantities of rock in the matrix that would otherwise limit tilling options and water holding capacity,
- Adequate distribution of soils and size of high potential soil area to constitute a viable economic management unit, and
- Good enough internal and external (out of profile) drainage if irrigation practices are considered. Drainage is imperative for the removal (leaching) of salts that accumulate in profiles during irrigation and fertilization.

In addition to soil characteristics, climatic characteristics need to be assessed to determine the agricultural potential of a site. The rainfall characteristics are of primary importance and in order to provide an adequate baseline for the viable production of crops rainfall quantities and distribution need to be sufficient and optimal.

In the case where crop production is not possible due to soil or climatic constraints aspects such as grazing potential and carrying capacity is considered. Grazing capacity is mainly determined by vegetation characteristics of a site and would therefore have to be deduced from vegetation reports (that do address carrying capacity) or from dedicated discussions with farmers and land users. The

combination of the above mentioned factors will be used to assess the agricultural potential of the soils on the site.

2. BRIEF DESCRIPTION OF THE SURVEY AREA

2.1 SURVEY AREA BOUNDARY

The survey area lies between 25° 53' 15" and 25° 55' 28" S and 28° 13' 29" and 28° 15' 51" E immediately west of the Rietvlei Nature Reserve (**Figure 1**). The survey site is surrounded by various urban and industrial developments and open land on all sides.

2.2 SURVEY AREA PHYSICAL FEATURES

The altitude above mean sea level varies from 1440 in the west to 1540 in the east. The geology of the area is dominated by dolomite and chert with inclusions of shale and quartzite – leading to the dominance of red sandy clay loam soils of variable depth and rockiness.

3. METHOD OF SOIL AND AGRICULTURAL SURVEY

The survey was conducted in four phases.

3.1 PHASE 1: LAND TYPE DATA

Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 – 2006). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System (MacVicar et al., 1977). The soil data was interpreted and re-classified according to the Taxonomic System (The Soil Classification Working Group, 1991).

3.2 PHASE 2: TOPOGRAPHIC PARAMETERS

The topography of the site was elucidated through the generation of a digital elevation model (DEM) map, a slope map and a topographic wetness index (TWI) for the site. Data generated during this phase was verified during the field survey phase and used to generate additional soil information for the site.

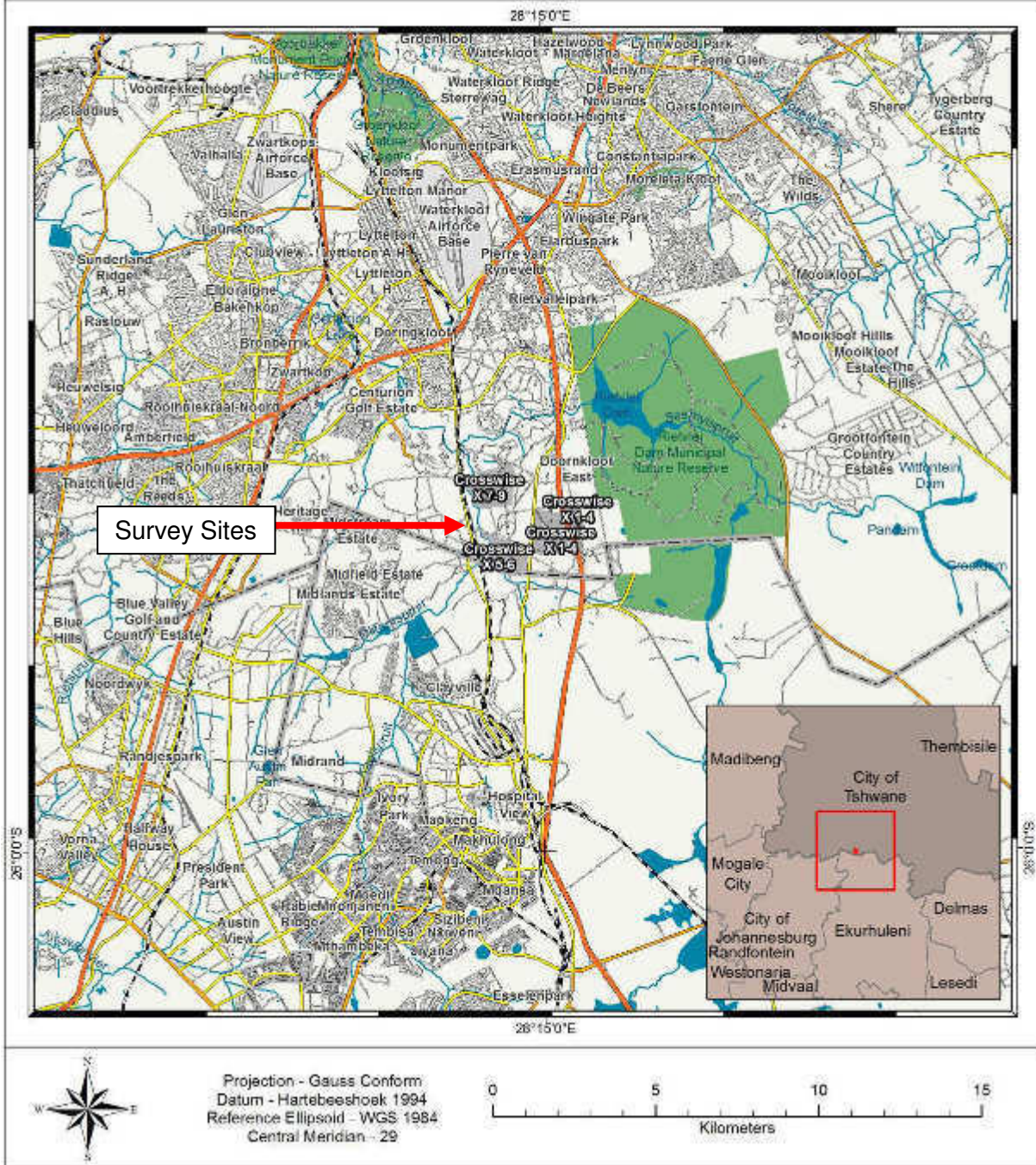


Figure 1 Location of the survey sites

3.3 PHASE 3: SATELLITE IMAGE INTERPRETATION

A dedicated satellite image (Google Earth) interpretation exercise was conducted to complement the predictive soil mapping exercise. This was done through the accessing of Google Earth images and the identification of landscape features that are known to be associated with soil properties.

3.4 PHASE 4: SITE VISIT AND SOIL SURVEY

For the soil survey the site was traversed on foot and in a vehicle. Additionally, several profile pits were dug with a TLB to determine profile stoniness due to the restrictions posed by rocks in the auguring of the soils with a hand auger. Photographs were taken of noteworthy aspects and these are provided in the report.

4. SURVEY RESULTS

4.1 PHASE 1: LAND TYPE DATA

Figure 2 presents the land type distribution for the site and surrounding area. The land types found on the site are **Ab1**, **Ab2** and to a lesser extent **Ba3** (Land Type Survey Staff, 1972 – 2006). Below follows a brief description of the land types in terms of soils, land capability, land use and agricultural potential.

Land Types Ab1 and Ab2

Land Type – General: Ab land types accommodate soils that are predominantly red and that have no water tables within the profile.

Soils: Almost exclusively red sandy loam soils of varying depth and rockiness. Valley bottom soils are structured with limited signs of wetness.

Land capability and land use: Due to the ubiquitous presence of rock in the landscape the soils are mainly suitable for grazing. This mimics the land use in that areas outside urban developments are used for grazing. Within urban areas grazing land uses are limited.

Agricultural potential: Due to the ubiquitous presence of rock in the landscape the agricultural potential is considered to be low in terms of crop production and high in terms of grazing. In areas where soil preparation has been done (on suitable soils) the land types have a high potential, especially if irrigation water is available.

Land Type Ba3

Land Type – General: Ba land types accommodate soils that are predominantly mesotrophic and dystrophic yellow and red profiles in a plinthic catena.

Soils: Red to yellow sandy loam soils in upland positions and structured soils with distinct signs of wetness in footslope and valley bottom positions.

Land capability and land use: The land capability is mainly arable and grazing depending on soil depth. Large areas have been developed through urbanisation. The land use mimics the land capability.

Agricultural potential Where soil profiles are deep enough the land type is considered to be of high potential. Large areas are dominated by shallow profiles with a subsequent low potential.

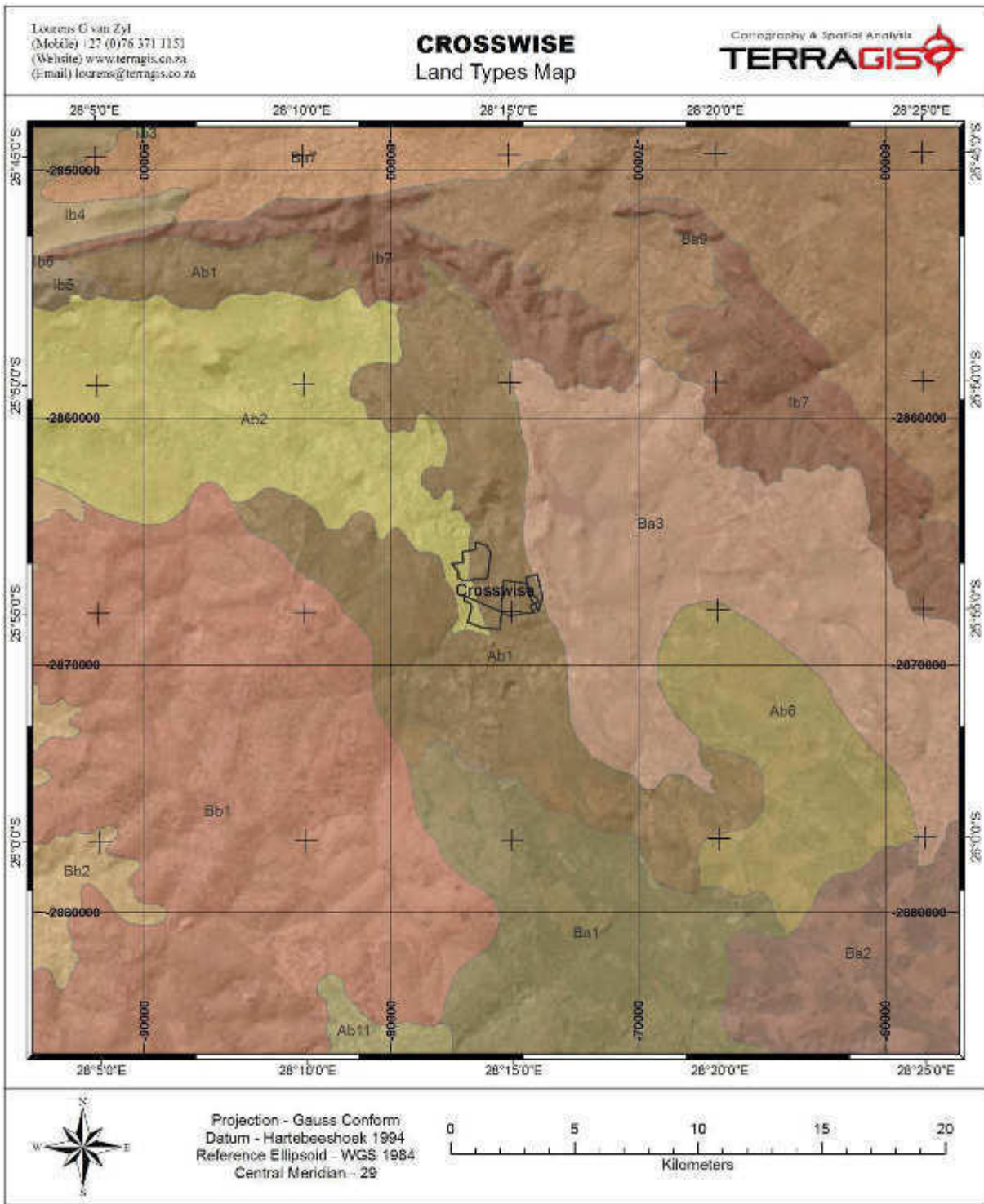


Figure 2 Land type map of the survey site and its surrounding area

4.2 PHASE 2: TOPOGRAPHIC PARAMETERS

Contours of the site (5 meters – **Figure 3**) were used to generate a digital elevation model (**Figure 4**). This data was used to generate the topographic wetness index (TWI) for the site (**Figure 5**). The TWI indicates areas where water will flow and accumulate on the surface and does not necessarily indicate wetlands.



Figure 3 Satellite image of the site with 5 meter contours

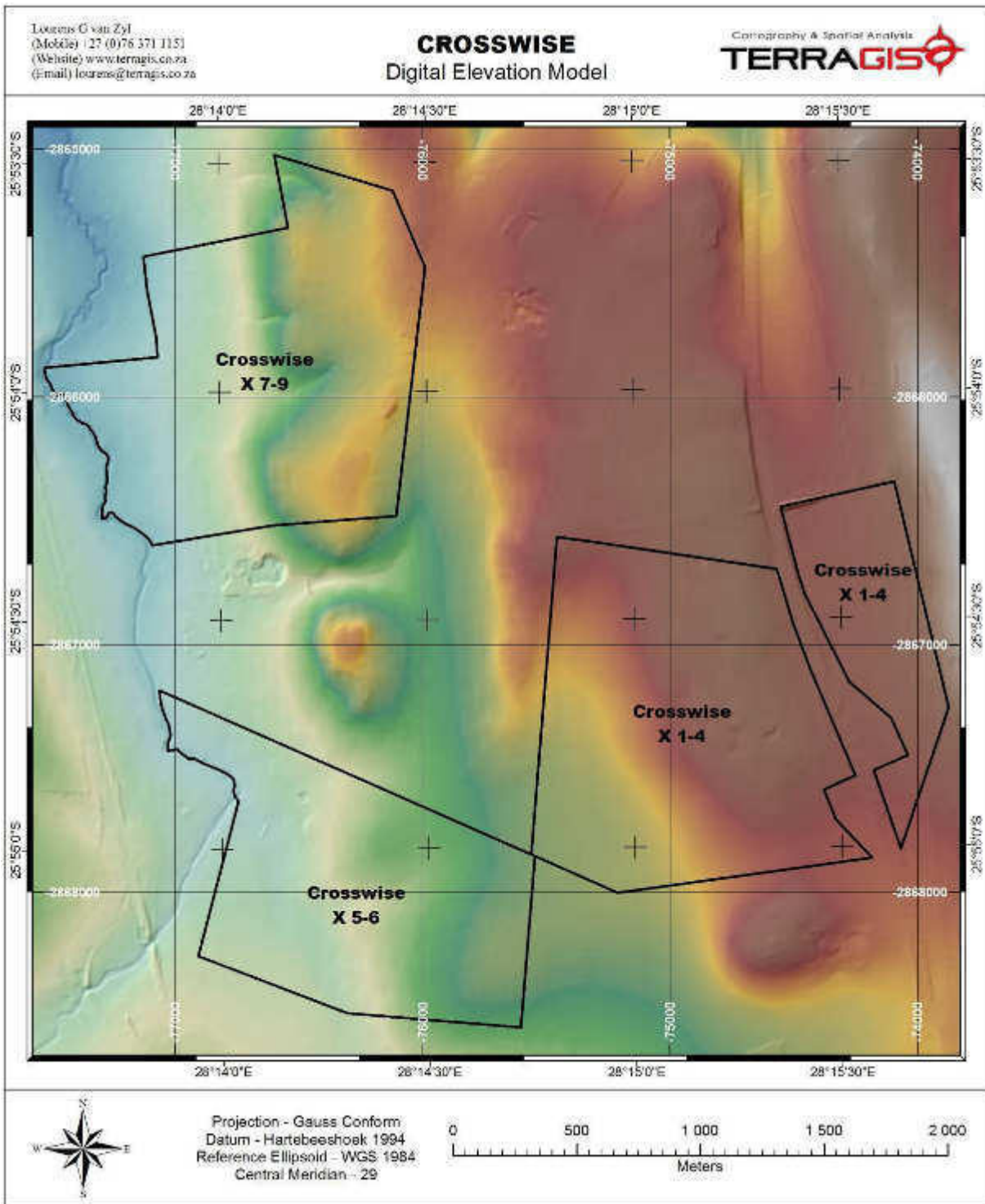


Figure 4 Digital elevation model for the survey site

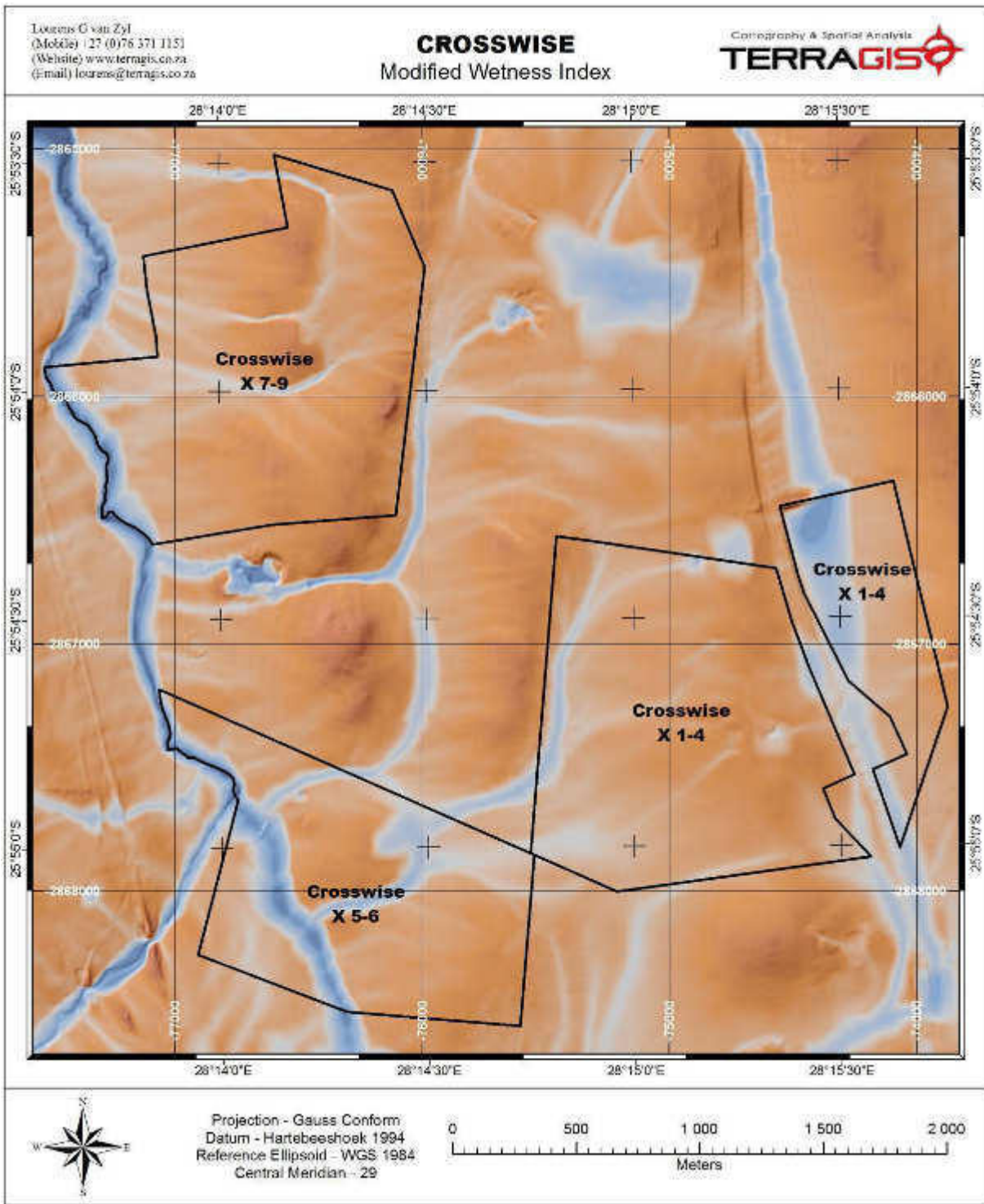


Figure 5 Topographic wetness index for the survey site

4.3 PHASE 3: SATELLITE IMAGE INTERPRETATION

From the satellite image (**Figure 6**) it is evident that only one land use dominates namely grazing. However, due to the encroachment of human activities and formal and informal housing the grazing that takes place is haphazard and uncontrolled.



Figure 6 Satellite image of the survey site with the proposed turbine positions and influence areas

4.4 PHASE 4: SITE VISIT AND SOIL SURVEY

The soil survey revealed that the soils on the site vary from very shallow and rocky red soils of the Mispah (orthic A horizon / hard rock) and Hutton (orthic A horizon / red apedal B horizon / unspecified material – usually hard or weathering rock) forms on the crest and midslope positions of localised topography (**Figures 7 to 9**). The footslope positions are dominated by slightly deeper soils of the Hutton form but these have copious amounts of rock in the profile matrix (**Figures 10 to 12**). Occasionally deep soils are found but then these are interspersed with frequent dolomite rock outcrops (**Figures 13 to 17**).

The absence of historical signs of ploughing and crop production attests to the limitations that the soils on site pose to such land uses. Although there are signs of grazing no cattle were encountered during the survey. Some areas on the site have been used for the illegal dumping of rubble (**Figure 18**).



Figure 7 Rock outcrops (dolomite) and shallow soils on the site



Figure 8 Rock outcrops (dolomite) and shallow soils on the site



Figure 9 Rock outcrops (quartzite) and shallow soils on the site



Figure 10 Shallow soil profile with chert pebbles throughout



Figure 11 Shallow soil profile with chert



Figure 12 Shallow soil profile with chert



Figure 13 Deeper soil profile with dolomite rock outcrops in the background



Figure 14 Dolomite rock outcrop



Figure 15 Deeper soil profile with dolomite rock to the left and chert rocks and pebbles in the matrix



Figure 16 Deeper soil profile in valley bottom position



Figure 17 Deeper soil profile in valley bottom position



Figure 18 Rubble disposal in the general area of the site

5. AGRICULTURAL POTENTIAL

5.1 AGRICULTURAL POTENTIAL OF THE SITE

Due to the dominance of shallow and rocky soils on the site it is considered to be of low agricultural potential from a crop production perspective. The grazing potential is high but this land use is not viable due to the lack of fences and high human traffic in the area. Some areas have been used for the dumping of rubble, therefore further decreasing the potential of the site.

5.2 SOIL POTENTIAL LINKED TO CURRENT LAND USE AND STATUS

The current land use of the site appears to be derelict open veld as there are no structured farming activities taking place. Although the site is suitable for grazing it appears that there are major limitations to this land use. The limitations relate to a lack of fencing and high human traffic within the area.

5.3 COST-BENEFIT ANALYSIS

Under the specific circumstances the costs of production will invariably outweigh the potential benefit as the soils are predominantly shallow and there are significant constraints (predominantly due to security) in terms of grazing activities. Under these conditions a cost-benefit analysis will invariably be negative.

5.4 CURRENT ACTIVITIES / DEVELOPMENTS / BUILDINGS

From the site investigation it appears that the site is not used for any specific agricultural activity. As such there are no structures or buildings except for limited historical mining and industrial activities and associated structures.

5.5 SURROUNDING DEVELOPMENTS / LAND USES / ACTIVITIES WITHIN A 500 M RADIUS

The area within a 500 m radius of the site, in terms of land use, does not include any activities other than those indicated in this report.

5.6 CURRENT STATUS OF LAND

The current status of the land appears to be derelict land that is not being used for any dedicated purpose. It is assumed that this status is due to the low potential of the land as well as the encroaching human activities on all sides. The site characteristics (in terms of soil properties and surrounding developments and activities) preclude the sites from being used successfully for agricultural purposes.

5.7 POSSIBLE LAND USE OPTIONS FOR THE SITE

Apart from the current land uses there is no other land use considered to be ideally suited to the specific soil and site characteristics.

6. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that:

1. The site is dominated by shallow and rocky soils. In some areas deep soils occur but these are interspersed with distinct dolomite outcrops.
2. The soils on the site are not suited to crop production activities due to the limitations posed to tillage.
3. The site is suited to extensive grazing but this land use is unlikely as several human activities in the area as well as the lack of fencing restrict grazing potential.
4. There is no way of improving the agricultural potential of the sites through soil preparation or incorporation of neighbouring land.

References

Land Type Survey Staff. 1972 – 2006. Land Types of South Africa: Digital map (1:250 000 scale) and soil inventory databases. ARC-Institute for Soil, Climate and Water, Pretoria.

MacVicar CN, De Villiers JM, Loxton RF, Verster E, Lambrechts JJN, Merryweather FR, Le Roux J, Van Rooyen TH, Harmse HJ von M. 1977. Soil Classification. A binomial system for South Africa. *Sci. Bull. 390. Dep. Agric. Tech. Serv., Repub. S. Afr.*, Pretoria.

Soil Classification Working Group. 1991. Soil Classification. A taxonomic system for South Africa. *Mem. Agric. Nat. Resour. S.Afr.* No.15. Pretoria.



Annexure G(xii)

Market Study





Doornkloof Mixed Use Market Study

MARKET RESEARCH FINDINGS & RECOMMENDATIONS

February 2008

DEMACON Market Studies
PO BOX 95530
WATERKLOOF
0145
Tel: +27 12 460 7009
Fax: 27 12 346 5883
Cell: +27 82 898 8667
E-mail: hein@demacon.co.za
Website: www.demacon.co.za



Demacon is a member of

SOUTH AFRICAN COUNCIL OF SHOPPING CENTRES (SACSC)



SOUTH AFRICAN PROPERTY OWNERS ASSOCIATION (SAPOA)



The information contained in this report has been compiled with the utmost care and accuracy within the parameters specified in this document. Any decision based on the contents of this report is, however, the sole responsibility of the decision maker.

Enquiries:

Hein du Toit

+27 12 460 7009 (t)

+27 12 346 5883 (f)

+27 82 8988 667

hein@demacon.co.za

www.demacon.co.za

TABLE OF CONTENTS

EXECUTIVE SUMMARY1

CHAPTER 1: INTRODUCTION7

1.1 BACKGROUND7

1.2 PROJECT BRIEF7

1.3 STUDY AREA DELINEATION7

1.4 REPORT OUTLINE.....7

CHAPTER 2: LOCATION ANALYSIS9

2.1 INTRODUCTION9

2.2 DEFINING CORRIDORS / NODES10

2.3 CORRIDOR AND NODAL DEVELOPMENT ENVISIONED IN TERMS OF THE SDF.....12

2.4 DEVELOPMENT DRIVERS IN THE AREA15

2.5 GAUTENG FREEWAY IMPROVEMENT PROJECTS / ROAD UPGRADINGS18

2.6 MIXED USE PRECINCTS & NEW URBANISM CONCEPTS.....19

2.7 ENERGY NODES AND COMPOSITION OF MIXED USE NODES21

2.8 DEVELOPMENT SITE ASSESSMENT23

2.9 SYNTHESIS.....28

CHAPTER 3: ECONOMIC PROFILE.....29

3.1 INTRODUCTION29

3.2 REFERENCE FRAMEWORK.....29

3.3 MACROECONOMIC FUNDAMENTALS.....30

3.4 LOCAL ECONOMIC TRENDS38

3.5 SYNTHESIS.....54

CHAPTER 4: CONSUMER MARKET PROFILE56

4.1 INTRODUCTION56

4.2 MARKET AREA DELINEATION AND POPULATION SIZE.....56

4.3 AGE PROFILE59

4.4 LIFE STAGES.....59

4.5 HIGHEST LEVEL OF EDUCATION61

4.6 EMPLOYMENT STATUS62

4.7 OCCUPATION PROFILE63

4.8 DWELLING TYPES64

4.9 TENURE STATUS64

4.10 ANNUAL HOUSEHOLD INCOME65

4.11 LIVING STANDARD MEASUREMENT.....66

4.12 SYNTHESIS.....67

CHAPTER 5: RESIDENTIAL MARKET ANALYSIS.....69

5.1 INTRODUCTION69

5.2 DOMESTIC MARKET INDICATORS – STATE OF THE MARKET.....69

5.3 RESIDENTIAL DEMAND MODELING.....75

5.4 SYNTHESIS.....81

CHAPTER 6: RETAIL MARKET ANALYSIS.....	82
6.1 INTRODUCTION	82
6.2 LOCAL DEVELOPMENT PERSPECTIVE.....	82
6.3 MARKET POTENTIAL ASSESSMENT	82
6.4 RETAIL MARKET DEMAND ESTIMATIONS	84
6.5 SYNTHESIS.....	88
CHAPTER 7: OFFICE MARKET ANALYSIS.....	90
7.1 INTRODUCTION	90
7.2 OFFICE MARKET INDICATORS.....	90
7.3 SPACE DEMAND MODELING	95
7.4 GENERAL OFFICE MARKET TRENDS.....	98
7.5 RECENT / PROPOSED OFFICE DEVELOPMENTS IN GAUTENG	104
7.6 SYNTHESIS.....	108
CHAPTER 8: LIGHT INDUSTRIAL / COMMERCIAL MARKET.....	110
8.1 INTRODUCTION	110
8.2 GENERAL INDUSTRIAL MARKET TRENDS	110
8.3 INDUSTRIAL MARKET OVERVIEW	112
8.4 AREA GROWTH PROSPECTS	114
8.5 LOCAL MARKET INDICATORS	118
8.6 SELECTION OF PREFERRED / EXEMPLARY INDUSTRIAL / WAREHOUSING CASE STUDIES	123
8.7 INDUSTRIAL NET SPACE DEMAND MODELING	125
8.8 SYNTHESIS.....	129
CHAPTER 9: PRIVATE HOSPITAL MARKET.....	130
9.1 INTRODUCTION	130
9.2 COMPETING PRIVATE HOSPITAL FACILITIES	130
9.3 MARKET POTENTIAL ESTIMATION	130
9.4 SYNTHESIS.....	132
CHAPTER 10: DEVELOPMENT RECOMMENDATIONS	133
10.1 INTRODUCTION	133
10.2 RESIDENTIAL MARKET RECOMMENDATIONS	133
10.3 RETAIL MARKET RECOMMENDATIONS.....	134
10.4 OFFICE DEVELOPMENT RECOMMENDATIONS.....	137
10.5 INDUSTRIAL / COMMERCIAL DEVELOPMENT RECOMMENDATIONS	139
10.6 PRIVATE HOSPITAL RECOMMENDATIONS.....	140
10.7 INCREMENTAL DEMAND / PHASING	141
10.8 CONCEPTUAL MAP OF DOORNKLOOF MIXED USE DEVELOPMENT.....	142

PREFACE

Albertina Sisulu Corridor Investor's Facts:

- ✓ The greater Albertina Sisulu Development Corridor is **one of a hand full** of geographic investment destinations in Southern Africa that could accommodate well in excess of 500 000sqm retail and commercial GLA in the next decade.
- ✓ The corridor draws direct benefit from location attributes such as direct access to **O.R. Tambo International Airport** (formerly Johannesburg International Airport) and its R3.3 billion upgrade programme - the initial phases of which have commenced prior to the 2010 Soccer World Cup in SA as host country. O.R Tambo is the busiest international airport on the African Continent.
- ✓ **Amenity value** within the corridor area is greatly enhanced by secure, up-market lifestyle estate developments, including developments with anticipated amenity and golf icon status.
- ✓ Demand for **residential units** in the greater corridor area is forecast to exceed ±40 000 units over the next 10 to 15 years.
- ✓ The **Kempton Park local economy**, within which the corridor is partially located, is expanding at a rate exceeding 9% per annum in value added (gross geographic production) and the **Centurion local economy** is expanding at a rate exceeding 7% per annum - close to double the rate of the national economy at 4.7% per annum.
- ✓ The greater corridor area offers a broad spectrum of **mixed land use development and investment opportunities** (residential, retail, office, industrial, warehousing & distribution) on more than 5 000 hectares of greenfields land.
- ✓ The corridor is fast emerging as a **driver** of sub-regional economic growth.

EXECUTIVE SUMMARY

➤ PROJECT BRIEF

Demacon Market Studies were commissioned by **Tech IQ Consulting Engineers** to perform a comprehensive, specialist potential assessment to determine the capacity of the local market to sustain a mixed use development node situated on portion 15, 20 and 113 of the farm Doornkloof 391 JR, south of Irene Estate, Centurion.

➤ DEMOGRAPHIC OVERVIEW:

The market area is informed by an anticipated 10km radius. Given the expected regional significance of the precinct, the market area has been identified for the mixed use development based on empirical research of customer origins at similar nodes.

Table 1: Key socio-economic indicators of the primary market area (10km radius)

Variable	Market Characteristics
Population size	232,675 people 84,747 households
Household Size	2.7 people/ household
Age profile	13.4% - between 10 and 19 years 47.7% - between 20 and 40 years 19.0% - between 40 and 60 years 4.3% - 60 years + 75.0% - between 15 – 65 years
Highest level of education	29.7% - Std 10 / Grd 12 28.3% - Some secondary 19.0% - Higher education 9.4% - Some secondary 4.7% - Complete secondary 8.8% - No schooling
Level of employment	77.8% Economically active of which 35.9% is unemployed and 64.1% is employed
Occupation profile	22.7% - Elementary occupations 15.0% - Professionals 12.1% - Technicians and associate professionals 11.7% - Craft and related trades workers 11.2% - Service workers; shop and market sales workers 8.0% - Undetermined
Dwelling types	39.2% - House or brick structure on a separate stand or yard 32.6% - Informal dwelling/shack NOT in back yard 9.0% - Town/cluster/semi-detached house (simplex; duplex; triplex) 6.5% - House/flat/room in back yard
Tenure status	27.5% - Occupied rent-free 27.2% - Owned and fully paid off 26.2% - Owned but not yet paid off 19.1% - Rented
Average household income (2008)	R221,105 per annum R18,425 per month
LSM Profile	54.4% LSM 6 to 10+ 24.8% LSM 10 - 10+

It is estimated that approximately **223 224 people** and **81 247 households** reside in the market area, where as **24.8%** households fall within LSM 10 and 10+. The area is furthermore

characterised by an increasing number of *younger couples and families* as well as mature parents accommodated in new cluster / townhouse security developments in the area. Of the total labour force, **64.1%** are formally employed - largely within occupations varying from *elementary occupations to professionals*.

➤ LOCATION ANALYSIS

Preceding table analyses the potential sites in terms of residential, retail, office, industrial and medical related developments. Each of these developments poses unique investment benefits and challenges. Findings of the location assessments can be summarised as follows:

Table 2: Summary of site evaluation results

Proposed Land Use	Percentage
Warehousing / distribution development	75.0%
Office development & business parks	74.3%
Mixed typology density residential development	73.2%
Mixed retail developments	72.7%
Hospital development	71.4%

* **Note:** 80%+ indicates an exceptional site rating; a site rating of 70 – 80% is high and indicates that most important fundamentals for successful shopping centre development are in place; a rating of 60 – 70% indicates some critical factors may be lacking but could possibly be addressed; projects with a sub 60% rating are not recommended for consideration.

Exhibit location characteristics of corridor development and accompanying location advantages pave the way for a broad spectrum of mixed use economic activities. Multiple mixed use precincts as mixed typology residential, various retail, office developments and warehousing & distribution developments.

➤ RESIDENTIAL MARKET

The following table summarizes the residential market, estimating the development potential of the market as a whole. In order to reach this objective, the supply and demand for residential facilities within the market area are identified and assessed in light of current trends.

Table 3: Summary of the residential composition

Income midpoint 2008	Unit Price Estimate	Distribution (%)	Recommended Unit Types
R 77,863	R 192,599	23.8%	Gap & Entry level Economic Freestanding / Group
R 155,725	R 385,196	22.6%	Entry level Economic Freestanding / Group
R 311,449	R 770,389	24.5%	Sectional title town houses
R 622,897	R 1,540,777	19.4%	Full title cluster units
R 1,245,794	R 3,081,553	5.9%	Freestanding full title homes
R 2,491,587	R 6,163,104	2.4%	Freestanding full title homes
R 3,350,773	R 8,288,358	1.5%	Freestanding full title homes

Given the above calculations it can be anticipated that proportionally the largest segment (**24.5%**) of the residential composition resulted in *sectional title town houses*, with an estimated average unit price of approximately **±R770,000** (2008 prices), followed by **23.8%** of the composition resulted in *gap & entry level economic freestanding houses* of approximately **±R190,000**.

Table 4: Synthesis of market potential

Variable	Value
TOTAL MARKET	
Market growth (market based units per annum - secondary & new growth) ¹	1,259
Secondary market depth (total households) ³	105
Annual secondary market contribution (units / annum) ⁴	21 - 28
PROJECT SPECIFIC	
Project Credit-Linked & Bonded Units (R250k - R350k)	1,500
Forecast market share of total market sales	20% - 25%
Project forecast total annual take-up rate (units / annum)	256 – 448
Years to 80% take-up (bonded & credit-linked units)	3.4 – 5.9

¹ – Total Annual take-up of market area

² – Reflects the percentage of the local population with incomes and affordability levels aligned to credit-linked and lower-end bonded units

³ – Total number of existing households within the credit linked and lower-end bonded local segments

⁴ – Number of potential buyers through local secondary market transactions, eg qualifying local potential buyers selling existing homes to move to new project.

➤ RETAIL MARKET

The findings of the preceding Chapter are integrated into an empirical assessment of retail market potential. Demacon's Retail Demand Modelling results illustrate that the consumer market can sustain a **lifestyle centre**, a **big box / value / speciality centre** and a **convenience centre** based on the following:

Table 5: Recommended centre options for portions

Variables	Lifestyle Mall	Big box / Value / Speciality Centre	Convenience Centre
Market size (2008) – annual consumer retail spend	R 1,521,446,116	R 2,130,131,069	R 1,521,446,116
Optimum point of market entry	Q4:2013 / Q2:2014	Q4:2014 / Q2:2015+	2015+
Optimum centre size (m² GLA) – including banking & services	23,261m²	32,568m²	8,529m²
Annual sales potential	R 448,039,425	R 627,286,559	R 164,281,122
Employment opportunities (on site)	775	1,086	284
Capital investment	R 219,691,784	R 184,550,326	R 48,332,193
Parking bays required	2,326	1,954	512
Parking infrastructure & landscaping cost	R 56,078,783	R 47,108,533	R 12,337,332

Based on the figures summarised in Table 6.11 and Table 6.12, it is evident that the market can sustain a **community centre** of **23,261m² retail GLA**, a **big box / value / speciality centre** of **32,568m² retail GLA** and a **convenience centre** of **8,529m² retail GLA** which makes provision for banking and services.

The optimum point of market entry calculated for the community centre should be in Q4:2013 / 2014, the big box / value / speciality centre in 2014 / 2015 and the convenience centre should be 2015+ (depending on the development phasing of the local residential component).

➤ OFFICE MARKET

The commercial component of the project should consist of a hybrid mixture of warehousing and distribution combined with office park developments for examples R21 Office Park / Samrand, which draws corporates but are not entirely a corporate park development itself.

The following table provides a synthesis of space demand modelling results of the finance and insurance and the business services sectors also the market share for offices.

Table 6: Synthesis of Space Demand Modelling Results – m² GLA

Cumulative Additional Space Demand	Up to 2013	2018	2023
Finance & Insurance (sqm GLA)	130,098	229,918	350,631
Business services (sqm GLA)	242,374	341,596	505,817
Total: Centurion	372,472	571,515	856,447
Total: Nodal share 10%	37,247	57,151	85,645
Total: Nodal share 15%	55,871	85,727	128,467
Average*	46,559	71,439	107,056

* Note: the nodal shares and the average figures are cumulative

Table 7: Space Demand Results - m² GLA

Forecast	Square metres
Up to 2013	45,000m ² – 50,000m ²
2013 – 2018	70,000m ² - 73,000m ²
2018+	105,000m ² - 110,000m ²

Table 8: Recommended office park space options

Variables	Rand per annum / m ² GLA
Capital Investment	R500,075,498
Optimum size (GLA – up to 2018)	71,439m²
Employment (on-site)	3,572
Units sizes	150m ² – 750m ²
Larger modules	750m ² – 4,000m ²
Gross rentals (excl VAT)	R80 – R100

The following also emerged from preceding paragraphs:

- ✓ Dominant sub-sector: **Business services sector**
- ✓ Greatest percentage of take-up is expected to occur between 2021 and 2026 for *business services*, and *finance and insurance* also between 2021 and 2026
- ✓ Recommended type of office development: **Low rise, medium density, suburban lifestyle Grade A and Grade A+ office park**
- ✓ Recommended size up to 2018: **71,439m² GLA**
- ✓ Employment opportunities: **3,572**
- ✓ Capital investment: **R500,075,498**
- ✓ In terms of the nodal development principles, the Office Park Development could follow later stages of the warehousing / distribution component.

➤ **INDUSTRIAL MARKET**

The report focuses on the industrial / commercial market, with the objective of estimating the development potential within the designated area. In order to reach this objective, the demand for development within the market area should be identified and assessed in light of current trends.

The following table provides a concise overview of the light industrial / commercial market in terms of the space demand modelling results:

Table 9: Synthesis of Space Demand Modelling Results

Cumulative Additional Land Demand	Up to 2010	2010-2015	2015-2020	2020-2025
Manufacturing	11.19	9.06	8.59	5.06
Warehousing	16.39	14.47	14.83	8.74
Total	27.58	23.53	23.41	13.80
Market share for manufacturing (35.0%)	6.55	5.30	5.02	2.96
Market share for warehousing (35.0%)	9.59	8.46	8.67	5.11
Total hectares	16.14	13.76	13.70	8.08
Development potential (hectares)	29.90			
Development potential (square metres)	298,981			

Table 10: Recommended space options

Forecast	Hectares
Up to 2010	15 hectares – 17hectares
2010 – 2015	13 hectares – 15 hectares
2015+	13 hectares – 15 hectares

The following also emerged from preceding paragraphs:

- ✓ Dominant sub-sector in the space demand modelling: **warehousing sector**
- ✓ Greatest percentage of take-up for both warehousing and manufacturing is expected to occur up to 2010
- ✓ A market share of 35% is allocated towards manufacturing and warehousing.
- ✓ Recommended size of development (up to 2015): **29.90 hectares**.
- ✓ Optimum point of market entry: **2010 - 2014**
- ✓ The recommended type of development: **warehousing / commercial** development.

➤ **PRIVATE HOSPITAL MARKET**

The following table provides an indication of the overall market capacity in terms of the number of sustainable / viable beds in demand for a proposed private hospital in the market area.

Table 11: Private Hospital Demand Estimations

MARKET POTENTIAL	2008	2013	2018
Net effective demand (residual market capacity - additional beds)	15	160	526
Market share (% market share of total beds for facility)	26.00%	26.00%	26.00%
Market potential (total number of viable beds for facility)	24.3	61.8	157.2
Total additional area requirement (sqm hospital floor space)	15	160	526

Demacon's Demand Modeling results illustrate that the market can sustain ultimately a **±100** bed facility by 2015.

➤ **INCREMENTAL DEMAND / PHASING**

Table 12: Market Based Implementation Plan (total size and point of market entry)

Mixed Use Developments	Development potential	Point of market entry
Residential (units)	1,515 units	2009 - 2014
Retail	64,358m²	
Lifestyle Mall	23,261m ²	2013 - 2014
Big box / Value / Speciality Centre	32,568m ²	2014 – 2015

Mixed Use Developments	Development potential	Point of market entry
Convenience Centre	8,529m ²	2015+
Offices	71,439m²	2011 - 2012
Private Hospital (beds)	100 – 120 beds	2015+
Industrial / Commercial Development (hectares)	60 hectares	2010 – 2011

Table 13: Market Based Phasing Plan (phasing)

Mixed Use Developments	Development potential	Phase 1 2009 - 2013	Phase 2 2014 - 2018
Residential (units)	1,500 units	1,000 units	500 units
Retail	33,487m²		
Lifestyle Mall	23,261m ²	23,261m ²	
Big box / Value / Speciality Centre	32,568m ²	32,568m ²	
Convenience Centre	8,529m ²		8,529m ²
Offices	71,439m²	71,439m²	-
Private Hospital (beds)	100 – 120 beds		100 – 120 beds-
Industrial / Commercial Development (hectares)	60 hectares	60 hectares	

➤ DEVELOPMENT RECOMMENDATIONS

Due to various factors, such as market growth dynamics, as well as the tempo and geographic direction of market growth, the market area could become a major future regional energy node. The Doornkloof Mixed Use Development would consist of four main precincts as indicated above.

- Warehousing & Distribution
- Corporate Offices
- Retail
- Medical and related
- Residential

Table 14: Summary of Development Options

Economic Activity	Forecast GLA (m ²)	Gross Floor Area (m ²)	Site Area Required (hectares)
Retail		m ²	
Lifestyle Mall	23,261m ²	26,750m ²	8.0 hectares
Big Box / Value / Speciality	32,568m ²	37,453m ²	11.5 hectares
Convenience Centre	8,529m ²	9,808m ²	3.0 hectares
Offices	71,439m²	82,155m²	16.5 hectares
Warehousing & Distribution	298,981m²	298,981m²	60.0 hectares
Residential (1,500 Units)			100.0 hectares
Medical & related	7,000m²	8,000m²	2.0 hectares
TOTAL			201 hectares*

It can be concluded that the total potential of the Doornkloof Mixed Use Project amounts to approximately 201 hectares, which indicates that the site is potentially oversubscribed. Sectoral real estate yields can be utilised to refine the project mix, based on available land.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Chapter one provides an introduction and concise roadmap of the **Doornkloof Mixed Use Development**. The chapter also provides concise background to the project, a site description as well as a report outline.

1.2 PROJECT BRIEF

Demacon Market Studies were commissioned by **Tech IQ Consulting Engineers** to perform a comprehensive, specialist potential assessment to determine the capacity of the local market to sustain a mixed use development node situated on portion 15, 20 and 113 of the farm Doornkloof 391 JR, south of Irene Estate, Centurion.

It is understood that a comprehensive market study is required to inform investment decisions regarding a mixed use development on a land portion that straddles the R21 / Albertina Sisulu highway, including a 50 hectares site on the eastern side and a **147 hectare** site on the western site of the R21 / Albertina Sisulu. A market study is required to provide market based data and recommendations in terms of, *inter alia*:

- ✓ Highest and best use of the 197 hectare site (taking due cognisance of development trends in the sub-region)
- ✓ Identification of short list of potential activities / real estate market to be analysed
- ✓ Market potential assessment, including current and future / proposed supply, market growth, take-up rates, key real estate indicators (e.g. rentals, vacancies, etc)
- ✓ Recommendations – highest and best use scenarios, phasing, access requirements (including need for a highway intersection), etc.

Demacon's approach is purely market based and we will apply our extensive involvement and recent research in the study area, coupled to market intelligence on the subject matter to complement the market study.

1.3 STUDY AREA DELINEATION

The mixed use development sites are located in the east and west of R21, south of Irene Estate, Centurion. The area is experiencing high levels of development pressure with the emphasis on residential and commercial developments. Map 1.1 shows the location of the site (overleaf).

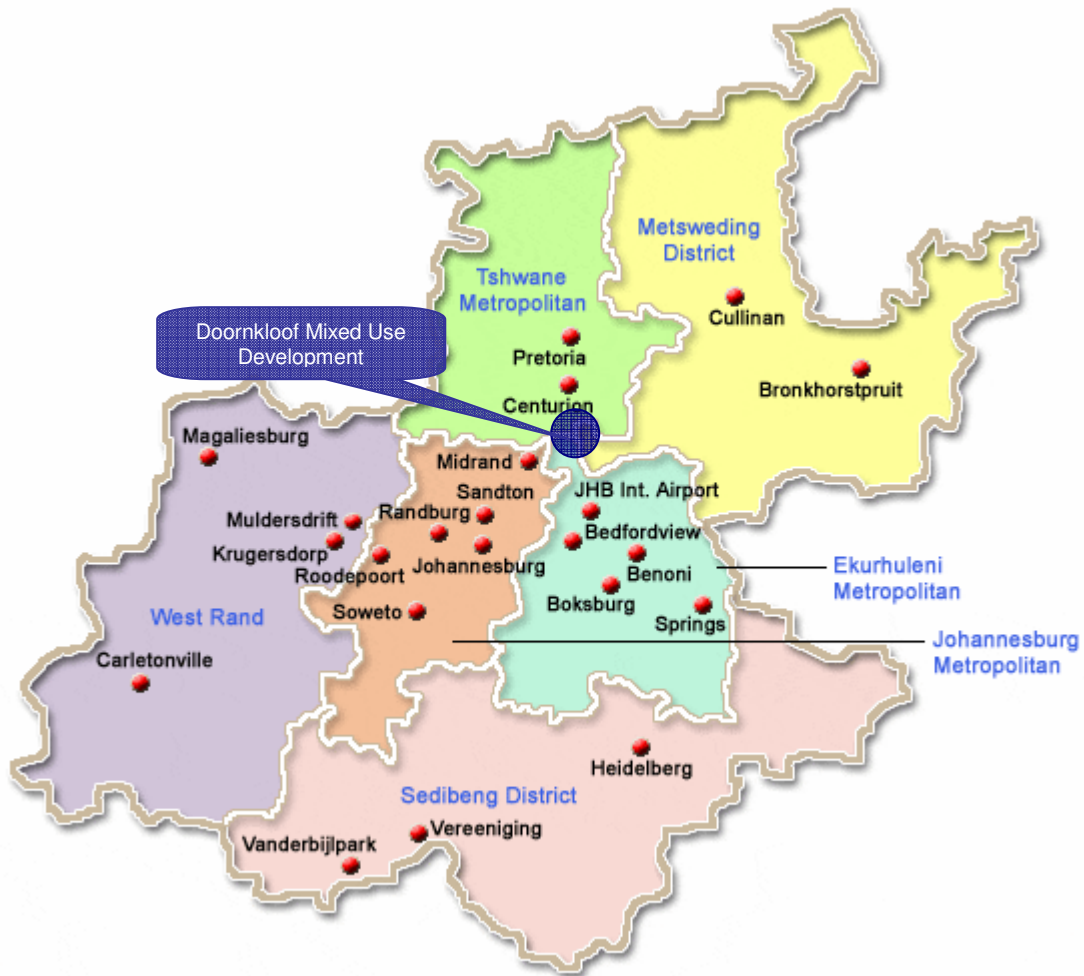
1.4 REPORT OUTLINE

The remainder of the report is structured in terms of the following main headings:

- Chapter 2: Location Analysis
- Chapter 3: Economic Market Profile
- Chapter 4: Consumer Market Profile
- Chapter 5: Residential Market Analysis
- Chapter 6: Retail Market Analysis
- Chapter 7: Office Market Analysis
- Chapter 8: Industrial Market Analysis

Chapter 9: Private Hospital Market Analysis
Chapter 10: Development Recommendations

Map 1.1: Location of site within the context of Gauteng Province

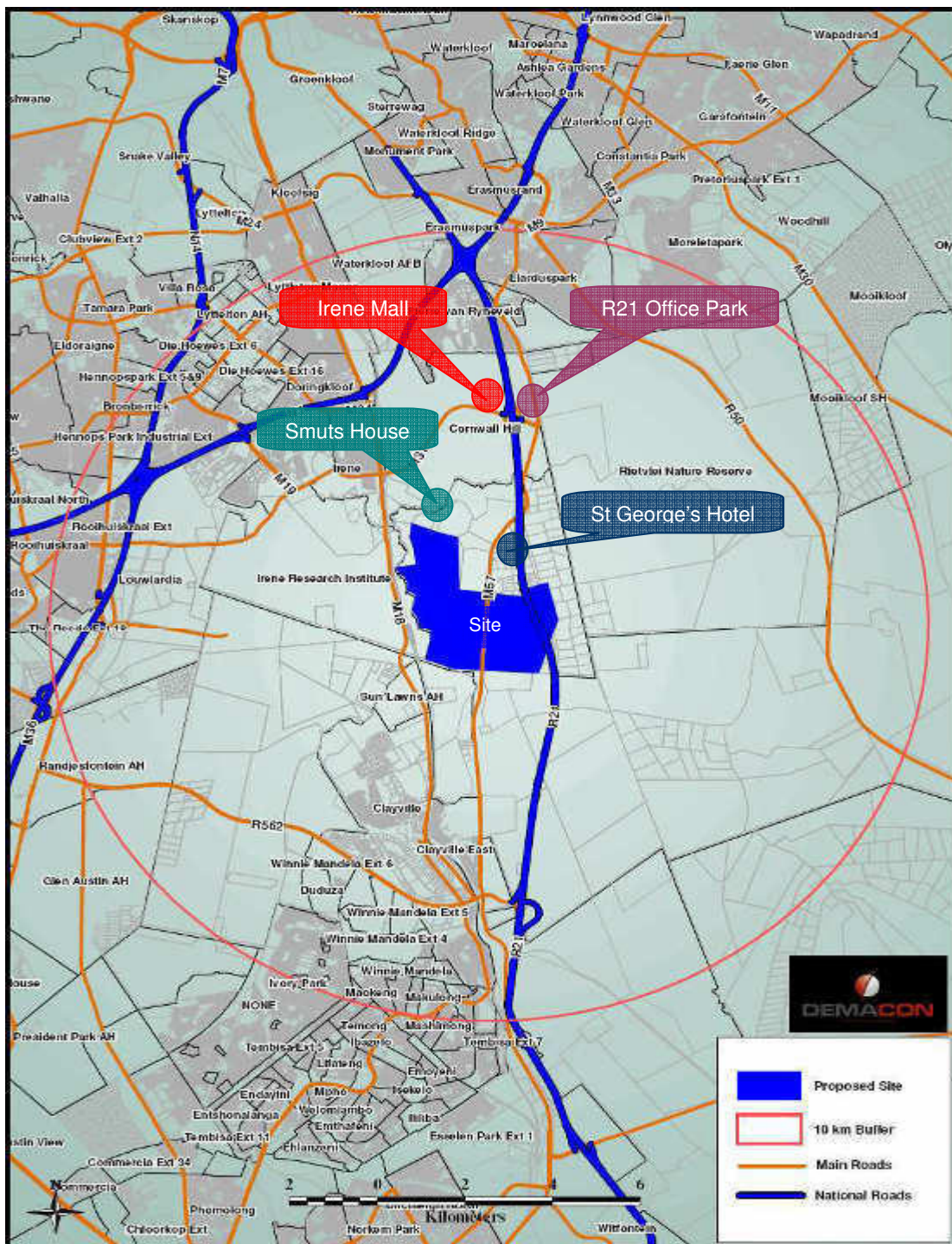


CHAPTER 2: LOCATION ANALYSIS

2.1 INTRODUCTION

Market potential is influenced by; *inter alia*, the characteristics of the site to be developed. Certain types of developments each have specific location requirements and should subsequently be assessed in terms of selected location criteria. To this effect, the site evaluation model is utilized. The chapter is analysed in terms of development drivers, mixed use precincts & new urbanism, energy nodes, corridors / nodes and the development site assessment.

Map 2.1: Locality map / landmark map of area



2.2 DEFINING CORRIDORS / NODES

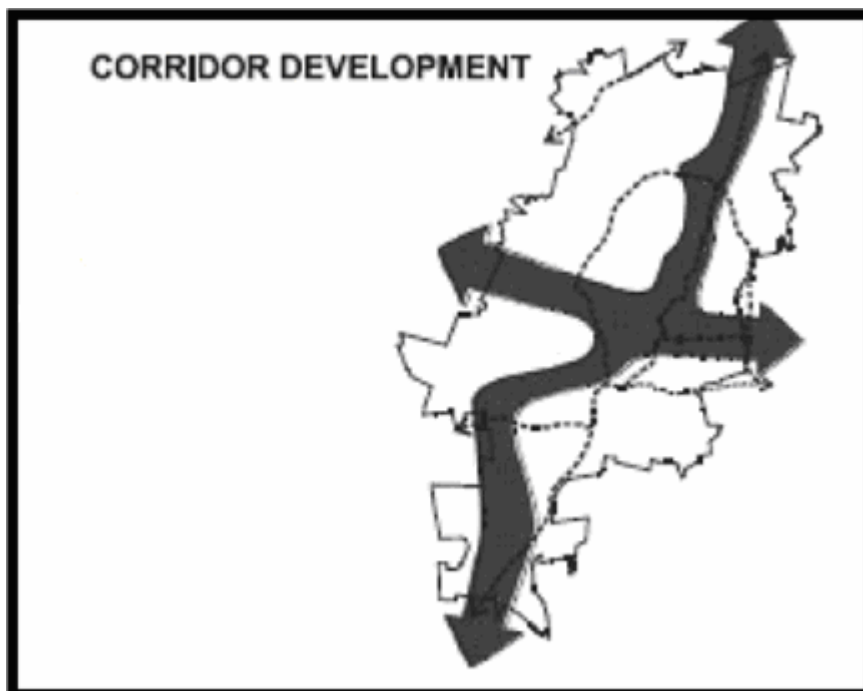
➤ CORRIDORS

The corridors are the main structures that hold the spatial framework in place. The corridor concept has recently become popular in provincial development planning and national spatial development planning as the notion of corridor development is providing a useful framework for regional development. The idea of the corridor essentially refers to the development along major roads with considerable existing or potential movement. This inevitably occurs along routes, which connect major 'attractors' – significant towns, tourism attractions and other movement, which generate economic activity.

The corridor is effective in linking infrastructure and economic development as towns and structures are connected to each other via the transport network like "beads on a string". A major objective behind the corridors in this study is the generation of sustainable economic growth and development in relatively underdeveloped areas, according to the inherent economic potential of the locality.

The development of corridors has been identified as one of the potential instruments available to restructure a city into a more efficient and robust structure. Corridor development also aids in the linkage of facilities, nodes and precincts and enhances opportunities and maximizes new development potential. Typically, Mixed Use areas need to be well connected and would be located along specific corridors demarcated for such purposes.

The concept of activity spines was developed in the late 1970s / early 1980s in South Africa, where the concept of corridors was used to advocate high order activity areas complimented by higher residential and mixed use densities to support these uses. Activity spines, or corridors, are argued to structure and organise space as well as interlink areas and nodes to achieve integration. However, academics have cautioned that corridors should not only be lines on a map, but that they must be accompanied by strategic economic interventions to ensure the success of such corridor developments. Economic interventions should include the need to have home, work, facilities and amenities in close proximity. Corridors ultimately stimulate development and economic activity.



➤ **NODES**

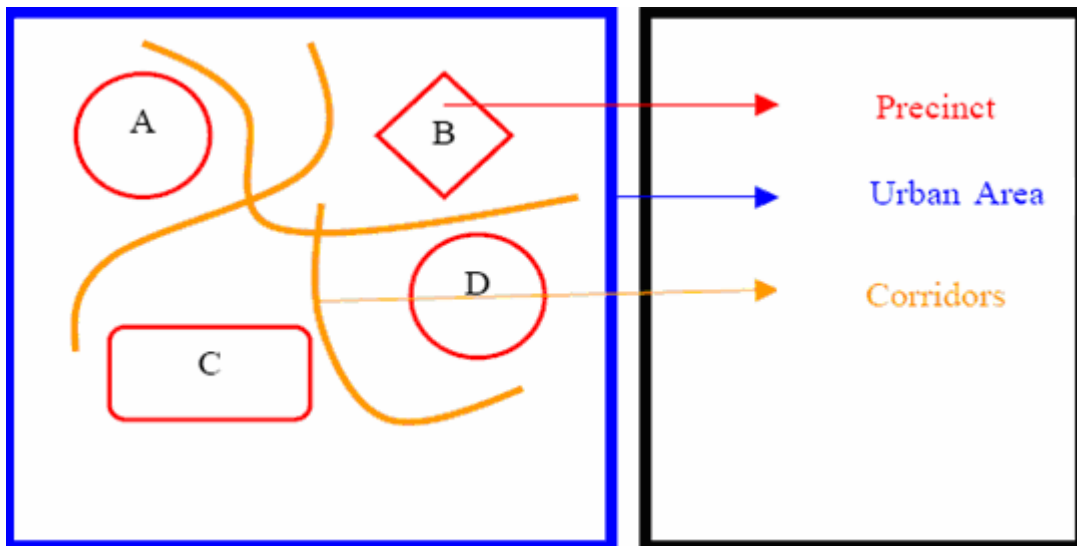
A city's nodes should reflect a number of characteristics and elements. Nodes are usually associated with higher residential densities and usually have a mix of uses. Nodes ideally should be pedestrian orientated but should also easily be accessible by means of vehicles and especially public transport. Nodes also usually host a variety of public amenities and services and have high levels of infrastructure. Nodes should be functional in nature and nodal areas should be well connected across a city. Distances between nodes and to each node are important in terms of the connection of the nodes. In addition, there is a 'critical mass' in the size of a node, both in terms of intensity and physical size. A Hierarchy of Nodes is necessary to create a balanced urban environment and to protect existing areas from 'cannibalization'.

With the growing global phenomenon of Urban Sprawl, urban compaction and densification is being advocated worldwide. It has become part of policy documents and urban planning across the globe, in order to make the urban morphology more manageable and sustainable, as well as to increase the efficiency of services. Strategic densification has become associated with Mixed Use and Nodal development.

Strategic densification, combined with a mixture of uses, is promoted primarily in and around city Nodes and also along movement corridors. Strategic densification of this nature supports public transport and optimises the use of prime land within urban areas.

➤ **PRECINCTS**

Precincts are areas within urban regions, which are defined according to a spatial logic and the functionality of an area. Precincts usually have an identity of their own, with characteristics unique to the identity and uses found within an area.



Precincts are associated with Precinct Plans that provide more detailed intervention mechanisms, land uses, densities and urban design frameworks, very often incorporating a mixture of uses or designated mixed use areas.

Precinct Plans aid the planning of areas as they provide further detail and could be compiled either by the public sector planning authority or by the private sector in compliance with agreed norms and standards. Precinct Plans also allow the flexibility to incorporate new dynamics into current planning as the spatial and economic dynamics of an area develop.

Precincts are defined by function or by spatial logic. Precinct Plans need to outline at least the following elements:

- Definition of the functional area
- Movement within the area (including parking)
- Land use activities
- Urban spaces
- Landscaping of the public realm
- Detailed built form directives
- Architectural guidelines
- Development parameters
- Subdivision parameters

Precinct Plans may be developed for any functional area provided there is clear spatial logic. The size of the Precinct area relates to function rather than distance. Precinct Plans need to have the support of the majority of owners of the area. Precinct Plans are tools that provide further detail for the enhancement of an area, which may entail altering an area's function(s). Residents or owners may take the initiative to compile Precinct Plans. These resident-initiated Precinct Plans do not however form part of the LSDF until they are approved by the Local Authority and are incorporated into the Local Spatial Framework.

2.3 CORRIDOR AND NODAL DEVELOPMENT ENVISIONED IN TERMS OF THE SDF

➤ DEVELOPMENT CORRIDORS

The development opportunities offered by the N1 and R21 corridors are exploited by proposing linear development on both sides of the first order roads passing through the urban area of the Southern Region. First order roads in the development corridor are supported by lower order roads to provide access. Mobility and visibility is provided by first order roads and accessibility is provided by lower order roads.

- The N1 development corridor is supported by the K101 to the west and Olievenhoutbosch Road to the east. The focus of this development corridor is on the provision of job opportunities. Residential development could however be accommodated in focus areas along the corridor subject the availability of supporting community and social facilities as well as the mitigation of noise. Buffer uses along the roads and medium density residential to the rear is supported especially along the highways
- The R21 / Albertina Sisulu development corridor is supported by Van Ryneveld Avenue in the west and Goedehoop Road in the east as well as the proposed Olievenhoutbosch Road providing an east-west link. This mixed use areas accommodates light industries, high-tech land-uses and offices.
- To the north of the intersection of the R21 and the N1 and to the south of Hans Strijdom Drive (K69) further opportunity for mixed uses similar to the section of the corridor further to the south exists.
- The proposed PWV 9 together with the R55 could provide energy in the future for the development of a third development corridor.

The extension of Sunderland Ridge in a northerly direction to accommodate light and high-tech industries is proposed for this section of the new development corridor.

➤ NODES

In terms of the SDF, the region accommodates the higher income community of the City of Tshwane with the result that many offices and retail functions have relocated to the region during the past few years. The Centurion CBD (Metropolitan Core) is the strongest node of the region, situated along the Centurion Lake. Numerous smaller nodes are located throughout the region accommodating retail, office and industrial functions.

- Route 21 - Industrial/office park
- Sunderland Ridge - Industrial
- Highveld Technopark – Industrial and Office development (part of N1 development corridor)
- Hennospark Industrial Area – part of the N1 development corridor)
- Louwlandia – Commercial/Industrial
- Samrand

Retail nodes

The region accommodates a number of retail nodes. These nodes include:

- Centurion Mall 120 000 m²
- Mall @ Reds 30 000 m²
- Doringkloof 20 000 m²
- Irene Mall 30 000 m² (to expand to 60,000m²)
- Southdowns 12 000 m²

Proposed retail nodes:

- Heuweloord Crossing 40 000 m²
- Monavoni X 20 20 000 m²

Integrated (Mixed) land use nodes:

The trend for new development is integrated development nodes which includes various land uses and emphasize the need to incorporate job opportunities close to residential development. The following integrated nodes have been established and/or are in process within the region:

- Eco-Park – including different housing typologies, commercial, retail, office development
- Pick & Pay Life Style development – including retail and commercial – 70 000 m²
- Route 21 development corridor
- The proposed PWV 9 development corridor

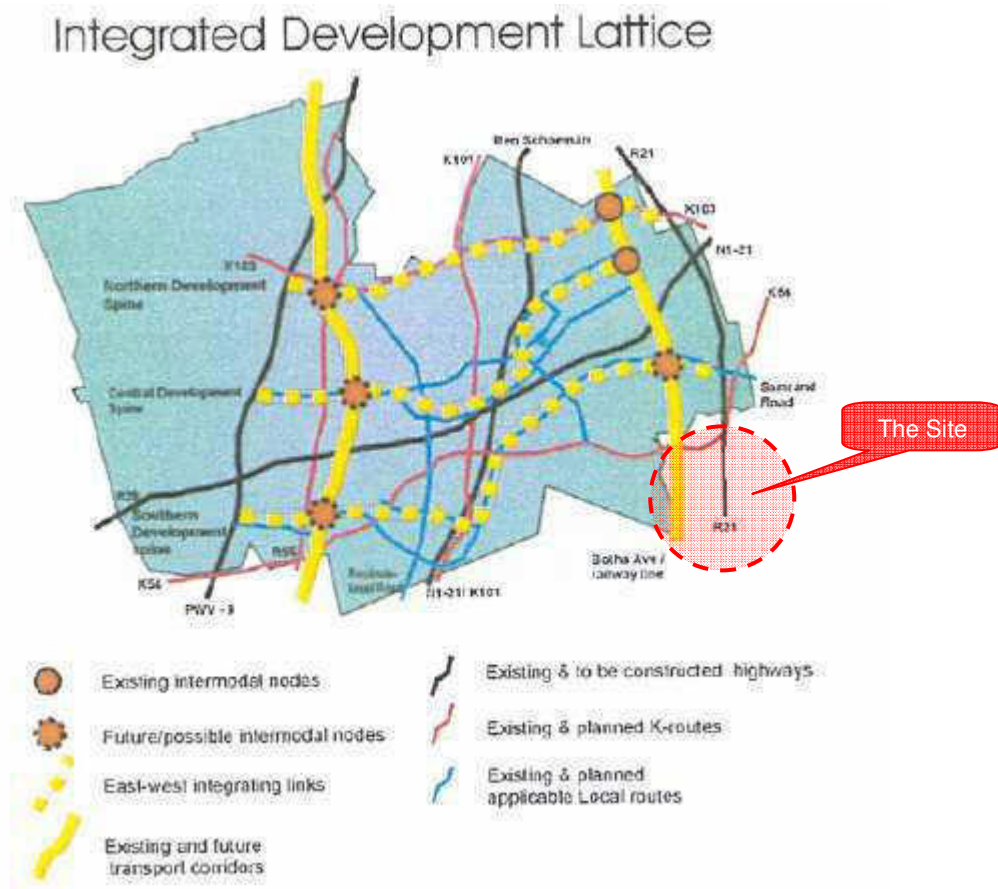
➤ LINEAR ACTIVITY AREAS

The structure of this region is defined by two spatial linear elements – that of roads and that of open space. Within a framework of waterways, greenways, parkways and brownways as part of the open space system and relevant streets, roads and related linkages and nodes, the elements are combined into a network to form a grid overlay over the urban structure that integrates roads and natural resources. This is enhanced with a system of legibility and identity. Together these elements and the system of legibility and identity provide the necessary quality of the urban environment as specified in the Chapter 1 principles of the DFA.

The urban development framework for the region is based on an integrated urban lattice on which densification and intensification of development can take place in an integrated manner. A set of linear systems form the framework of the urban development lattice and relays urban energy from the traversing highways to lower order roads where it can be converted into physical

development and economic growth. Existing and future mass transport routes are and should be integrated into the urban system.

A system of activity nodes is placed onto the development lattice to provide thrust to development occurring in a linear fashion along highways or other linear activity systems.



The lattice development concept consists of an interconnected system of development corridors along highways, mobility spines, mobility roads, activity spines and activity streets as well as strategically placed nodes serving as pull factors in the network. The development that is placed alongside these roads is enhanced by the activity nodes that are placed on the lattice where there is the most access – at the convergence of transport modes. There is a hierarchy of nodes consisting of a changing mix of activities. It is believed that the lattice concept is the most appropriate since it integrates interactive development with available transport capacity the most effectively.

The following areas are deemed existing or potential development corridors:

- The R21/ Albertina Sisulu highway to the Oliver Tambo International Airport and the East Rand.
- The existing Pretoria/Germiston/ Johannesburg railway line considered with the Botha Avenue/K105 road to Kempton Park and the R21 highway to the East Rand, with a portion of Olievenhoutbosch Road
- N1 route considered with Olievenhoutbosch Road, known as the Centurion N1 area.
- The existing R55 road linking Pretoria West with/ Sandton and the future PWV-9 road.

The following development spines along mobility/activity routes creating east-west integrated links are recognised:

- The Northern Development Spine following the K103 as an extension of Hans Strijdom/ Trichardt Road/ Wierda Road

- The Central Development Spine does not fall on a single road and the alignment thereof is based on the east-west extension of Hendrik
- Verwoerd - and Lenchen Avenues through the Urban Core.
- The Southern Development Spine is located between the N1 and the proposed Olievenhoutbosch/Nelmapius Road and the K54.

2.4 DEVELOPMENT DRIVERS IN THE AREA

Gauteng is the economic hub of South Africa, as well as the contributor of approximately 10% of the GDP of the African continent. Immense **market interest and pressure for development** currently exists in the study area, which is considered to be on the top ten potential development sites in the country.

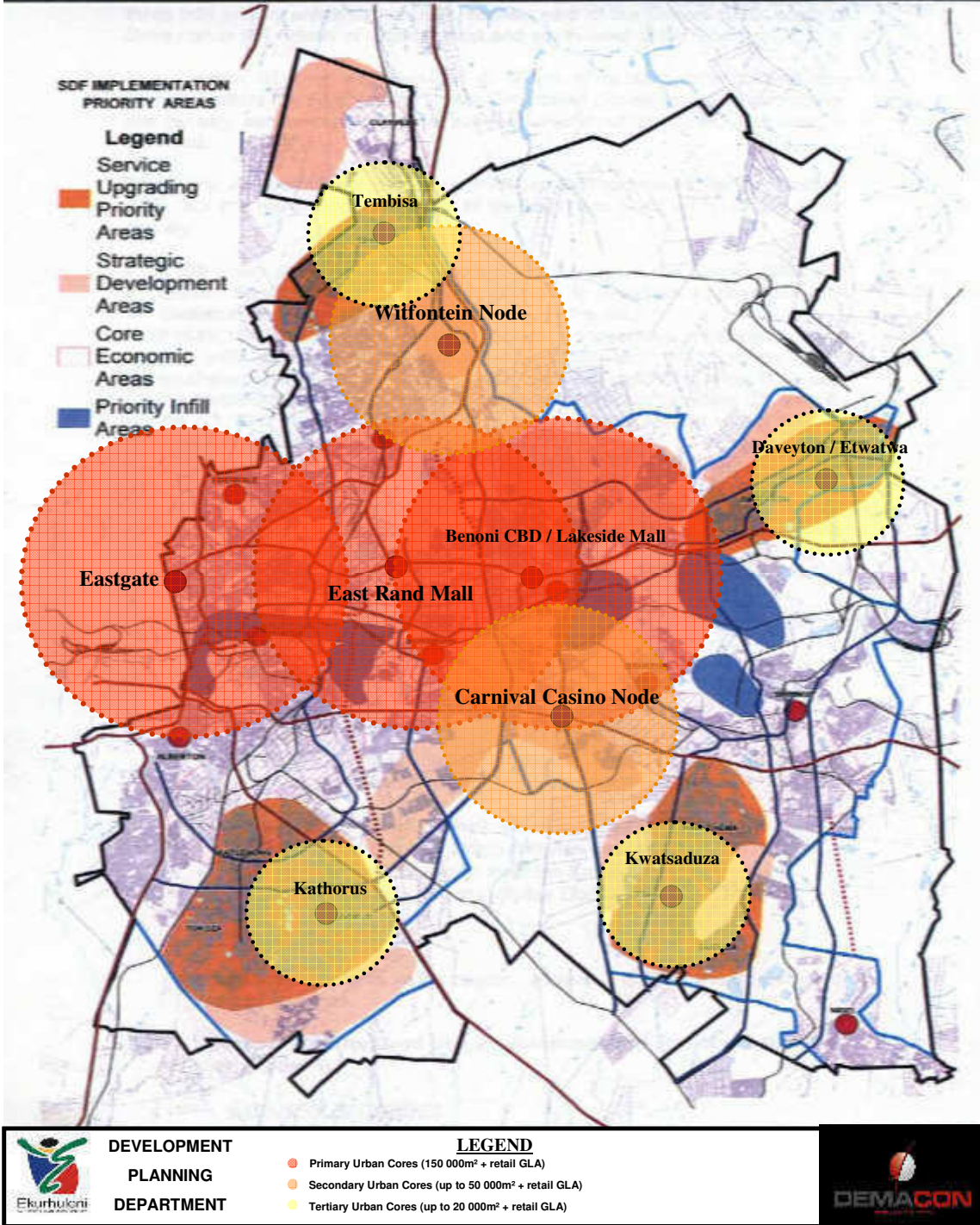
The following **development drivers** exist in the study area under investigation:

- ✓ Ekurhuleni's **Albertina Sisulu / R21 corridor** (which is part of a triangular node – Olifantsfontein to the north, Benoni to the east and Germiston to the west), stretches from Boksburg to Tshwane and is expected to grow into a major economic activity node for Gauteng – which is also the study area under consideration.
- ✓ The proposed upgrading of **O.R Tambo International Airport**, which will involve a total investment of more than R3.3 billion, and is expected to create numerous employment opportunities. This will, in turn, lead to the creation of various residential and retail development opportunities.
- ✓ The development of an **Industrial Development Zone (IDZ)** at O.R Tambo Airport, which will facilitate the innovative clustering of light manufacturing, avionics and aerospace industries. The IDZ is supported by the new flyover highway network that feeds from the ever-busy R21. The zone is the first joint private sector and government-led IDZ, which involves upgrading the airport and further developing manufacturing and exports.
- ✓ The development of the **Serengeti Golf & Wildlife Estate**, including a Jack Nicklaus signature golf course (which is one of three upmarket golf estate developments to come on stream in Gauteng in the foreseeable future). This development will also include Serengeti Village Square, to provide restaurant and retail facilities to residents of this estate.
- ✓ Talks culminated in MEC Khabisi Mosunkutu and Ekurhuleni Executive Mayor Duma Nkosi signing the **Northern Environmental Management Framework (NEMF)** in December 2005. In terms of this NEMF, the area around the R21 has been declared a strategic management zone.
- ✓ A new project underway to further market Ekurhuleni to international business people coming to the country is the **Absa International Trade Bureau (AITB)**, a new trade centre across from the international arrivals hall at O.R. Tambo Airport. Ekurhuleni Metro will have stands representing economic sectors relevant to local companies and will invite businesses to exhibit (virtually cost-free) at the AITB. Around 1.2 million people from 212 countries visit South Africa on business each year.
- ✓ The **Gautrain Rapid Rail Link**, with O.R Tambo Airport at the heart of the scheme, will create numerous employment and investment opportunities during the construction phase, as well as after completion of the project.
- ✓ The upgrading of the **R21 / K90 interchange** near O.R Tambo Airport, which will impact, *inter alia*, traffic flows to and from the development corridor. It is estimated that the R21 experiences a growth in traffic volume of between 8% and 13% per annum.

- ✓ Local Spatial Development Frameworks (LSDFs) underway in the study area include the Germiston CBD LSDF; Springs CBD LSDF; Edenvale LSDF as well as the R21 corridor LSDF.

Map 2.2: Ekurhuleni Urban Core Structure

Ekurhuleni Urban Core Structure (Towards 2015)



2.4.1 AIRPORT ECONOMICS

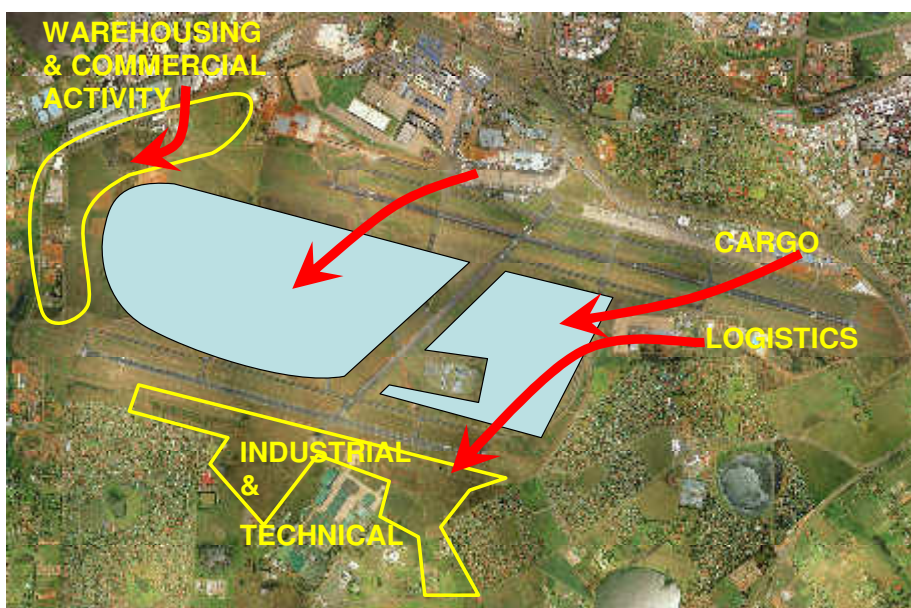
The following important *development drivers* were identified by Airports Company South Africa (ACSA), which owns and operates South Africa's nine principal airports:

- ✓ Traffic growth – both in peaks and volumes
- ✓ Introduction of new generation large aircraft
- ✓ Desire to ultimately consolidate airline, stakeholder and partners operations into efficient clusters and areas
- ✓ World Cup Soccer Tournament to take place in 2010
- ✓ Gautrain, which will include a station at OR Tambo Airport.

Major western precinct developments at OR Tambo Airport are currently underway, and migration and growth of airport activity towards the southern and eastern precincts are expected. The following *development guidelines* will serve to link development opportunities with certain best practices from various international case studies:

- ✓ Activities that could gain a comparative advantage from an airport location should be encouraged – this would include economic activities with high volume / seasonal and low-weight / high value properties.
- ✓ Encourage the development of high-tech industries as they have low-weight / high value properties and are proven to be successful in increasing airport-industry linkages.
- ✓ Encourage the processing of perishable goods to locate near the OR Tambo Airport, due to the time sensitive nature of the goods produced by this industry.
- ✓ Headquarter offices should be encouraged to locate near the OR Tambo Airport to take advantage of the airport location and to be close to their manufacturing / distribution functions.
- ✓ Industries of the OR Tambo Airport should be encouraged to create linkages with the metropolitan region as well as the airport in order to improve global competitiveness.
- ✓ Encourage companies that serve a local as well as a global market to locate near OR Tambo Airport to help ensure international competitiveness.

JNB potential outcome of updated Master Plan *Migration AND growth of airport activity towards the southern & eastern precincts*



2.5 GAUTENG FREEWAY IMPROVEMENT PROJECTS / ROAD UPGRADINGS

Gauteng, the economic heartland of South Africa, generates nearly 38 % of the total value of South Africa's economic activities. As a result, development in housing, offices, retail and industrial properties has grown significantly over the past 10 years, resulting in above average traffic growth. Unfortunately, road infrastructure provision did not keep up with the increased traffic demand, resulting in a road network, including the freeway network that is over capacity.

In order to improve the current traffic flow situation and to provide a road network that will stimulate the development potential in the province; the South African National Roads Agency Ltd (SANRAL) proposes an improvement to the Gauteng freeway network by improving the existing network, as well as the provision of additional infrastructure.

The proposed improvements will be further refined after consultation with provincial and local governments. In principle, the objective of the scheme is to provide an interconnected network of inner and outer ring roads as a solution to the traffic congestion experienced in Gauteng, and directly link the historically neglected areas of the Western and Southern townships of Johannesburg. The solution will be beneficial to public transport, private and road freight users. Such a network will enhance the concept of network management whereby users have alternative options available, or can be diverted in the event of incidents occurring on certain links of the network.

New freeway sections include:

- PWV 9 (South), between the N14 and N1, and potentially a southern extension of the Mabopane Freeway up to the R55.
- PWV 5 between the R21 and PWV9, and
- PWV 14 between R21 and M2
- N17 to the West Rand

Ease traffic problems:

- The Gillooly's interchange on the M1;
- The William Nicol interchange on the N1 bypass;
- The Rivonia Road interchange on the N1 bypass;
- The Allandale interchange on the N1 highway;
- The Rigel Lane exit on the N1 in Pretoria;
- The Atterbury exit at Menlyn in Pretoria; and
- A new exit on the N1 at Garsfontein Road.

A new highway which will run from East to West through Olifantsfontein

The proposed PWV-9, which will run parallel to the N2 and which will eventually become a highway. This road will run approximately along the route of the present R511 between Sandton and Pretoria West and will replace parts of this road. A highway was also planned for the Germiston area, which will distribute traffic to the East Rand. Mpofo said the latter new roads would be built after 2010 to ensure that construction do not hamper traffic during the soccer tournament.

Project progress:

Construction works for the N1 section between the R21 and Atterbury commenced. The other upgrade sections are currently in the design stage, and it is planned to commence with the tender stage on these projects over the next 8 months. The EIA for the upgrading projects, not covered under separate EIA processes, is currently underway. The feasibility to implement the

project as a user pay project, was completed. It was concluded that the project can be funded on the user pay principle.

A public participation process first need to take place before any road may be toll declared. In the event that the network of roads are toll declared, it is planned that all tolling will take place via an open road toll system, meaning that all transactions will take place fully electronically at toll collection locations identified for the network. Therefore, it is not anticipated that any physical toll plaza will be constructed, and that vehicles will therefore not be required to stop or even to slow down, for tolling to take place.

2.6 MIXED USE PRECINCTS & NEW URBANISM CONCEPTS

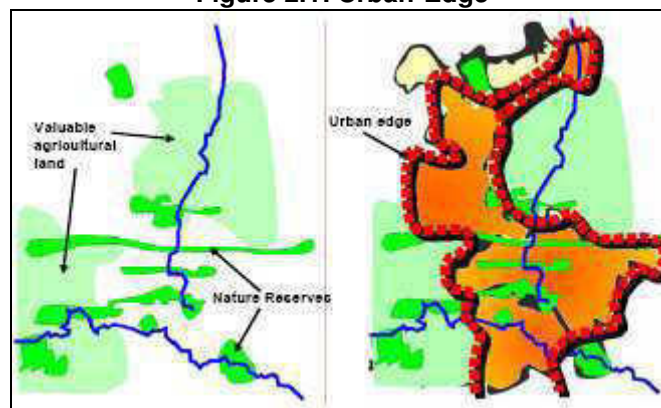
2.6.1 Densification of Urban Nodes

The sub-section describes a number of aspects that support this rationale of densifying within the urban edge, for Kungwini.

A. Urban Edge

The growth of greater Tshwane should be selectively directed, towards pre-defined urban cores, mixed-use activity spines and specialised activity zones. Built-up areas should be encouraged to densify. The urban edge can be defined as an institutional boundary within the metropolitan area with the sole purpose of containing physical development and sprawl and redirecting growth towards a more integrated, compact and efficient urban form (Tshwane: Integrated Transport Plan, 2004-2009). Government is protecting the so-called urban edge, with the effect that development will move back towards the centre of urban areas. The growing demand for land resulting from this inward movement, will ultimately be reflected in higher priced stands and real estate improvements.

Figure 2.1: Urban-Edge



Source: Tshwane Integrated Transport Plan, 2004-2009

Doornkloof Mixed Use Development is situated in Kungwini local municipal area on the border of Tshwane local municipal area. The development could strengthen the metropolitan growth and expand its own tax base.

B. New Urbanism

New urbanism is an American urban design movement that arose in the early 1980s and is more and more being implemented around the world as well as in South Africa. Its goal is to reform all aspects of real estate development and urban planning, from urban retrofits to suburban infill. New urbanist neighbourhoods are designed to contain a diverse range of housing and jobs, and to be 'walkable' (Wikipedia, 2007).

Principles of New Urbanism (www.newurbanism.org)

- ✓ **Walkability** – most things within a 10 minute walk of home and work
- ✓ **Connectivity** – A hierarchy of narrow streets, boulevard and alleys
- ✓ **Mixed-Use & Diversity** – A mix of shops, offices, apartments and homes on site with mixed use within neighbourhoods, within blocks and within buildings.
- ✓ **Mixed housing** – A range of types, sizes and process in closer proximity
- ✓ **Increased density** – More buildings, residences, shops and services closer together for ease of walking, to enable a more efficient use of services and resources and to create a more convenient, enjoyable place to live
- ✓ **Sustainability** – More walking less driving, energy efficient, eco-friendly technologies, respect for ecology and value of natural systems
- ✓ **Quality of life** – All of these together add up to a high quality of life and create places that enrich, uplift and inspire the human spirit

New urbanism holds advantages for the residents, the businesses, developers and municipalities. The benefits that are applicable to high density mixed use development (new urbanism) are listed below (www.newurbanism.org):

BENEFITS TO RESIDENTS

Higher quality of life; Better places to live, work, & play; Higher, more stable property values; Less traffic congestion & less driving; Healthier lifestyle with more walking, and less stress; Close proximity to main street retail & services; Pedestrian friendly communities offer more opportunities to get to know others in the neighborhood and town, resulting in meaningful relationships with more people, and a friendlier town;

More freedom and independence to children, elderly, and the poor in being able to get to jobs, recreation, and services without the need for a car or someone to drive them; More diversity and smaller, unique shops and services with local owners who are involved in community; Big savings by driving less, and owning less cars; Less ugly, congested sprawl to deal with daily; Better sense of place and community identity with more unique architecture; More open space to enjoy that will remain open space; More efficient use of tax money with less spent on spread out utilities and roads.

BENEFITS TO BUSINESSES

Increased sales due to more foot traffic & people spending less on cars and gas; More profits due to spending less on advertising and large signs; Better lifestyle by living above shop in live-work units - saves the stressful & costly commute; Economies of scale in marketing due to close proximity and cooperation with other local businesses; Smaller spaces promote small local business incubation; Lower rents due to smaller spaces & smaller parking lots; Healthier lifestyle due to more walking and being near healthier restaurants; More community involvement from being part of community and knowing residents.

BENEFITS TO DEVELOPERS

Greater revenue potential from higher density mixed-use projects due to more leasable square footage, more sales per square foot, and higher property values and selling prices; Faster approvals in communities that have adopted smart growth principles resulting in cost / time savings; Cost savings in parking facilities in mixed-use properties due to sharing of spaces throughout the day and night, resulting in less duplication in providing parking; Less need for parking facilities due to mix of residences and commercial uses within walking distance of each other; Less impact on roads / traffic, which can result in lower impact fees; Lower cost of utilities due to compact nature of New Urbanist design; Faster sell out due to greater acceptance by consumers from a wider product range resulting in wider market share.

BENEFITS TO MUNICIPALITIES

Stable, appreciating tax base; Less spent per capita on infrastructure and utilities than typical suburban development due to compact, high-density nature of projects; Increased tax base due to more buildings packed into a tighter area; Less traffic congestion due to walkability of design; Less crime and less spent on policing due to the presence of more people day and night; Less resistance from community; Better overall community image and sense of place; Less incentive to sprawl when urban core area is desirable; Easy to install transit where it's not, and improve it where it is; Greater civic involvement of population leads to better governance.

In terms of alignment of development with national and local government policy, the proposed Atterbury Towers is set to align this development with strategies and policies to reduce urban sprawl and increase diversity in a specified area (the urban edge).

2.7 ENERGY NODES AND COMPOSITION OF MIXED USE NODES

The commercial infrastructure of Cities and Towns, follows certain principles that are embedded in Land use, Town Planning, Lifestyle, and other conventions. Historically, most towns were centered around the cathedral or church, alongside or close to a town square, close to which was established the commercial heart of the town. Fundamentally these facilities all had to be in easy walking distance of one another.

The town square became the center of much activity, social and commercial. Week end markets still frequent many squares in Europe, whilst at other times they become meeting places and the center of much social political and other events.

There was no mechanised transport and the horse and carriage was the most widely used form of transport. Even before any formalised or mass transport systems were conceived, the townsfolk gravitated to the heart. It was in this manner that the urban fabric was established. Consistent with this phenomenon, the land at and near the heart was most in demand and commanded the best prices and was used by the landed gentry, those that could afford to live and work in the heart. Amongst the gentry, it was not uncommon for families to compete with each other in most walks of life and this competition was often manifested in each trying to outdo the others by building a taller, grander and more significant building, palace or tower on the best sites in the heart of the urban fabric.

Only the wealthiest merchants were able to trade from the center with the less wealthy and those trading in bulky goods and manufacturing being forced to the periphery. It is no different today, although the train, motor car and air transport have had major influences on land use, town planning and values of land. Older civilizations than South Africa have particularly relevant and noticeable examples of this phenomenon.

Notwithstanding its relative youth, South Africa too has seen its towns and cities being developed along these self same lines. Possibly the major significant difference is that older European towns and cities were developed before the motor car, whilst newer environments have been strongly influenced by the motor car.

In South Africa accordingly there are towns with a commercial heart, often with the most significant church and a town square or "plein". Nearby the following uses often locates: banks, other commercial buildings, civic and government buildings, and very often railway stations and taxi ranks.

Land use in the heart of towns and cities is most intense, values generally are high and the density of people who flock to the center sees strong commercial activity. No single element of

the “heart” of a town plays the role of the destination – it is the mix of uses, enterprises, facilities and other elements that act collectively as the draw card for people to congregate in the center and to go about their daily business.

These hearts of towns and cities became **energy nodes** and the **collective energy** generated saw most if not all stakeholders benefiting.

As occurred in the older civilizations, certain land uses were unable, for reasons including affordability, land size, type of use and for sound town planning and other economic reasons, to locate in the heart. These accordingly located on the periphery of the town or city. Examples in the nineteenth century, in the European context, would have been, say, the mills, the wineries, blacksmiths, farriers, industry and service industries.

Examples in the South African context of types of businesses that have located peripheral to the hearts of towns and cities are factories, warehouses, distribution businesses, destination type merchants such as wholesalers, factory outlet stores, manufacturers and the like.

In some cases these are destination businesses, where the customer will visit the respective business because he or she wants to visit the specific business – it is not an impulse business, stands on its own and is not necessarily reliant on other nearby collective energy. They have clearly defined market profiles and their customers are similarly well if broadly defined.

In the 21st century as urban sprawl has taken place, when coupled with the social and political change in South Africa, has spawned new energy nodes. Very often these subscribe to the old principles of the development of towns, which have been briefly dealt with above, but on a far more loose or flexible basis. There are many examples:

Tyger Valley in Cape Town has developed into a powerful energy node. Centered around a massive regional shopping centre, the node now contains many complementary uses. These include medical facilities, motor, offices and the like. It is significant that wholesalers, and low cost businesses, such as manufacturers, distributors have not formed part of the inner heart – they are however well represented on the periphery, where cost are lower and their customer can still easily reach them, although the customer does so on the basis that such visit is specific and destination based.

The same phenomenon is evident in many of South Africa’s smaller towns, the difference being that the interceding new energy nodes are not evident due to the demographics of the towns being too small to support such secondary nodes. In these cases the heart of the town remains as the major energy node with the destination type businesses locating on the periphery – albeit that the periphery may be relatively close to the heart.

Other examples of these **energy nodes** are Sandton CBD, Greenacres in Port Elizabeth, Umhlanga in Kwa Zulu Natal, Rosebank in Johannesburg and Menlyn in Pretoria.

The latter is a very good example, with the Menlyn regional shopping center forming the heart, with an inner core of supporting uses such as medical and offices nearby. The tenant mix of Menlyn (as is the case in Sandton City, Greenacres, Gateway at Umhlanga and Rosebank) is definitively of a comparative nature. The environments created allow one stop shopping based on the key combinations of food, clothing, health care, soft furnishings, services such as banks, travel agents and the like and an entertainment and food offering. Purchases are of comparative nature, in the instances of clothing, health care and soft furnishings and of a household nature in the instance of food.

2.8 DEVELOPMENT SITE ASSESSMENT

The Demacon model is pragmatic and is based on the assignment of values to various location factors. Firstly, the site is evaluated on a ten-point scale, with ten being the highest. Secondly, weights are attached to these factors, in order of importance (1 to 5, with 5 being the most important).

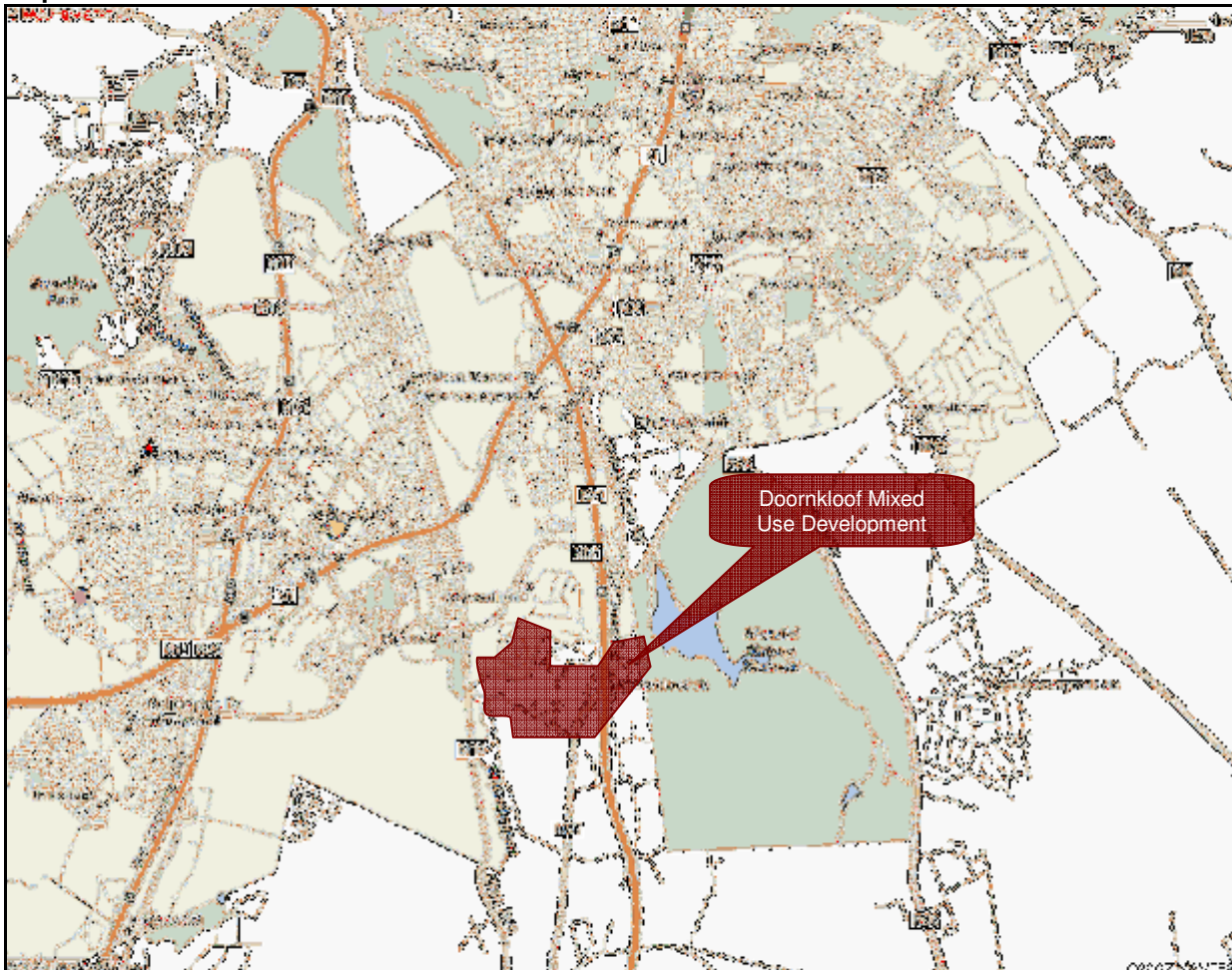
In the context of preceding citywide and local analyses, Demacon was requested to rate a number of potential sites for future investment purposes. The preceding economic analysis, coupled to knowledge of local *City of Tshwane Metropolitan Municipality* and *surrounding urban markets* will enable an in-depth analysis.

The following precincts / markets are evaluated in subsequent paragraphs:

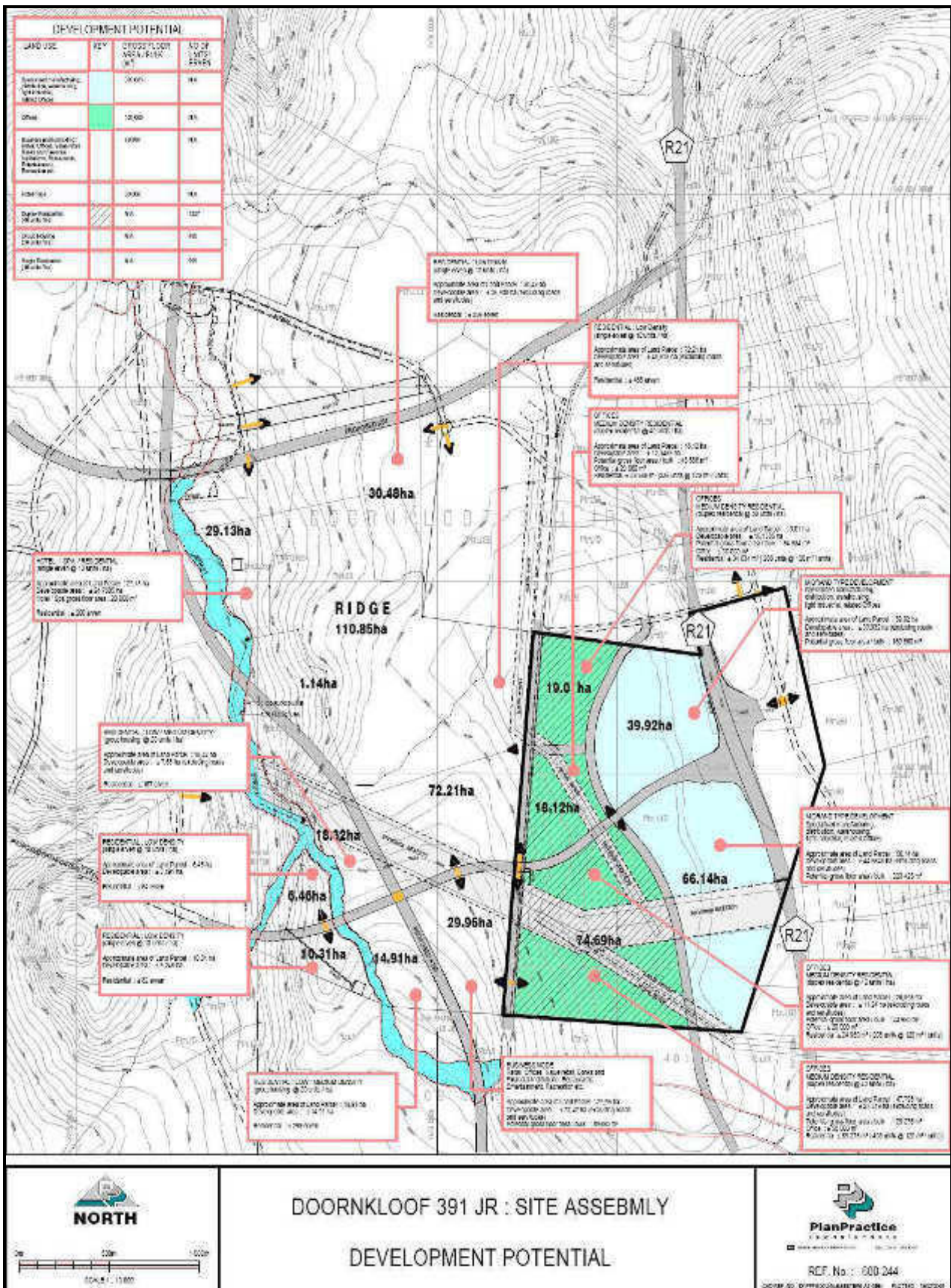
- Residential
- Retail
- Offices
- Warehousing / Distribution
- Medical (Private Hospital)

Map 2.3 provides an indication of the location of the site and Map 2.4 provides the site assembly and development potential of Doornkloof Mixed Use Development Project.

Map 2.3: Location of site



Map 2.4: Site assembly and development potential



DOORKLOOF 391 JR : SITE ASSEMBLY
DEVELOPMENT POTENTIAL

PlanPractice
CONSULTANTS
REF. No.: 600-244
DOORKLOOF 391 JR : SITE ASSEMBLY AND DEVELOPMENT POTENTIAL

➤ **RESIDENTIAL ASSESSMENT**

Table 2.1: Assessment of mixed typology density residential development

Location Factors	Grade 1-10	Weight 1-5	Points
Project match to consumer affordability levels	7	5	35
Peaceful / tranquil / quiet environment	7	5	35
Directional growth of the area	7	4	28
Compatibility with SDF	7	3	21
Future expansion potential	8	2	16
Initial broker response	8	5	40
Address value	8	5	40
Access to freeways / main routes	8	3	24
Proximity to work place	7	4	28
Proximity to schools	7	4	28
Proximity to public transport	7	2	14
Proximity to retail facilities*	7	2	14
Proximity to social amenities	7	3	21
		Total points	344
		Score	73.2%

Source: Demacon, 2008

➤ **RETAIL ASSESSMENT**

Table 2.2: Assessment of mixed retail developments

Location Factors	Grade 1-10	Weight 1-5	Points
Consumer volumes	6	5	30
Accessibility and visibility	8	4	32
Income level and income growth	7	5	35
Population growth	7	5	35
Age factor	7	3	21
Proximity to competition	7	3	21
Condition of premises	8	2	16
Directional Growth of the area	8	4	32
Functionality and complimentary uses	6	4	24
Area improving or deteriorating	7	4	28
Proximity to labour	7	3	21
Proximity to suppliers	7	2	14
Public transport accessibility	7	3	21
Address value	8	4	32
Future expansion potential	7	4	28
		Total points	390
		Score	70.9%

Source: Demacon, 2008

The mixed typology residential and retail development assessments ratings reflect the current situation and could thereby increase as the node is developing. The retail developments for the node should be implemented further in the future, which indicates that this is a medium term investment.

➤ **OFFICE ASSESSMENT**

Table 2.3: Assessment of office development and business parks

Location criteria	Rating	General Comments
Micro location	8	As long as the wider geographical area is above average the micro location of an office block is less important.
Accessibility	9	The road network will enhance the accessibility of the area.
Visibility	9	The site enjoys relatively high levels of visibility.
Residential area	7	World-wide office decentralising takes place in the direction of the more affluent suburbs.
Image	7	Image is one of the key factors for the success of an office location. Especially head offices require a prestigious address associated with an area with a good address.
Boss theory	7	Linked to the residential address, many of the smaller office firms are located in close proximity to where the owner/manager lives.
Linkages with other activities	7	Located within an area in proximity to retail, office and residential uses.
Workforce	7	Located within proximity to a number of residential areas.
Infrastructure	7	All the necessary infrastructural services are available, and sufficient service providers are located in the area.
Future Development Trends	8	Located in an area that is characterised by development strengthening the overall area as a commercial node.
Proximity to retail facilities	7	This is important for clerical workers especially during lunch hours.
Sufficient parking (to be provided)	7	Enough parking is important because ±75% of decentralised office workers use private transport.
Good security	7	This is of the utmost importance and must be a top priority.
Performance of existing node	7	A measure of existing supply, demand and vacancy levels over a long period. The node is expanding.
Overall potential	74.3%	Good Office Location

Source: Demacon, 2008

➤ **WAREHOUSING / DISTRIBUTION ASSESSMENT**

Table 2.4: Assessment of warehousing / distribution development

Location criteria	Rating	General Comments
Micro location	8	Micro location relates to juxtaposition to <i>inter alia</i> freeways, corridors and nodes
Accessibility	9	The road network and freeway location will enhance the accessibility of the area.
Exposure & sight value	9	The site enjoys relatively high levels of visibility.
Suitably differentiated residential markets	8	World-wide decentralising takes place in the direction of the more affluent suburbs.
Image as successful industrial precinct	7	Image is one of the key factors influencing successful commercial development. Especially head offices require a prestige address associated with an area with a good address.
Boss theory	8	Linked to the residential address, many of the smaller commercial enterprises are located in close proximity to where the owner/manager lives.
Linkages / agglomeration	8	Located within an area in proximity to retail, office and residential uses.
Workforce	7	Located within proximity to a number of residential areas.

Location criteria	Rating	General Comments
Infrastructure	7	All the necessary infrastructural services are available, and sufficient service providers are located in the area.
Future Development Trends	7	Located in an area that is characterised by development strengthening the overall area.
Proximity to retail & services	7	This is important for workers especially during lunch hours.
Sufficient parking & access for heavy vehicles	7	Sufficient parking is important including access requirements for heavy / articulated vehicles.
Good security	7	This is one of the utmost importance and must be a top priority.
Performance of existing node	6	A measure of existing supply, demand and vacancy levels over a long period. The retail node is expanding.
Overall potential	75.0%	Good Industrial / Commercial Location

Source: Demacon, 2008

➤ HOSPITAL ASSESSMENT

Table 2.5: Potential of Block 16 – Medical

Location criteria	Rating	General Comments
Micro location	8	As long as the wider geographical area is above average the micro location of hospital is less important.
Regional Accessibility	9	The surrounding road network (R21 and the M57), enhances the accessibility of the site.
Visibility	8	The site fairly visible from the surrounding road network.
LSM Profile and growth	8	Middle income market, predominantly LSM 4 – 10+; LSM profile is strengthened by new townhouse and up-market estate developments in the area.
Population growth	8	High growth forecast over the short to medium term.
Age and life cycle profile	8	Young and upcoming families between ages 25 – 45, moving into the area; demographic profile includes couples, new parents and mature parents
Directional growth of area	7	South easterly direction
Residential / non commercial character of area	7	Rapid growth in residential market – consists of many townhouse developments for younger and mature families.
Boss theory (doctor theory)	7	Large concentration of doctors in the primary market area. New upmarket lifestyle estate to serve as draw card for professionals and doctors alike.
Address value	7	Excellent address value - continues to strengthen over time
Workforce	7	Stable workforce; good access to affordable housing
Future development trends	8	Positive medium to long term development prospects; short to medium term growth in higher income residential units set to continue.
Future expansion potential (on site)	8	Provision could be made for future expansion.
Overall potential	71.4%	

2.9 SYNTHESIS

Preceding paragraphs analysed the potential site in terms of residential, retail, office, warehousing & distribution and a private hospital potential. Each of these developments poses unique investment benefits and challenges. Findings of the location assessments can be summarised as follows:

Table 2.7: Summary of Site Evaluation Results:

Proposed Land Use	Percentage
Warehousing / distribution development	75.0%
Office development & business parks	74.3%
Mixed typology density residential development	73.2%
Mixed retail developments	72.7%
Hospital development	71.4%

** Note: 80%+ indicates an exceptional site rating; a site rating of 70 – 80% is high and indicates that most important fundamentals for successful shopping centre development are in place; a rating of 60 – 70% indicates some critical factors may be lacking but could possibly be addressed; projects with a sub 60% rating are not recommended for consideration.*

Exhibit location characteristics of corridor development and accompanying location advantages pave the way for a broad spectrum of mixed use economic activities. Multiple mixed use precincts as mixed typology residential, various retail, office developments and warehousing & distribution developments.

The above assessment, contextualised by the regional economic overview discussed in Chapter 3, should enable stakeholders to make informed decisions regarding future development prospects and investment options in high growth destinations in the market area. The sites should be evaluated in the context of the economic and consumer market recovery forecast to occur towards Q4:2008 and throughout 2009 / 2010, as well as the anticipated consolidation phase which macroeconomists and real estate analysts predict will follow in the post 2010 period (2010 – 2015).

The following module indicates the economic overview of the market in macro context as well as in a local context.

CHAPTER 3: ECONOMIC PROFILE

3.1 INTRODUCTION

An intricate, though well defined relationship exists between the economy and urban real estate markets. The performance of specific economic sectors serves as proxy for the performance of these real estate markets. The purpose of this chapter is to outline the salient features of the market area economy (reference is made to the **Centurion & Kempton Park Economy**) in terms of selected time series economic indicators; most notably the economic profile and growth trends within the local economy.

As such, this chapter provides insight into the composition and stability of the local economies and hence, provides a more comprehensive assessment of medium- to long-term investment prospects than the conventional demographic analysis.

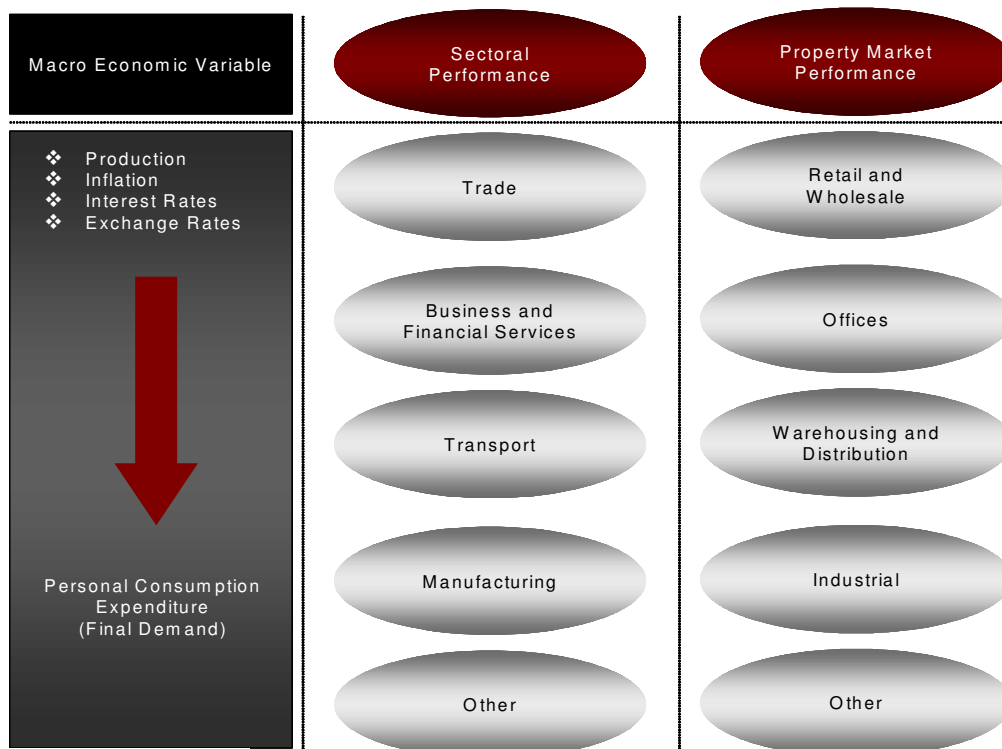
Subsequent sub-sections provide a concise overview of the local economy in terms of the following aspects:

✓ Reference Framework	✓ Business and Financial Service Sector
✓ Macroeconomic Overview	✓ Property Market Performance
✓ Local Economic Trends	✓ Synthesis
✓ Trade Sector Performance	

3.2 REFERENCE FRAMEWORK

The causal relationship between economic sector performance and property market performance is illustrated in Diagram 3.1.

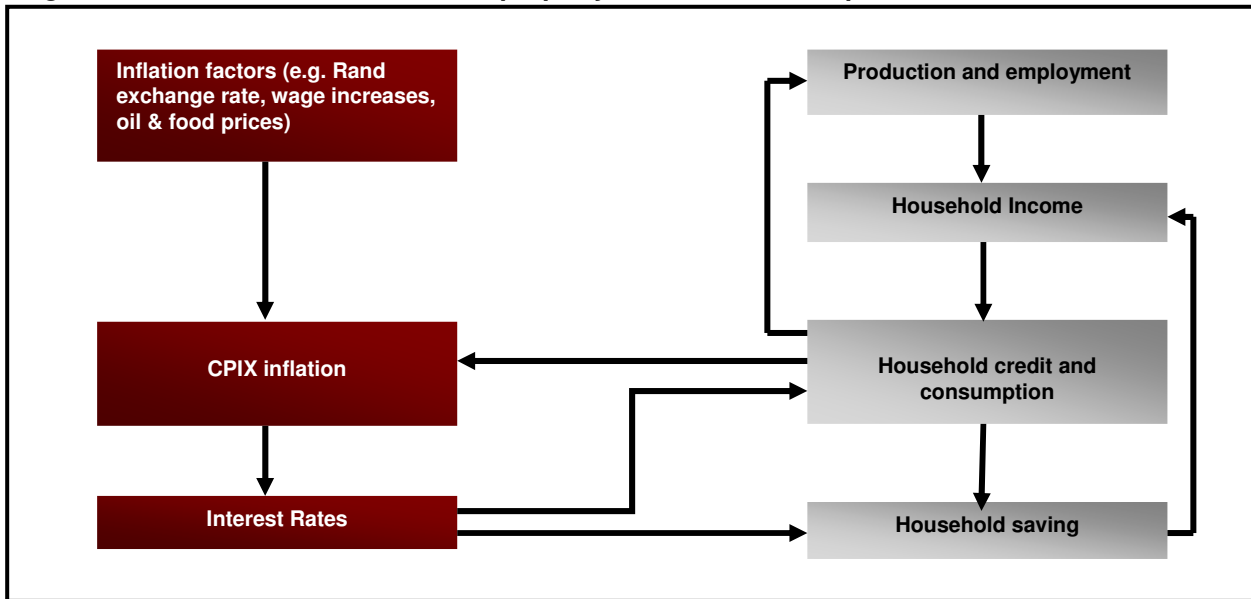
Diagram 3.1: Causal Relationship between Economic Performance and Property Sectors



© 2008 DEMACON

Diagram 3.2 indicates the relationship between the economic performance and the residential market.

Diagram 3.2: Economic and residential property market relationships



Indicators such as production, inflation, interest rates and exchange rates influence Personal Consumption Expenditure (PCE). PCE is a major demand driver for a broad spectrum of economic goods and services, including retail and accommodation. Gross Geographical Product (GDP), in turn, serves as leading indicator for property market performance.

In the context of Diagram 3.1, the trade sector performance serves as proxy for the retail market and the business and financial services sector serves as proxy for the office market. This causal relationship serves to inform property development proposals on a macro scale and creates a platform for more fine-grained analyses.

3.3 MACROECONOMIC FUNDAMENTALS

In terms of broad macroeconomic trends, the following are some of the dominant trends regarding the national economy and the impact of macroeconomic indicators on the property sector.

Table 3.1: Macroeconomic Indicators

Trend	Short to medium term implications
Positive prevailing economic conditions: <ul style="list-style-type: none"> ✓ Slight decrease in economic growth rate, ±4% forecast for 2008 ✓ Decreasing unemployment ✓ Rand depreciated significantly from July 2007, but subsequently recovered: (R/\$ R7.66, R/£ R15.08, R/€ R11.35) - as at 26/02/2008 ✓ Moderately rising inflation (lowest since 1960s, within the 3%-6% range) ✓ Moderately rising interest rates (14.5%) 	<ul style="list-style-type: none"> ✓ Strong growth predicted in lower end of property sector, with a recovery expected by 2009 ✓ Decreasing growth in house price index ✓ Strong demand from growing black middle class ✓ Increasing levels of disposable household income – may be curbed by increased interest rates over the medium term ✓ Foreign demand for South African property remain buoyant

Trend	Short to medium term implications
<ul style="list-style-type: none"> ✓ Nominal growth in house prices of 14.5% for the full 2007 (15.2% in 2006) ✓ House-price growth slowed to 11.2% in December 2007, with growth of around 9% expected for 2008 	<ul style="list-style-type: none"> ✓ House price growth slowing down, but continues to exceed growth in remuneration, making residential property increasingly less affordable ✓ However, rise in prices reflect increase in residential demand, inducing increased fixed capital formation in residential property ✓ Due to interest rate changes, prices of commodities and interest on debt will rise slightly although the debt-to-income ratio should remain positive
<ul style="list-style-type: none"> ✓ Personal tax relief (R64.1 billion between 2000/01 and 2006/07) 	<ul style="list-style-type: none"> ✓ Higher real disposable income ✓ Increase in household expenditure, with emphasis on middle and lower income groups
<ul style="list-style-type: none"> ✓ Annual reductions in transfer duties on property as from 1 March 2006 – no transfer duty payable on property valued at R500 000 and less ✓ Abolition of stamp duty on mortgage bonds from 1 March 2004 	<ul style="list-style-type: none"> ✓ Initial market sentiment is that property affordability will not improve significantly under present conditions ✓ Although house price growth is tapering off, prices are set to remain at high levels ✓ Growth will remain strong in selected locations
<ul style="list-style-type: none"> ✓ Strong growth in disposable income of households since 2000 (3.2% per annum; currently exceeding 7%) 	<ul style="list-style-type: none"> ✓ Higher levels of disposable income – may be affected by higher interest rates and inflation ✓ Improved capacity to afford better housing
<ul style="list-style-type: none"> ✓ Retail sales figures for October 2007 shows 8.1% decline in sales of household furniture, appliances and equipment in the three months from August to October compared with the same three months last year ✓ A decline year-on-year in real household expenditure on durable goods were also recorded 	<ul style="list-style-type: none"> ✓ A few years of slowing in the commercial market is expected, while office and industrial space are expected to resume their boom times, as reflected by low vacancy rates and strong rental inflation

CPIX INFLATION

CPIX inflation breached the upper end of the inflation target range in April 2007 for the first time since August 2003. The year-on-year increase of 6,3 per cent was higher than that expected by the Bank and most forecasters. The petrol price had increased by R0,69 per litre in April, and this was expected to contribute to an increase in the inflation rate. This was compounded by strong increases in food prices as well as generalised increases in some other categories.

Recent developments in inflation

Year-on-year inflation as measured by the consumer price index for metropolitan and other urban areas excluding the interest cost on mortgage bonds (CPIX) increased at a year-on-year rate of 6,3 per cent in April 2007 compared to 4,9 per cent in February and 5,5 per cent in March. Food and petrol price increases accounted for most of the increase, but more broad-based pressures are also becoming evident. If food and energy were excluded, CPIX inflation would have measured 4,6 per cent in April compared to 3,9 per cent in January. Although this measure is still

well within the target range, the recent strong upward trend is indicative of more broadly-based price pressures.

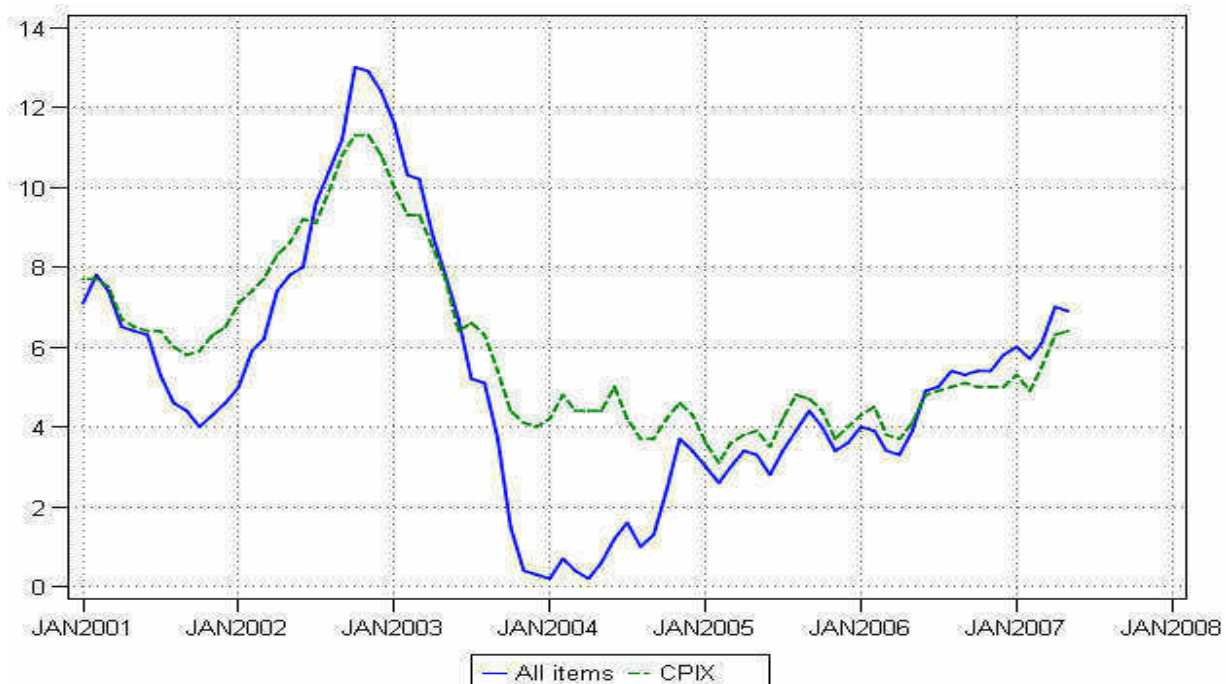
The biggest impetus to the increase in the inflation rate in April came from the petrol price. Petrol prices increased at a year-on-year rate of 15,5 per cent in April compared to 7,9 per cent in March 2007. Food price inflation also continued its upward trend measuring 7,8 per cent and 8,6 per cent in March and April respectively. The higher food price inflation in April was driven mainly by grain product and meat price increases. Grain product prices increased at a year-on-year rate of 10,6 per cent compared to meat price increases of 10,8 per cent. The latter, although still high, are significantly lower than the peak increases of almost 20 per cent in October and November last year. Prices of household consumables increased by 8 per cent in April, compared to 6,1 per cent in February.

The outlook for inflation

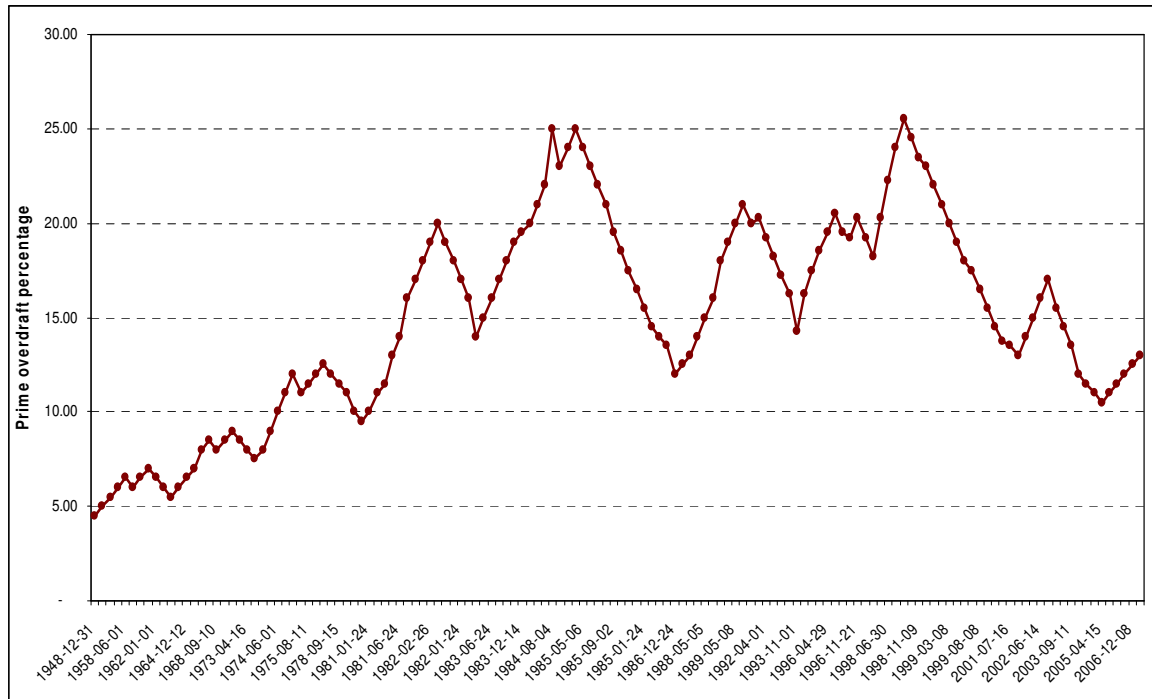
The most recent central forecast of the Bank’s models indicates a further deterioration in the inflation outlook compared to the previous forecast. The forecast, which takes account of the petrol price increases of May and June, projects that CPIX inflation will remain marginally above the upper level of the inflation target range in the second quarter of 2007. After a technical decline in the third quarter, CPIX inflation is expected to marginally exceed 6 per cent in the subsequent two quarters, peaking at an average of 6,3 in the first quarter of 2008. Thereafter, CPIX inflation is projected to follow a downward trajectory and to average 5,3 per cent in the fourth quarter of 2008. The higher trend of the forecast in the near term compared to the previous forecast is a result of a slightly higher oil price assumption. The committee continues to view the risks to the outlook to be strongly on the upside.

The sustained strength in consumer demand has been underpinned by higher levels of employment, higher real incomes and improved household balance sheets. Higher equity and house prices contributed to this positive wealth effect. The All-share index on the JSE Limited reached new heights in the past weeks, in tandem with strong equity market performances in a number of countries. According to the Absa and Standard Bank house price indices, house prices continue to increase although at moderately slower rates. The headline CPI annual inflation rate in May 2007 was 6,9%. The annual change in CPIX, the monetary policy inflation target measure, was 6,4% in May 2007.

CPIX Index Series



Prime Overdraft Rates



CPIX inflation expectations have worsened slightly according to the most recent Inflation Expectations Survey of the BER at the University of Stellenbosch.

The survey conducted in the second quarter of 2007, showed that participants on average expected annual average CPIX inflation to amount to 5,4 per cent in 2007, an acceleration of 0,2 percentage points compared with the outcome of the previous triparty survey conducted in the first quarter of 2007. All participants surveyed expected inflation to remain comfortably within the inflation target range during all three forecast years.

CPIX inflation expectations

Per cent, as surveyed in the second quarter of 2007

Average inflation expected for:	Financial analysts	Business representatives	Trade union representatives	All surveyed participants
2007	5,5	5,3	5,5	5,4
2008	5,0	5,4	5,5	5,3
2009	4,7	5,4	5,4	5,2

After having increased to 5,3 per cent in the first quarter of 2007, *household inflation expectations* rose further to 5,5 per cent in the second quarter of 2007. The higher household inflation expectations resulted mainly from an increase in the expectations of the high-income group. This group's inflation expectations increased to 5,7 per cent, whereas low-income earners' inflation expectations increased marginally to 5,5 per cent in the second quarter.

SARB Leading Indicator

The composite leading business cycle indicator is a measurable economic factor that changes before the economy starts to follow a particular pattern or trend.

Leading indicators are used to predict changes in the economy. Bond yields are typically a good leading indicator of the market because traders anticipate and speculate trends in the economy. For the time being, though, the SARB Composite Leading Indicator continues to experience a slowing rate of increase, suggesting the continuation of SA's longest business cycle upswing but slower economic growth for the time being. New vehicle sales, an important leading indicator, currently experiences negative growth, and real retail sales growth is on a broad slowdown, supporting expectations of mildly slower economic growth in the near term.

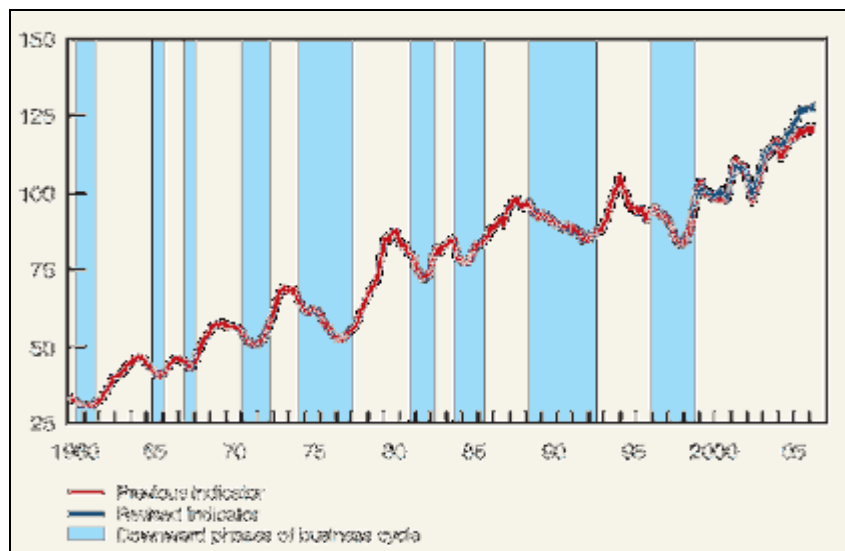
Revisions to the composite leading business cycle indicator

Composite leading business cycle indicator

The following graph shows the previous and the revised composite leading business cycle indicators.

Findings:

The red line indicates the previous indicator and the blue line the revised composite leading business cycle indicator which linked to the historical composite leading business cycle indicator in 1999.



The following 12 components are included in the composite leading business cycle:

- Job advertisement space in the Sunday Times newspaper: Percentage change over twelve months
- Number of residential building plans passed for flats, townhouses and houses larger than 80m²
- Interest rate spread: 10-year government bonds less 91-day Treasury bills
- Index of prices of all classes of shares traded on the JSE
- Real M1 money supply (deflated with CPI): Six month smoothed growth rate
- Index of commodity prices in US dollar for a basket of South Africa's export commodities
- Composite leading business cycle indicator of South Africa's major trading-partner countries: percentage change over twelve months
- Gross operating surplus as a percentage of gross domestic product
- Opinion survey of business confidence: Manufacturing, construction and trade
- Net balance of manufacturers observing an increase in the average number of hours worked per factory worker (half weight)

- Net balance of manufacturers observing an increase in the volume of orders received (half weight)
- Number of new passenger vehicles sold: Percentage change over 12 months

According to the above, the economy has a positive outlook on the short to medium term due to the above indicators such as the job advertisements, the number of residential building plans passed, index prices of all classes of shares, the number of new passenger vehicles sold and business confidence.

The buoyant spending on goods and services by households over the past few years was spurred by a number of factors, as stated in the table:

- ✓ A domestic economy expanding for the longest uninterrupted period since WWII, with a growth rate of 3.7% recorded for 2004, 5.5% for 2005, 4.6% for 2006, 4.7% for 2007, and 4.0% forecast for 2008
- ✓ Towards end 2004 – growth in retail sales of durable goods, non-durable goods and semi-durable goods reached record highs. Market crested in 2005, with slower growth expected in 2008
- ✓ The expanding domestic economy was supported by favourable global economic conditions.
- ✓ During 2005 cash expenditure by South African households totaled some R837 billion
- ✓ Close to one fifth of the amount was spent on food
- ✓ Poor households spent 71% of their budget on food, compared with 24% by middle income earners and 28% by upper income groups, an independent survey has found
- ✓ The average monthly food and beverage income for the 12 months to August 2006 was R1.86 billion, says StatsSA, 49.3% was earned by restaurants and coffee shops, followed by take-aways at 28.4%, caterers earned 17.9% and other catering services 4.4%. Of the total, food sales amounted to R1.58 billion (84.6%)
- ✓ A living standard survey, undertaken by Unisa, shows there is a rapid growth of the middle class, mostly made up of previously disadvantaged blacks and a widening gap between the rich and the poor
- ✓ Improving employment prospects in the formal economy, and hence more consumers
- ✓ Strong growth in assets – houses and equities, causing consumers to feel richer and spend more
- ✓ Positive real increases in remuneration for a number of sectors
- ✓ Lower levels of savings, higher levels of expenditure on debt
- ✓ Edcon, Truworths, Woolworths, Foschini, Pepkor and Mr Price have come out strongly against government's plan to restrict clothing and textile imports from China. It is expected that there will be an inflationary effect of 20% to 25% and more on prices of some categories of clothing
- ✓ Prolific growth rates primarily driven by strong consumer expenditure, thriving amidst relatively low and stable interest rates and inflation in recent times, may taper off over the short to medium term as the SARB deliberately increased the Repo Rate by 400 basis points between June 2006 and December 2007. Consequently, the average R500 000 home loan will cost approximately R1 667 per month per household more since June 2006. The impact is expected to be more pronounced in terms of household expenditure on luxury and durable consumer goods, e.g. homes, vehicles, furniture and appliances. DEMACON initially anticipated a total interest rate increase of between **2% and 4%**. Similar sentiments were also revealed in independent media reports. **Interest rate relief is widely anticipated towards Q4:2008.**

- ✓ The growth stimulus created by a new black middle-class, particularly for luxury consumer goods (cell phones, cars etc.) is expected to continue.

These factors all bode well for consumer and business confidence, which is expected to continue for some time, as indicated by projected macroeconomic indicators.

Table 3.2: Macroeconomic Indicator Forecasts (comparative annualised averages)

Macro-Economic indicators	2007	2008
Real GDP (% change)*	4.9	5.0
CPI (average, % change)	5.8	5.0
Current GDE (% change)	12.3	11.7
Real GDE (% change)	5.9	5.8
Real PCE (% change)	5.5	5.0
10-year bonds (average, %)	7.8	7.7
Nominal prime overdraft rate (average, %)	12.7	12.1
Real retail sales: durable goods (% change)	6.5	7.1
Real retail sales: non-durable goods (% change)	4.4	4.3
Real retail sales: semi-durable goods (% change)	9.8	7.4

- ✓ Government support for low income earners has seen a strong surge in retail sales at the lower end of the market while it is expected that the emerging middle class will continue spending in 2008
- ✓ Figures for 2008 are expected to be below the 2007 benchmark, although still positive, as the effects of higher interest rates filter through to various levels of the economy
- ✓ South Africa's consumer landscape is constantly evolving. Between 1994 and 2004, over 547 new stores have opened within the organised trade grocery retail sector, equaling a growth of 46%
- ✓ These stores have been fairly evenly split between corporates like Shoprite and Pick 'n Pay (who recently acquired Fruit & Veg City for an estimated R400 million)
- ✓ Regionally, South Africa's retail spend continues to be heavily weighted towards Gauteng and the Western Cape
- ✓ Despite only containing 30% of the country's population, these two business hives contribute 54% of the country's spend (GDP)
- ✓ Another imbalance in local retail scene exists in store concentration – The organized / modern grocery trade comprises a mere 5% of stores, but account for 70% of the country's grocery turnover
- ✓ Smaller counter and self service or traditional stores, bring in considerably less, but of course there are huge numbers of these outlets
- ✓ Examples of buoyant retailer performance include the following: Ellerines achieved 79.2% growth in turnover for the year ended 30 August 2006. The Ellerines group attributes its strong growth to the emergence of the middle class black community
- ✓ Woolworths increased sales by 20.2% year-on-year for the six months to December 2006, with Woolworths' store card, credit card and personal loan books growing by 25.9%.
- ✓ According to the South African Council of Shopping Centres, the Mr Price Group is on a major expansion drive. This group grew headline earnings by 49% to 161.7c a share in the 52 weeks to 31 March 2006 on a revenue increase of 14% to R5.28 billion. Mr Price has stated that it plans to spend around R1 billion on new store development over the next five

years. Expansion is to include bigger Mr Price stores, in particular the new Mr Price Home stores, occupying from 1 500m² to 2 500m².

- ✓ Interesting in the statement is that these stores would be opened near fast-growing high density residential areas to become final-destination destinations rather than part-of-a-shopping-mall-destination, where the rentals are much higher. The group is also moving into credit sales, having determined a strong demand for it. Cash sales, however, still make up 89% of total sales. Sales breakdowns indicate that the home products division reported a 72% increase in profit while apparel showed a 41% increase in operational profit
- ✓ Spur grew its attributable income by 40%; the group opened 20 new stores in South Africa during this financial year as well as three internationally
- ✓ Foschini reported third quarter sales increase of 19.4% compared to the corresponding period a year earlier, while Edcon reported a 21% jump
- ✓ The Shoprite Group (SA's second biggest supermarket chain) reported a 15.1% increase in turnover for the 52 weeks ending 30 June 2006.
- ✓ Market sentiment towards the first of the series of interest rate hikes was clearly negative, as exhibited by the Stock Market's immediate behaviour the day after the announcement, but the effects on household spend are still to be measured – the effect is expected to be more pronounced on certain commodity types. Although the initial impact on the retail market was negligible, the effect is expected to become gradually more pronounced during 2008.

The bottom line is that the South African consumer market is characterised by an increasingly large segment of **socially upward mobile consumers** – the rising black middle class with a set of very strong aspirational values. This trend holds direct beneficial implications for the domestic retail industry.

A combination of government expenditure, local economic development and social upliftment interventions are gradually creating a feeder system for the LSM 4, 5 & 6 categories due to steady growth in disposable income and household asset ownership levels in the LSM 1 to 3 categories since 1994 (refer to Table 3.3 and Table 3.4).

In the context of the above it is needless to say that, barring a major exogenous shock, the trade sector is set to continue along a positive growth trajectory over the short to medium term. Development in rural areas is set to benefit from this trend, as statistics indicate that the average South African consumer, in particular the LSM 1-3 segments, have increased his level of wealth over the past decade.

Table 3.3: SA population in terms of Living Standard Measurement Criteria, 2004

	Penetration			Average Monthly Household Income		
	2003A (%)	2003B (%)	2004 (%)	2003A (R)	2003B (R)	2004 (R)
LSM 1	10.3	9.5	9.1	862	886	879
LSM 2	13.2	13.1	12.7	1 112	1 130	1 068
LSM 3	14.3	14.4	14.0	1 342	1 348	1 408
LSM 4	14.0	14.0	14.7	1 751	1 717	1 774
LSM 5	12.5	12.8	13.1	2 429	2 347	2 427
LSM 6	12.9	13.2	14.0	3 999	3 960	4 075
LSM 7	6.3	6.5	6.2	6 020	6 189	6 455

	Penetration			Average Monthly Household Income		
	2003A (%)	2003B (%)	2004 (%)	2003A (R)	2003B (R)	2004 (R)
LSM 8	5.9	5.9	4.8	8 442	8 522	8 471
LSM 9	5.7	5.5	5.9	11 596	12 195	11 566
LSM 10	4.9	5.1	5.3	17 195	18 216	18 649

Table 3.4: SA population in terms of Living Standard Measurement Criteria, 2006

	Penetration			Average Monthly Household Income		
	2004 %	2005RA %	2006RA %	2004 %	2005 RA %	2006 RA %
LSM 1	9.1	7.6	6.1	878	905	1 003
LSM 2	12.7	12.2	12.2	1 075	1 093	1 210
LSM 3	14.0	13.0	13.0	1 407	1 417	1 509
LSM 4	14.7	14.9	14.9	1 783	1 870	1 924
LSM 5	13.1	13.5	13.5	2 427	2 495	2 674
LSM 6	14.0	14.5	14.5	4 063	4 207	4 400
LSM 7	6.2	7.1	7.8	6 437	6 466	6 880
LSM 8	4.8	5.2	5.7	8 458	9 247	9 304
LSM 9	5.9	6.4	6.7	11 516	11 951	12 647
LSM 10	5.3	5.5	6.0	18 664	18 955	19 974

Development Implications

These macro-economic factors have the following implications for local economies that planners and developers should acknowledge:

- ✓ Due to increasing demand for space in primary markets i.e. new developments, existing nodes may experience an increase in vacancy rates over the short term, with a recovery over the medium term
- ✓ The existence of highly differentiated micro markets imply that only certain nodes will benefit from prevailing macro market conditions, while others will continue to deteriorate rapidly
- ✓ Local authorities should mobilise available resources to align themselves and draw maximum benefit from government initiatives
- ✓ Local authorities characterised by low growth and limited investment should adopt a facilitative approach to encourage new investment

3.4 LOCAL ECONOMIC TRENDS

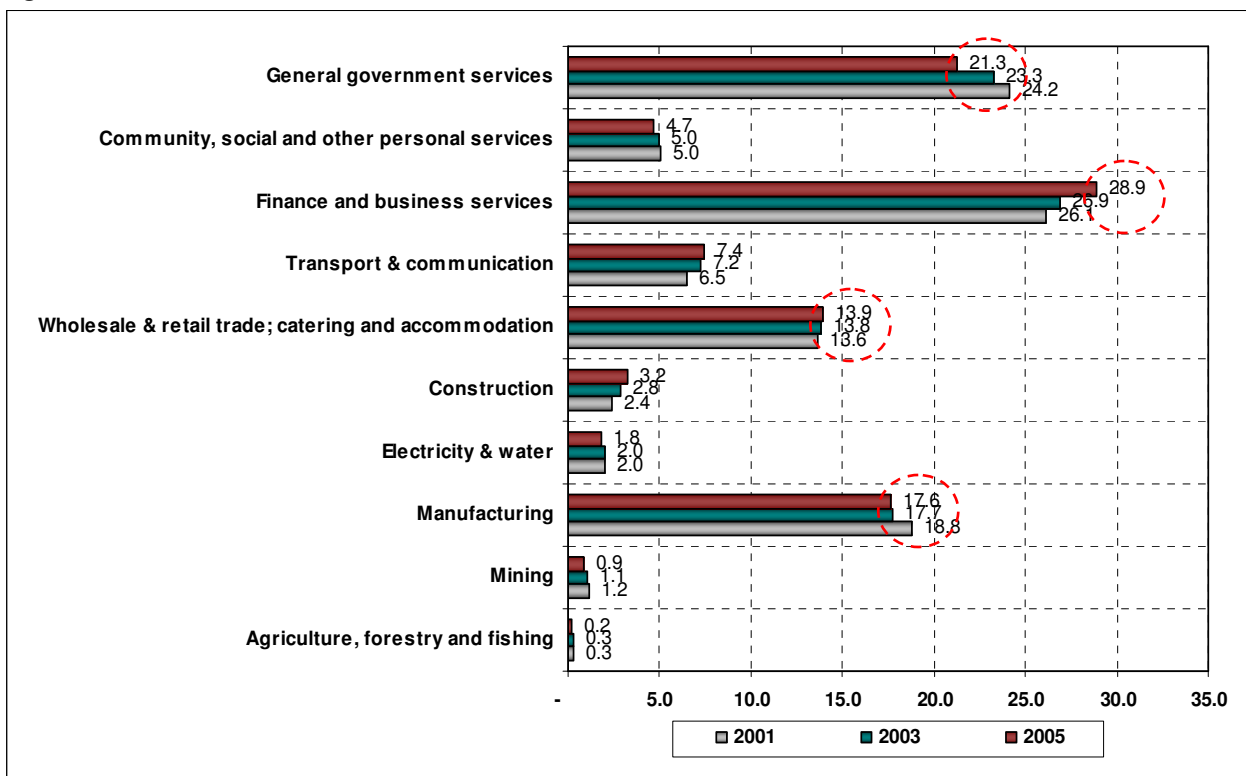
Subsequent economic indicators provide insight to the performance of the **Centurion local economy**. The data indicate the dominant economic sectors, growth sectors as well as the comparative advantages of all the local economies.

3.4.1 ECONOMIC PROFILE

Figure 3.1 indicates the contribution of the nine major economic sectors to the total economic production of Centurion and Kempton Park economy for the time period 2000 to 2005. These nine sectors are:

- ✓ General government services
- ✓ Community, social and other personal services
- ✓ Finance and business services
- ✓ Transport and communication
- ✓ Trade sector (Wholesale and retail; catering and accommodation)
- ✓ Construction
- ✓ Electricity and water
- ✓ Manufacturing
- ✓ Mining
- ✓ Agriculture, forestry and fishing

Figure 3.1: Economic Profile of Centurion, 2000 – 2005



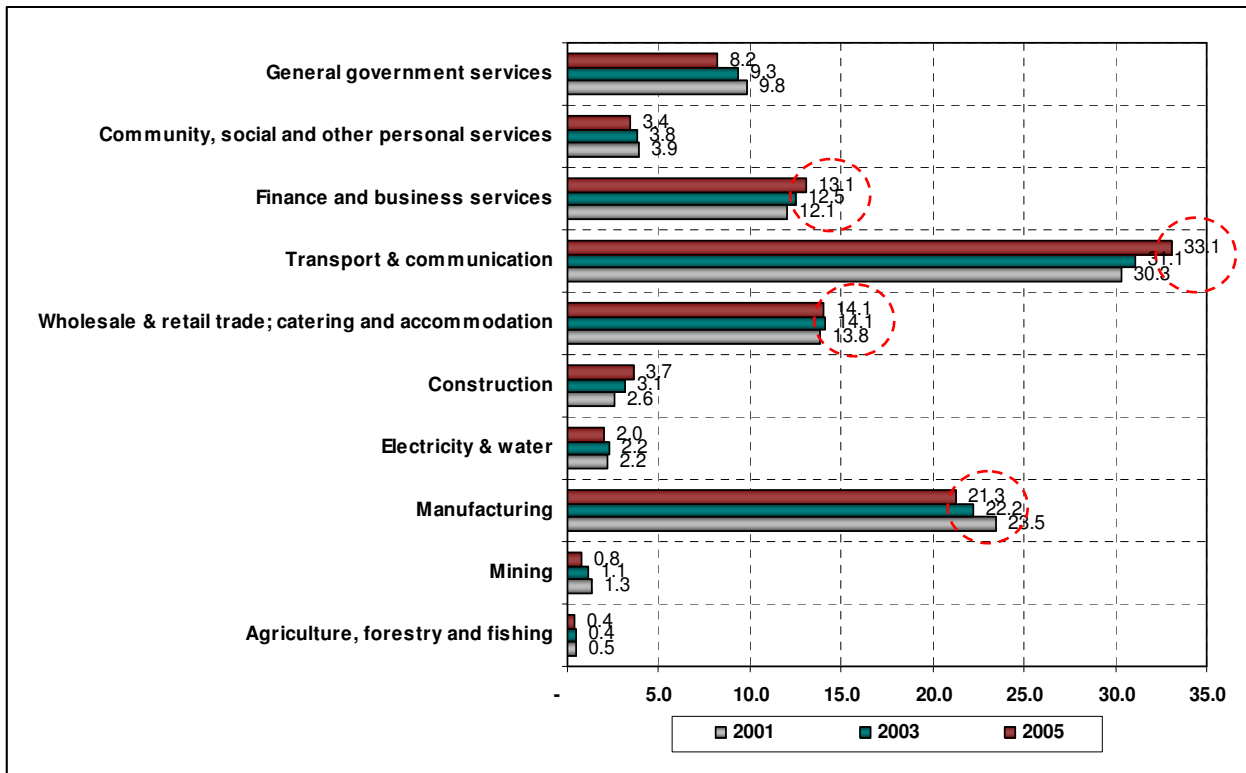
Source: Demacon, 2008

Findings: (Figure 3.1 and Figure 3.2)

- ✓ The regional economy and specific local economies have become increasingly diversified over the past two decades, the implication being that consumer demand and favourable local market conditions have created numerous investment opportunities for services sector based activities.
- ✓ Regional investment activities (discussed under subsequent paragraphs) affirm the notion that investors have a keen interest in the above economies.
- ✓ The four dominant contributors to the **Centurion** local economy in 2005 are the following:
 - Finance & business sector – **28.9%**
 - General government services – **21.3%**
 - Manufacturing – **17.6%**

- Trade sector – **13.9%**
- ✓ The four dominant contributors to the **Kempton Park** local economy in 2005 are the following:
 - Transport and communication sector – **33.1%**
 - Manufacturing – **21.3%**
 - Trade sector – **14.1%**
 - Finance & business sector – **28.9%**

Figure 3.2: Economic Profile of Kempton Park, 2000 – 2005



Source: Demacon, 2008

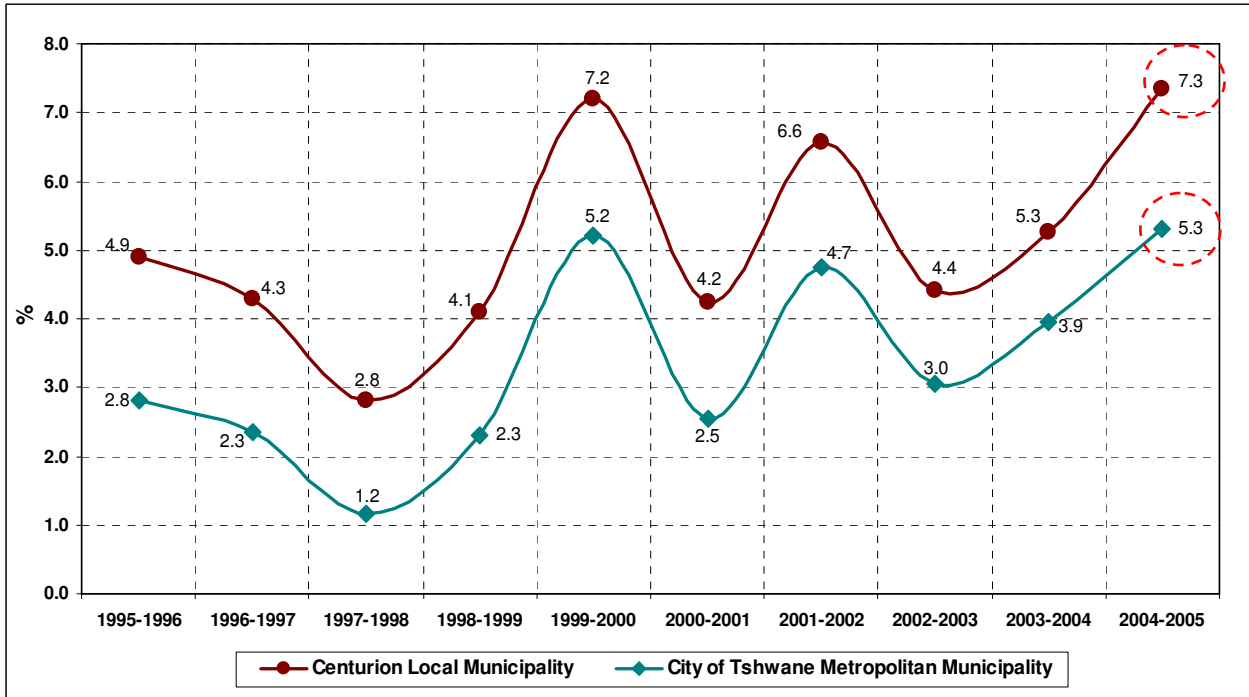
Subsequent economic indicators provide insight to the performance of the **Centurion and Kempton Park local economy**. The data indicate the dominant economic sectors, growth sectors as well as the comparative advantages of all the local economies.

3.4.2 ECONOMIC GROWTH

In as far as economic growth is concerned; there are two schools of thought. The conservative school of thought maintains that SA will realise economic growth of between 3% and 4% per annum between 2005 and 2010. The more optimistic school of thought maintains that a real economic growth rate of between 5% and 6% per annum is achievable.

Figure 3.3 and Figure 3.4 provide detail on the growth performance of Centurion local economy since 1995 and the degree of correlation in economic up- and downturns between the regional and national business cycle.

Figure 3.3: Centurion Economic Growth Performance, 1995 - 2005

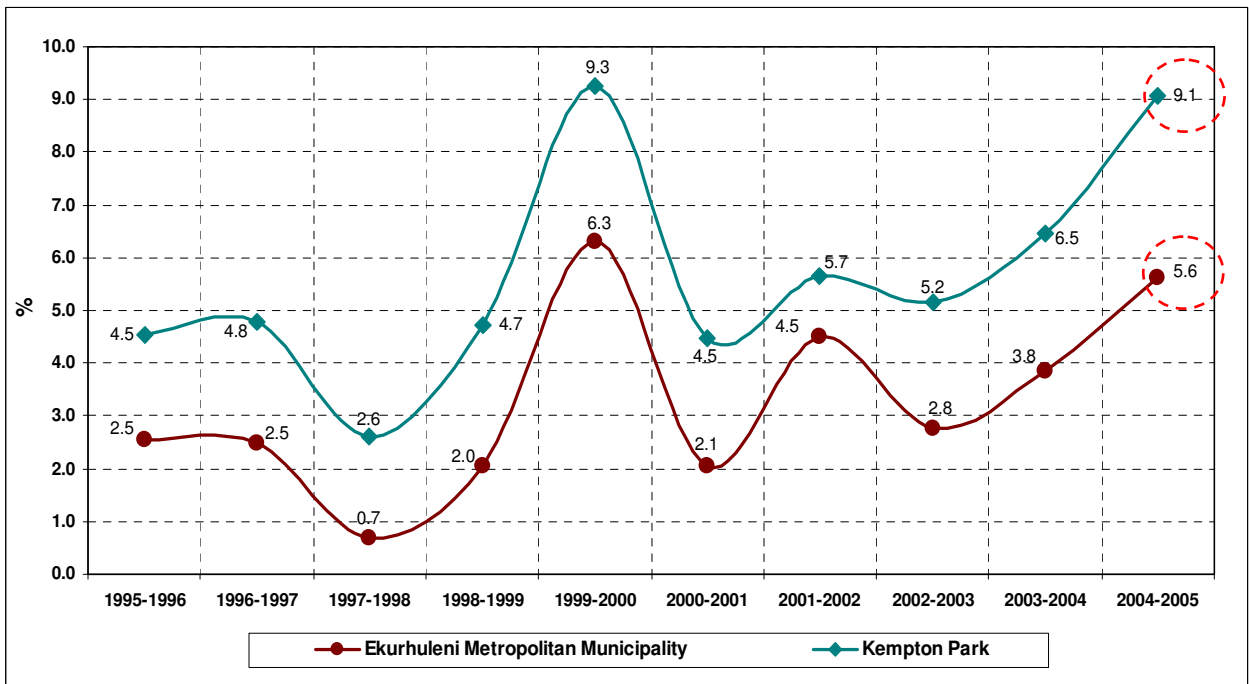


Source: Demacon, 2008

Findings: (Figure 3.3)

- ✓ The Centurion economy reached peaks up to **7.2%** in 1999 – 2000, and in 2001 – 2002 up to **6.6%**, compared to City of Tshwane Metro of **5.2%** in 1999 – 2000 and **4.7%** in 2001 – 2002.
- ✓ Centurion economy and the City of Tshwane reached its lowest points in 1997 – 1998, respectively **2.8%** and **1.2%** both in 1997 – 1998.
- ✓ The economic contribution of Centurion local economy was **7.3%** in 2004 – 2005 and the economic contribution of the City of Tshwane’s local economy was **5.3%**.

Figure 3.4: Kempton Park Economic Growth Performance, 1995 - 2005



Source: Demacon, 2008

Findings: (Figure 3.4)

- ✓ The *Kempton Park economy* reached peaks up to **9.3%** in 1999 – 2000, and in 2001 – 2002 up to **5.7%**, compared to *Ekurhuleni Metro* of **6.3%** in 1999 – 2000 and **4.5%** in 2001 – 2002.
- ✓ Kempton Park economy and the Ekurhuleni Metro reached its lowest points in 1997 – 1998, respectively **2.6%** and **0.7%** both in 1997 – 1998.
- ✓ The economic contribution of Kempton Park local economy was **9.1%** in 2004 – 2005 and the economic contribution of the Ekurhuleni Metro economy was **5.6%**.

Development implications

- ✓ Economic growth in the regional economy (and sub-economies) reflects a similar cyclical trend that correlates with growth trends experienced in the SA domestic economy over the same period of time.
- ✓ Most notable negative impacts that had a lagged effect on domestic demand and consumer expenditure include the 1997/1998 Asian Crisis (more commonly referred to as the Asian Flu), followed by record high prime lending rates of 25.5% in August 1998 and all time high exchange rates in January 2002 (R16.64:1£ and R11.61:1\$).
- ✓ The above trends had a direct and visible impact on the SA economy as a whole, as well as on consumer behaviour on a localised level. Hence, every local economy in SA was affected.
- ✓ As evident from the above figures, growth in most sub-economies in City of Tshwane peaked in the 1999 – 2000 period, mainly due to the beneficial effect of the weakening Rand on export earnings - in particular export based manufacturing firms.
- ✓ Local economic growth in recent years stabilised and averaged 4.0%, with the exception of a number of sub-economies that recorded **above average growth**.
- ✓ Most macroeconomists agree that the aforementioned conditions will remain favourable and relatively stable until at least 2010, when SA hosts the Soccer World Cup
- ✓ In as far as economic growth is concerned; there are two schools of thought. The conservative school of thought maintains that SA will realise economic growth of between 3% and 4% per annum between 2005 and 2010. The more optimistic school of thought maintains that a real economic growth rate of between 5% and 6% per annum is achievable.

3.4.3 FINANCIAL AND BUSINESS SERVICES SECTOR PERFORMANCE

The business and finance sector serves as proxy for the office market. This sector comprises establishments engaged in professional services, financial institutions (e.g. banks and insurance companies) as well as real estate services.

CLASSIFICATION OF FINANCE AND BUSINESS SECTOR

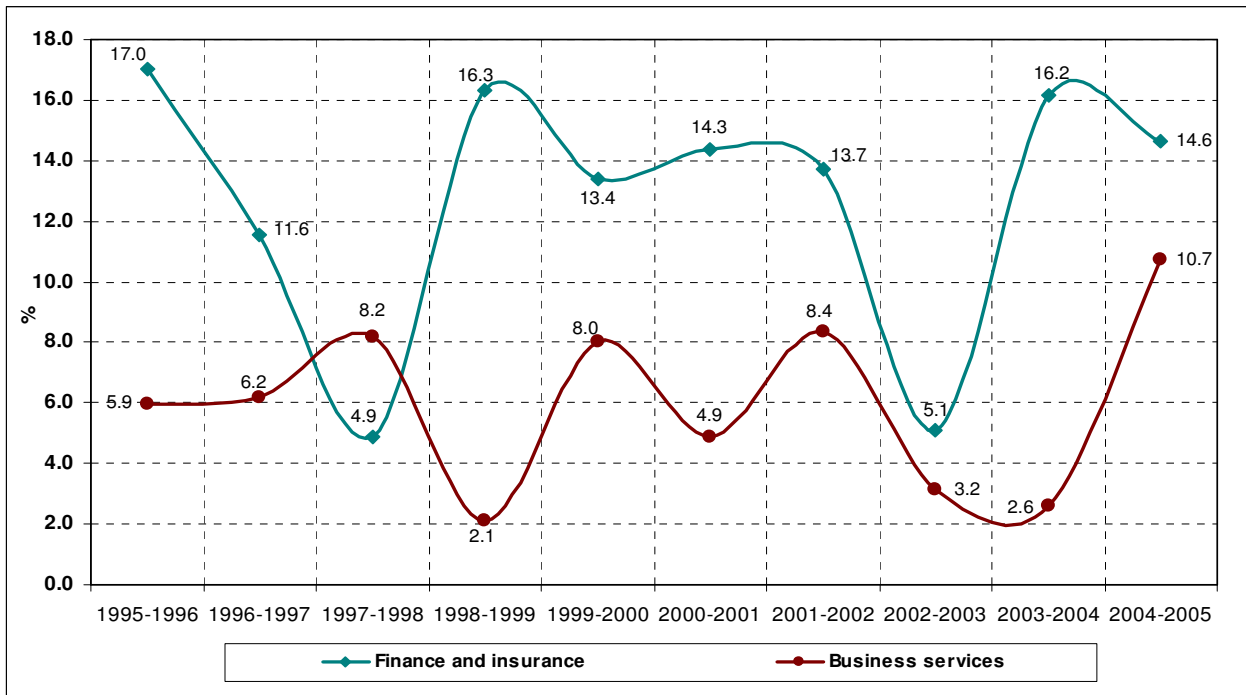
According to the SIC (Standard Industrial Classification of all Economic Activities) the following are included in the Finance and Business Services Sector:

- ✓ Financial intermediation
- ✓ Insurance and pension funding
- ✓ Real estate activities
- ✓ Computer and related activities
- ✓ Other business activities
 - Legal
 - Accounting
 - Book-keeping
 - Auditing activities
 - Tax consultancy

- Market research
- Public opinion research
- Business and management consultancy

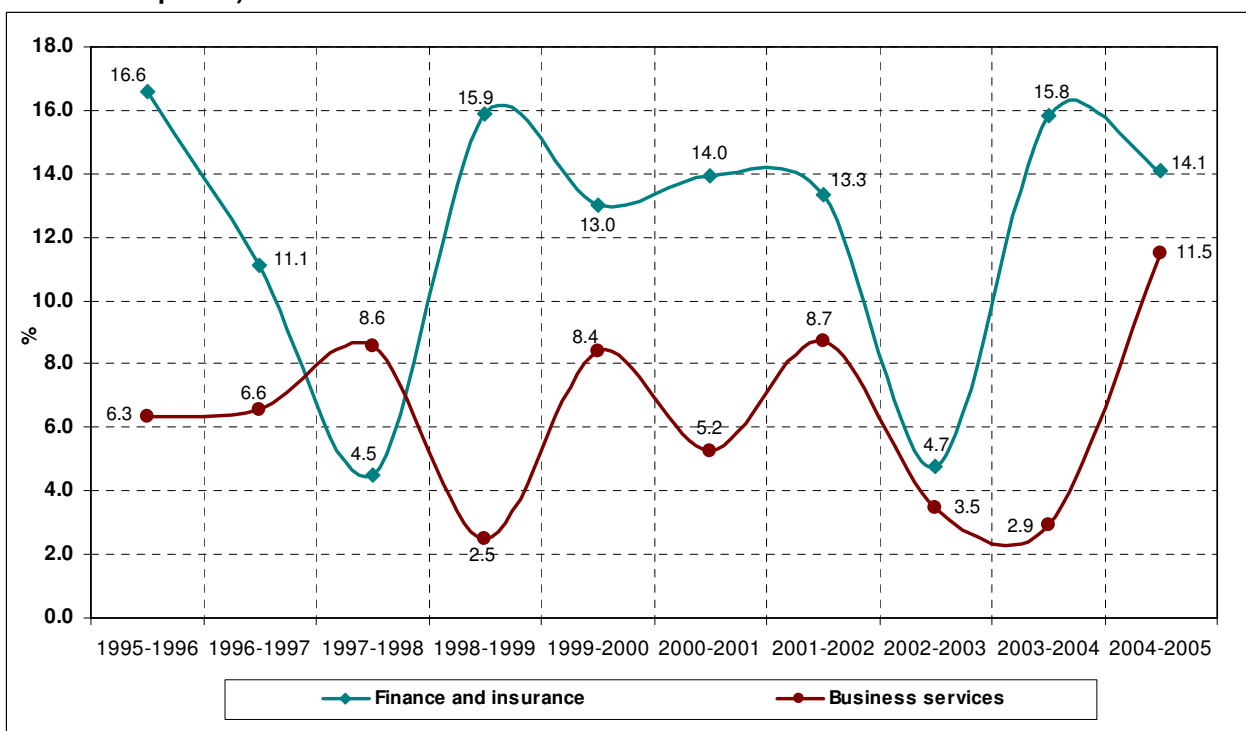
Figure 3.5 and Figure 3.6 indicate the growth performance of the business and finance sector from 1995 to 2005 for Centurion.

Figure 3.5: Centurion Financial and Business Sector Growth Performance (constant 2000 prices)



Source: Demacon, 2008

Figure 3.6: Kempton Park Financial and Business Sector Growth Performance (constant 2000 prices)



Source: Demacon, 2008

Findings: (Figure 3.5)

- ✓ It is evident from Figure 3.5 that the *finance and insurance sector* of **Centurion** is the dominant sector of the two sectors.
- ✓ The *finance and insurance sector* maintained higher growth rates throughout the selected time period, except during 1997/1998.
- ✓ The *business services* sector of Centurion peaked during 1997/1998, 1999/2000 and again in 2001/2002 and reached its lowest points in 1998/1999 and 2003/2004.
- ✓ The *finance and insurance* sector ended with a contribution of **14.6%** in 2004/2005 and *business and finance* sector with **10.7%**.

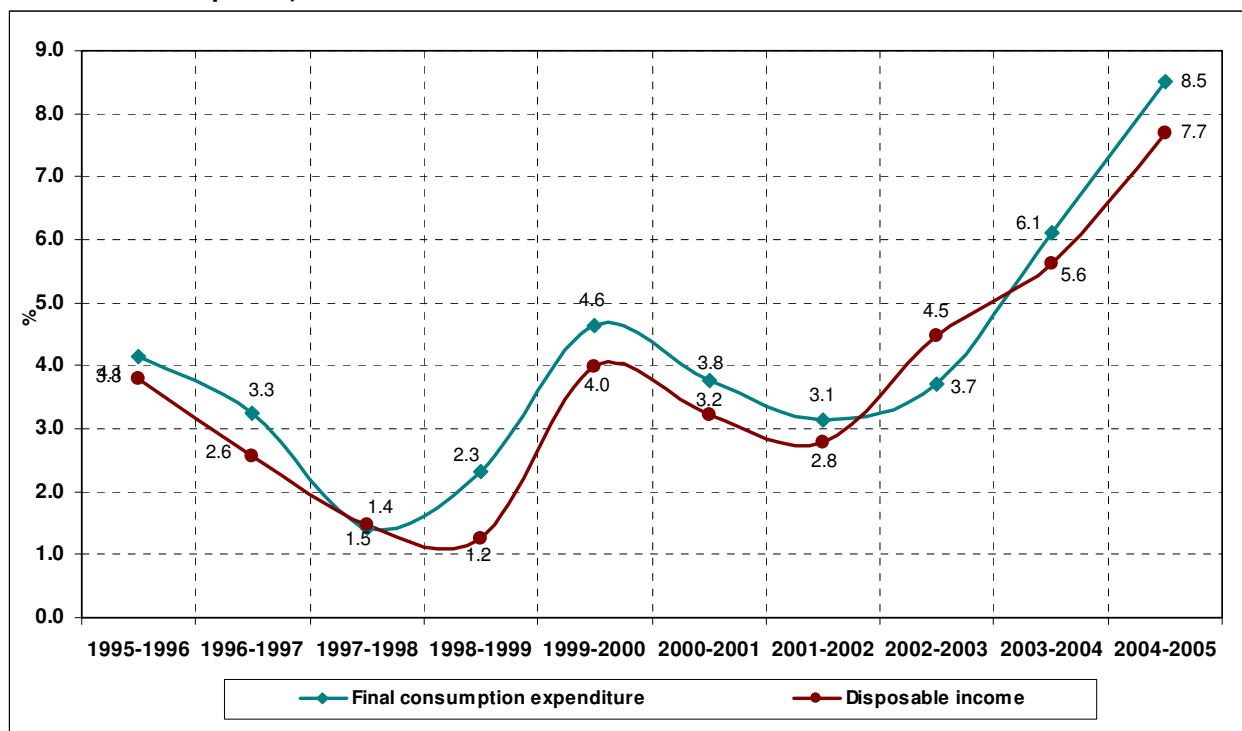
Findings: (Figure 3.6)

- ✓ It is evident from Figure 3.6 that the *finance and insurance sector* of **Kempton Park** is the dominant sector of the two sectors.
- ✓ The *finance and insurance sector* maintained higher growth rates throughout the selected time period, except during 1997/1998.
- ✓ The *finance and insurance* sector ended with a contribution of **14.1%** in 2004/2005 and *business and finance* sector with **11.5%**.

3.4.4 GROWTH IN FINAL CONSUMPTION EXPENDITURE AND DISPOSABLE INCOME

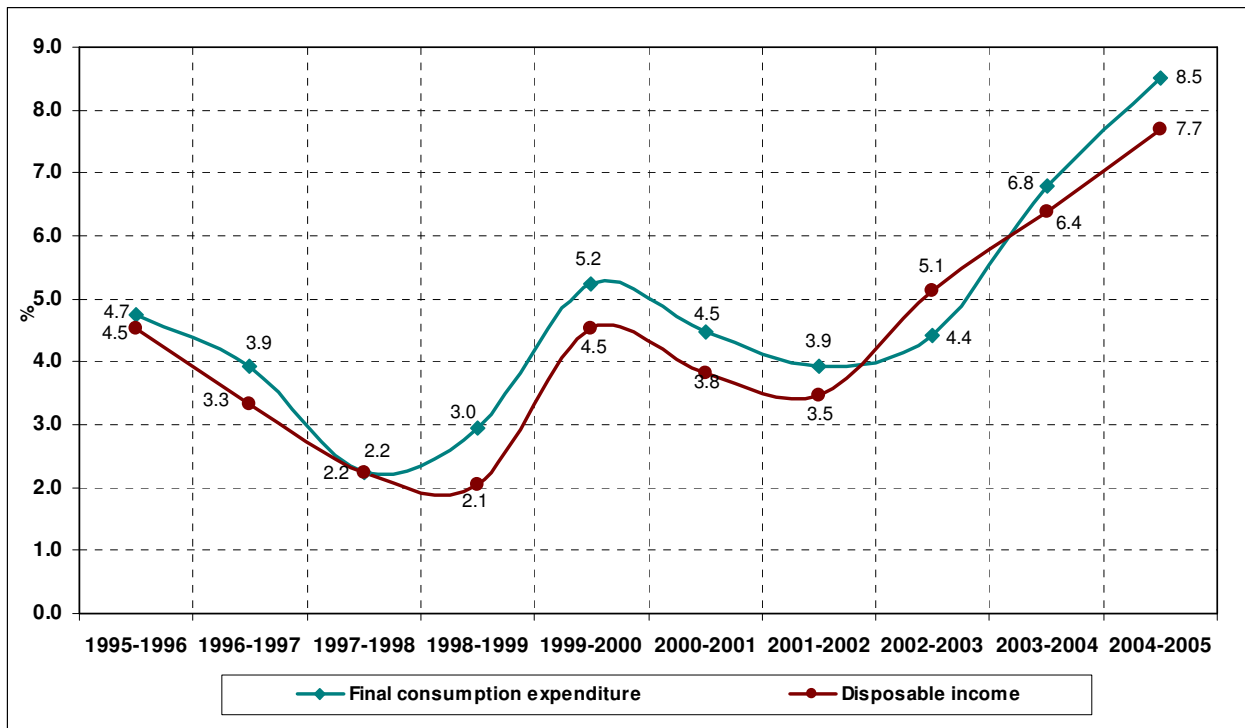
Figures in subsequent paragraphs illustrate the rate of **growth of final consumptions expenditure** (on all goods and services) in relation to **growth in disposable household income**. The graph reveals a high degree of positive correlation between the two variables, which in turn reveals similar up- and downturns to the business cycle as a whole. Figure 3.7 and Figure 3.8 illustrate the rate of growth in final consumption expenditure in relation to annual growth in disposable household income in Centurion and Kempton Park economies.

Figure 3.7: Growth in final consumption expenditure and disposable income of Centurion (constant 2000 prices)



Source: Demacon, 2008

Figure 3.8: Growth in final consumption expenditure and disposable income of Kempton Park (constant 2000 prices)



Source: Demacon, 2008

Findings: (Figure 3.7 and Figure 3.8)

- ✓ The cyclical trend observed in the above figure correlates with the business cycle trend, i.e. a follow through on the 2000 / 2001 weakening of the Rand and subsequent growth to record high levels in 2004 (continuing into 2005 and the first quarter of 2006).
- ✓ Final consumption expenditure cycle of **Centurion** and **Kempton Park** both achieved an economic contribution of **8.5%** and disposable income of both economies achieved an economic contribution of **7.7%** over the entire time period
- ✓ A general South African trend is the decrease in expenditure on non-durable goods which is declining year-on-year with a rise in consumption expenditure on semi-durables and durables. These trends can be ascribed to, *inter alia*, the high rate of inflation on non-durables (especially meat) and unabated clothing and footwear deflation (mainly fuelled by imports from China).
- ✓ Bear in mind that the above reflects **relative** values. Under present market conditions, which include low interest rates and inflation, households are prone to spend **relatively** more on durables and semi-durables.
- ✓ There is a positive correlation between the economic growth and the disposable income of the trade sector. The fact that both economic growth and growth in disposable income exceed the retail sector growth, suggests that households experience real income growth in the local retail infrastructure.

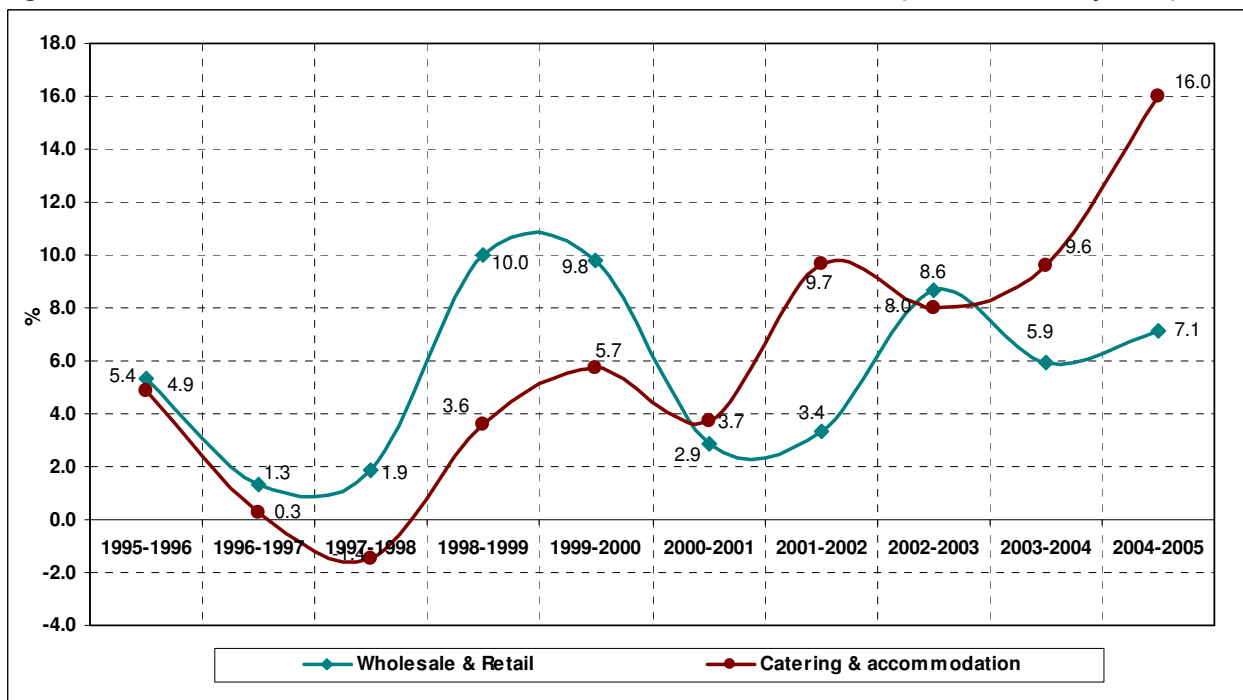
The above was, over the preceding 4 years, accompanied by gradually rising levels of household debt - which the recent interest rate hike by 50 basis points will set out to curb. The benefit from the analysis once again stems from a comparison of the various sub-economies to the regional average - above average performers are highlighted and reveal areas in which high growth is expected to continue in future (*these are indicative of **high potential locations for consumer driven services***).

3.4.5 TRADE SECTOR PERFORMANCE

The trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering of services incidental to the sale of merchandise. Trade thus involves the selling or arranging the purchase or sale of goods from resale, and selling durable, semi-durable and non-durable consumer goods. The trade sector is sensitive to business cycle fluctuations, which in turn are extremely sensitive to global economic fluctuations.

The state of this sector is therefore an ultimate and direct reflection of consumer demand. The impact of macro and micro economic forces on the trade sector therefore extends to both supply and demand side dynamics of the product value chain. The trade sector is the all-important interface between producer, wholesaler and consumer. Figure 3.9 and Figure 3.10 illustrate trade sector growth in the market area since 1995.

Figure 3.9: Trade Sector Growth Performance of Centurion, 1995-2005 (constant 2000 prices)



Source: Demacon, 2008

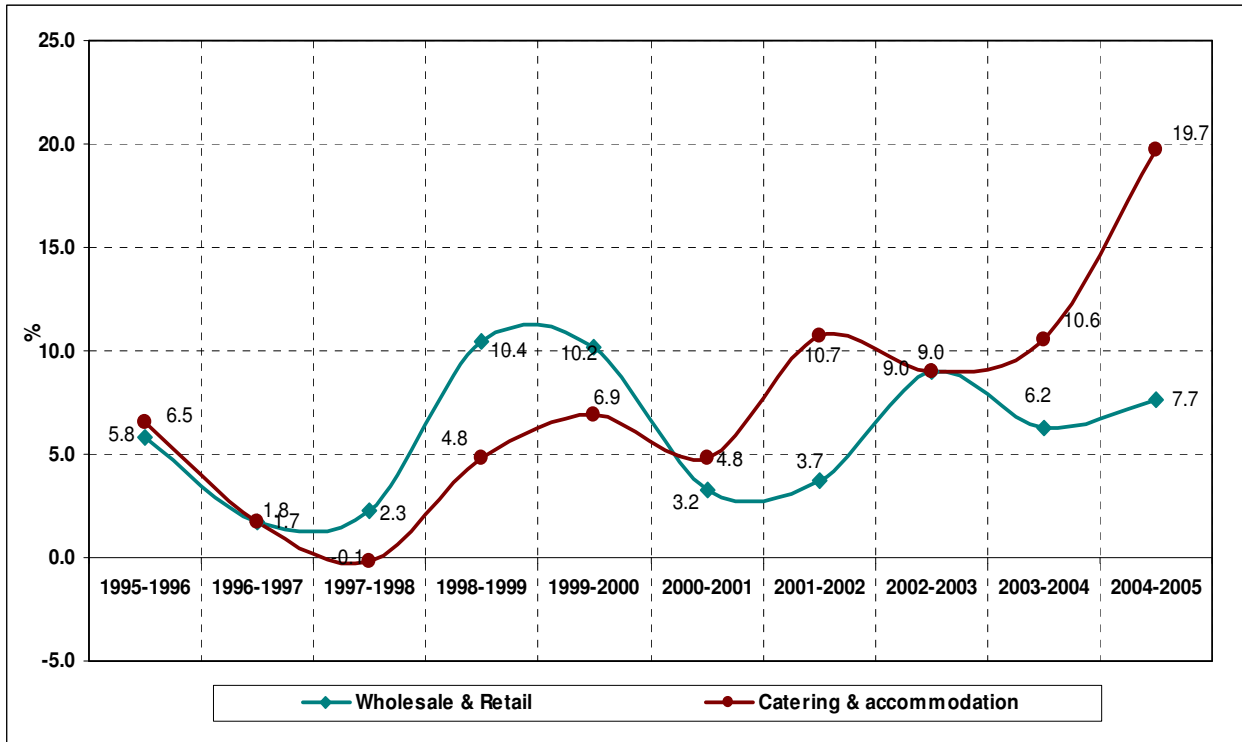
Findings: (Figure 3.9)

- ✓ Growth in *wholesale and retail* of Centurion peaked in 1998/1999 (**10.0%**) and again in 2002/2003 (**8.6%**).
- ✓ Growth in *catering and accommodation* peaked in 1999/2000 (**5.7%**) and again in 2001/2002 (**9.7%**).
- ✓ *Wholesale and retail* trade sector ended with a contribution of **7.1%** and *catering and accommodation* sector ended with a contribution of **16.0%**.

Findings: (Figure 3.10)

- ✓ Growth in *wholesale and retail* of Kempton Park peaked in 1998/1999 (**10.4%**) and again in 2002/2003 (**9.0%**).
- ✓ Growth in *catering and accommodation* peaked in 1999/2000 (**6.9%**) and again in 2001/2002 (**10.7%**).
- ✓ *Wholesale and retail* trade sector ended with a contribution of **7.7%** and *catering and accommodation* sector ended with a contribution of **19.7%**.

Figure 3.10: Trade Sector Growth Performance of Kempton Park, 1995-2005 (constant 2000 prices)



Source: Demacon, 2008

Expenditure

The trade sector is accounted for by a spectrum of consumer types, including private households, other businesses, government and exports. The household sector is by far the largest of these consumer markets, especially in the retail sub-sector. Retail sales refer to the amount of money spent on a variety of consumer goods. This includes for example non-perishable products, footwear, jewellery and hardware.

Retail sales serve as an indication of the expenditure in certain categories. Retail sales figures provide an indication of current demand for specific categories of consumer goods, which can be divided into three broad groupings, namely:

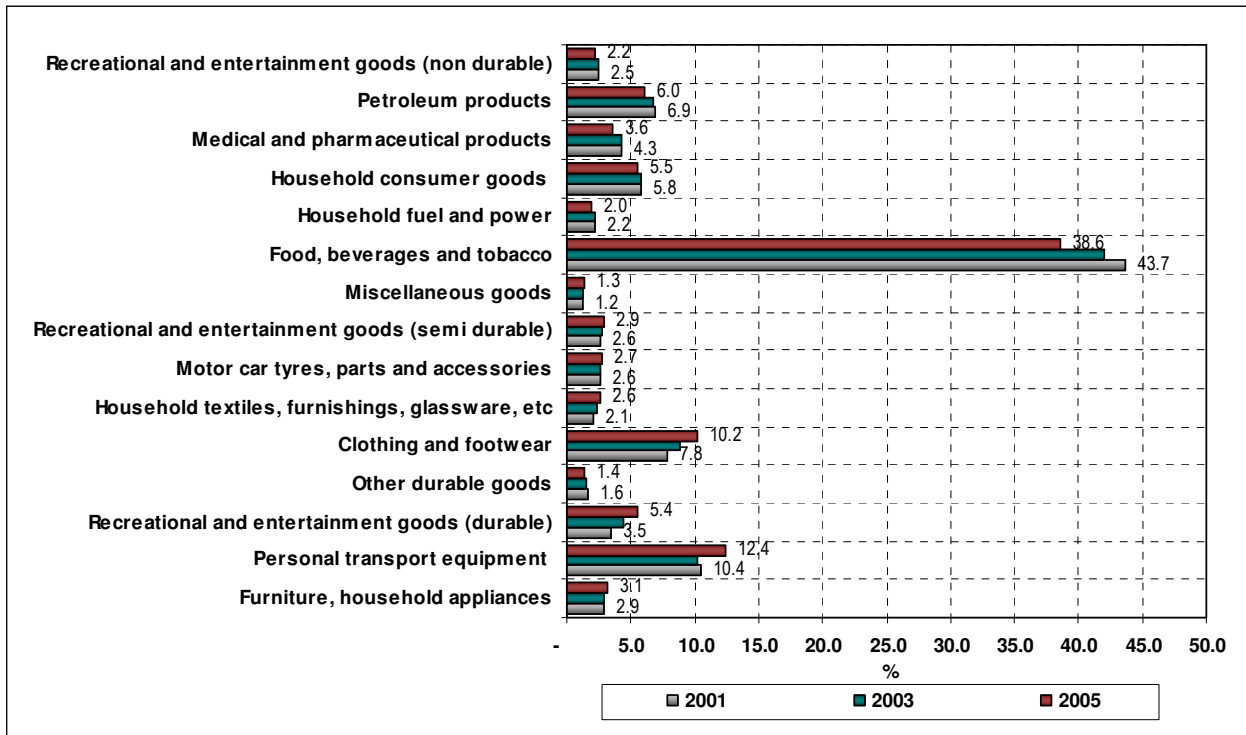
1. Durable goods	Durable goods include goods such as furniture, household appliances and personal transport equipment.
2. Semi-durable goods	Semi-durable goods include products such as footwear, clothing and household textiles.
3. Non-durable goods	Non-durable goods include food, beverages, and tobacco, and household consumer goods, medical and pharmaceutical products.

Subsequent paragraphs indicate the household expenditure per retail category.

3.4.6 HOUSEHOLD EXPENDITURE PER RETAIL CATEGORY

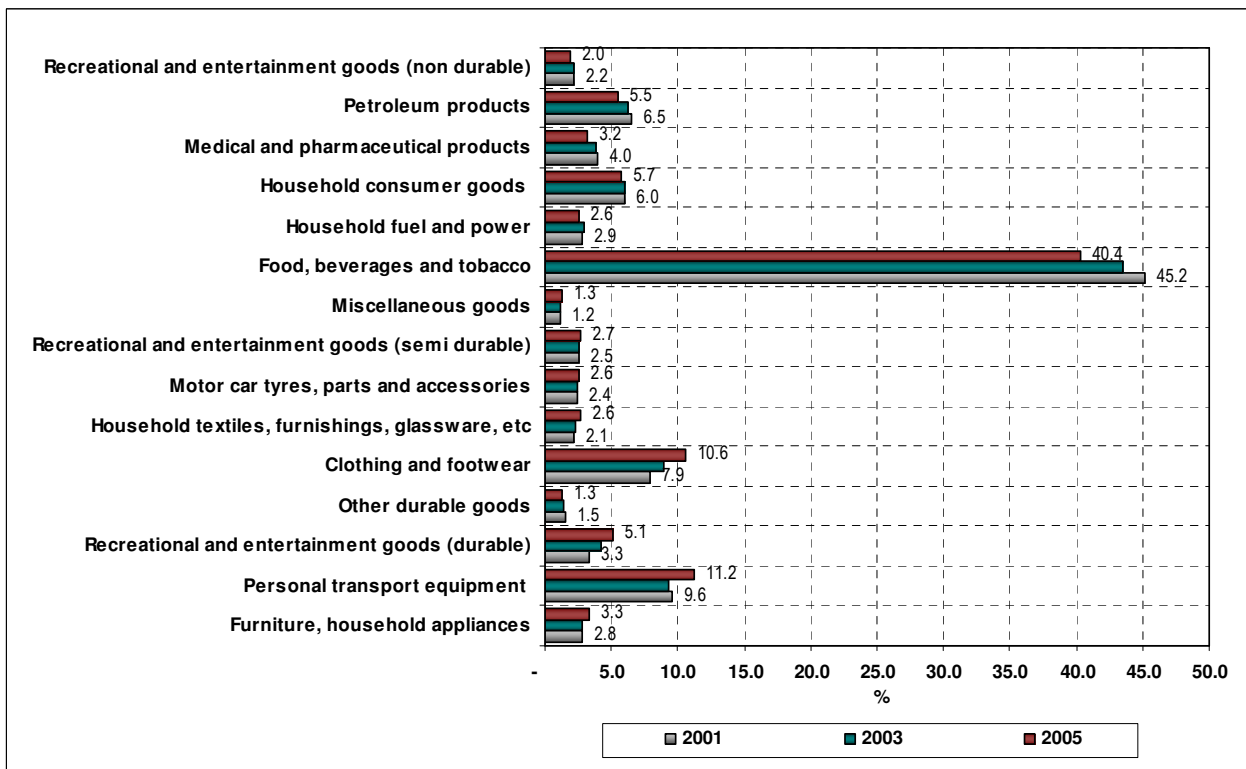
Sub-economies that recorded above average growth in household expenditure as highlighted in Figure 3.11 and Figure 3.12

Figure 3.11: Household expenditure per retail category – Centurion (constant 2000 prices)



Source: Demacon, 2008

Figure 3.12: Household expenditure per retail category – Kempton Park (constant 2000 prices)



Source: Demacon, 2008

Findings: (Figure 3.11 and Figure 3.12)

- ✓ A general urban South African trend indicates that the decrease in expenditure directed towards non-durable groceries is declining year-on-year with a rise in consumption expenditure on semi durables including clothes and foot ware. These trends can be ascribed

to the high rate of inflation on non-durables (especially meat) and unabated clothing and footwear deflation.

- ✓ Figure 3.11 and Figure 3.12 discloses that *food, beverages and tobacco* is the largest sector of the retail sections at both economies, with a contribution of **38.6%** in 2005 for Centurion and **40.4%** in 2005 for Kempton Park.
- ✓ The second largest sector within Centurion is *personal transport equipment* sector, with a contribution of **12.4%** in 2005, followed by clothing and footwear of **10.2%**.
- ✓ The second largest sector within Kempton Park is also *personal transport equipment* sector (**11.2%**), followed by clothing and footwear of **10.6%**.
- ✓ The smallest sector per retail category at both economies is *miscellaneous goods and other durable goods* with a contribution of **1.3%**.

Development implications:

Since 1994, local property markets - including retail - have experienced significant change. Due to economic and social openness, **disposable income** now comes from a much **wider base**. In short, consider the following:

- ✓ South Africa has a diverse population and broad geographic spread
- ✓ Although KwaZulu Natal is the most populous province, the spending power of South African consumers is located largely in Gauteng and the Western Cape
- ✓ 53% of the population is younger than 24 years old - for retailers, this means that the bulk of the population, although not responsible for shopping, has a major influence on consumer spending
- ✓ With regard to the product category to which consumers direct the bulk of their spending, food is and always will be one of the greatest avenues for spending
- ✓ In terms of discretionary disposable income, an interesting shift took place in this spending dynamics around 2000, with the arrival of legalised casino's - at this point, there is a noticeable decrease in the percentage of income spent on food and a noticeable increase in spending in the entertainment industry
- ✓ Allied to this, the burgeoning cellular telephone market has seen an increase in consumer spending from 2001 (8,3-million customers) to 2004 (18,2-million customers). This trend is indicative of the progress of and accessibility to technology, as well as the increased importance of such technology in our daily lives
- ✓ The advent of the National Lottery created another avenue for consumers to channel their money into, thus further increasing the market share of the entertainment industry. However, disillusionment has led to a recent drop in Lotto sales
- ✓ Increased levels of consumer confidence among all racial and income groups since 2003, coupled to stable inflation and interest rates have translated into higher spending on durables, in particular new cars - where the number of new cars purchased is at its highest level in four years.

3.4.7 PROPERTY MARKET PERFORMANCE

Research has shown that there is a time delay of some 6 – 18 months: i.e. response from the property market to, for example, a decrease in interest rates (a macro economic variable that stimulates production) becomes evident in the level of activity in the property market some 6 to 18 months after the announced interest rate decrease.

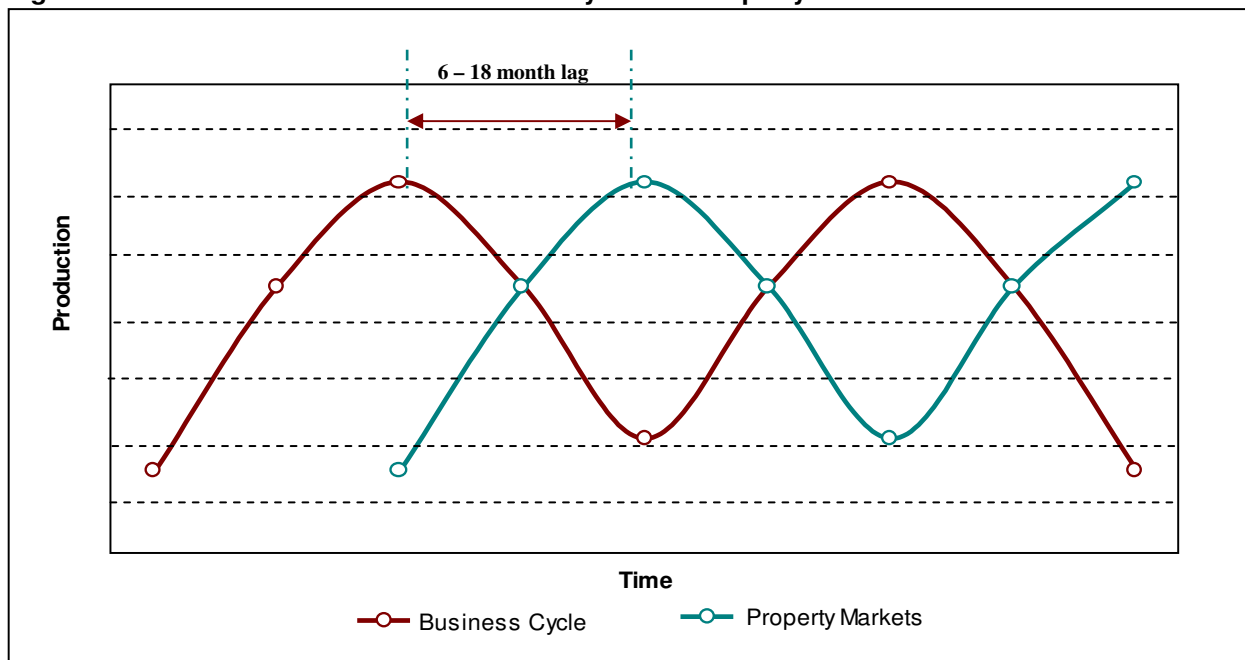
Figures released in January 2008 by Absa show that house-price growth slowed to 11.2% in December (year-on-year), the lowest growth since December 1999 when prices rose an average 9.3%. Although Absa's house-price index was still up a surprisingly robust 14.5% for the full 2007

(15.2% in 2006), it seems that the reality of nine interest rate hikes since mid-2006 and stricter mortgage-lending criteria introduced by the National Credit Act (NCA) has finally started to kick in.

Absa senior economist Jacques du Toit says there has been a gradual slowdown in house-price growth since the beginning of 2006, but the downward trend only started accelerating towards the end of 2007. Du Toit expects growth to drop to around 9% in 2008.

FNB Property strategist John Loos has a similar forecast. He expects house-price inflation to dip below 10% in first quarter 2008, with growth averaging 9.6% for the year. Loos says further "pain and suffering" is still expected until mid-2008 as the effect of rate hiking continues to feed into the market. If interest rates move sideways from now on, Loos maintains that the market should start to strengthen later this year with a likely return to double-digit price growth by end-2008. The relationship between the business cycle and property markets is shown in Figure 3.13.

Figure 3.13: Relation between the Business Cycle and Property Markets



Source: Demacon, 2008

This section aims to provide an overview of general trends pertaining to the industrial market, firstly on a national scale and then on a local level.

Property Market and Industrial Market Position

The following trends were reflected on by John Loos Property Strategist for FNB Property Finance in 2007:

- ✓ The latest interest rates hike is a disappointment to the property sector with strong fundamentals – and in terms of industrial and office space it might cause a premature short-term trend change towards mild weakening
- ✓ A mild decline has been recorded in total commercial property returns in 2006, from 30.1% in 2005 to 26.7%
- ✓ A reversal in this declining trend has taken place during the last two quarters of 2006 – industrial cap rates rose despite rental inflation increasing, and vacancies remained very low
- ✓ Despite the industrial sector's strong fundamentals, industrial property also looks set to come under mild pressure

- ✓ Manufacturing output is feeling some pressure from interest rate hikes to date, and year on year growth in the output of the sector has declined further
- ✓ Construction related manufacturing can be expected to hold up well
- ✓ As interest rates put pressure on consumer demand they will also pressure the areas of manufacturing focused on consumer goods
- ✓ Industrial and warehouse space currently experiences low levels of vacancy and in 2006 had the highest returns, at 31.1%, off the major commercial property categories
- ✓ While its longer fundamentals remain solid, it would appear that the property sector, too could experience further mild deterioration, though still remaining high, in total returns in the near term

Figure 3.14: Commercial Property Vacancy

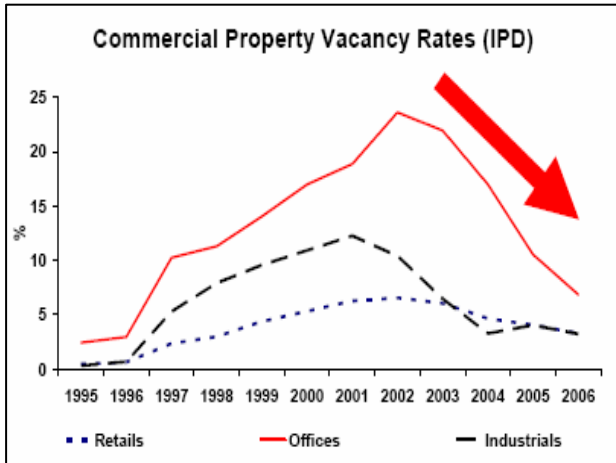
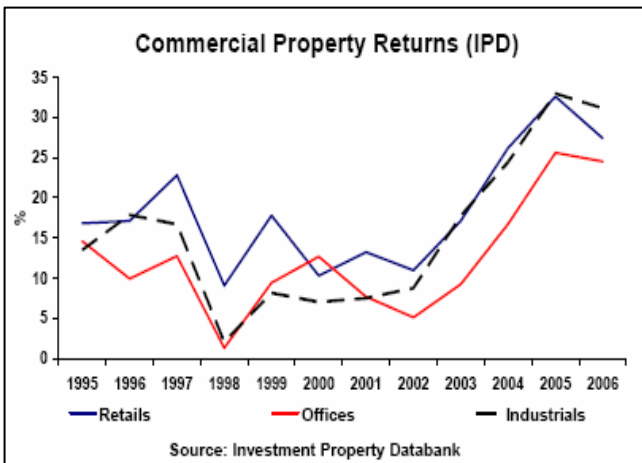


Figure 3.15: Commercial Property Returns



It is also interesting to note the commercial supply trend: Jan-July Year-to-Date

- ✓ Commercial supply data as surveyed by Stats SA shows that the level of planning activity measured in m² remains strong relative to previous years
- ✓ Across three major types of commercial space, the growth for industrial activity was 36%, offices 23% and retail was 15%.

Figure 3.16: Commercial Property Cycle – Plans vs Completions %

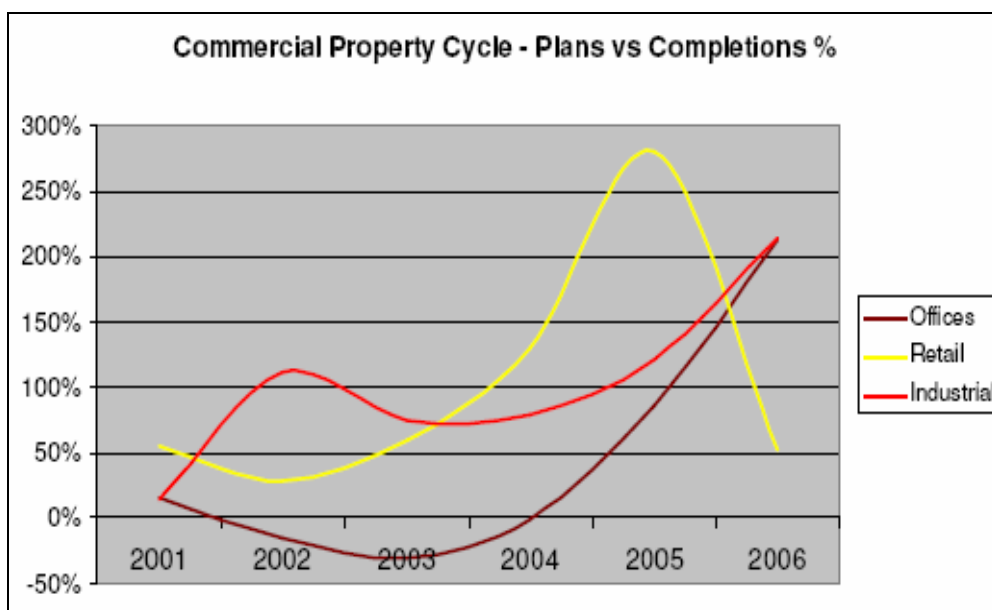


Figure 3.17: SA Completed Supply

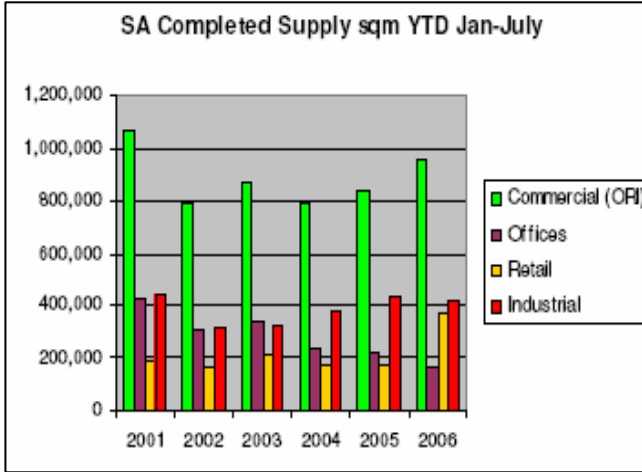
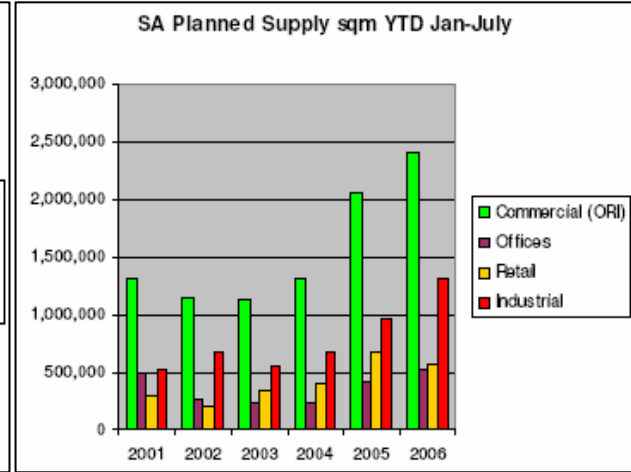


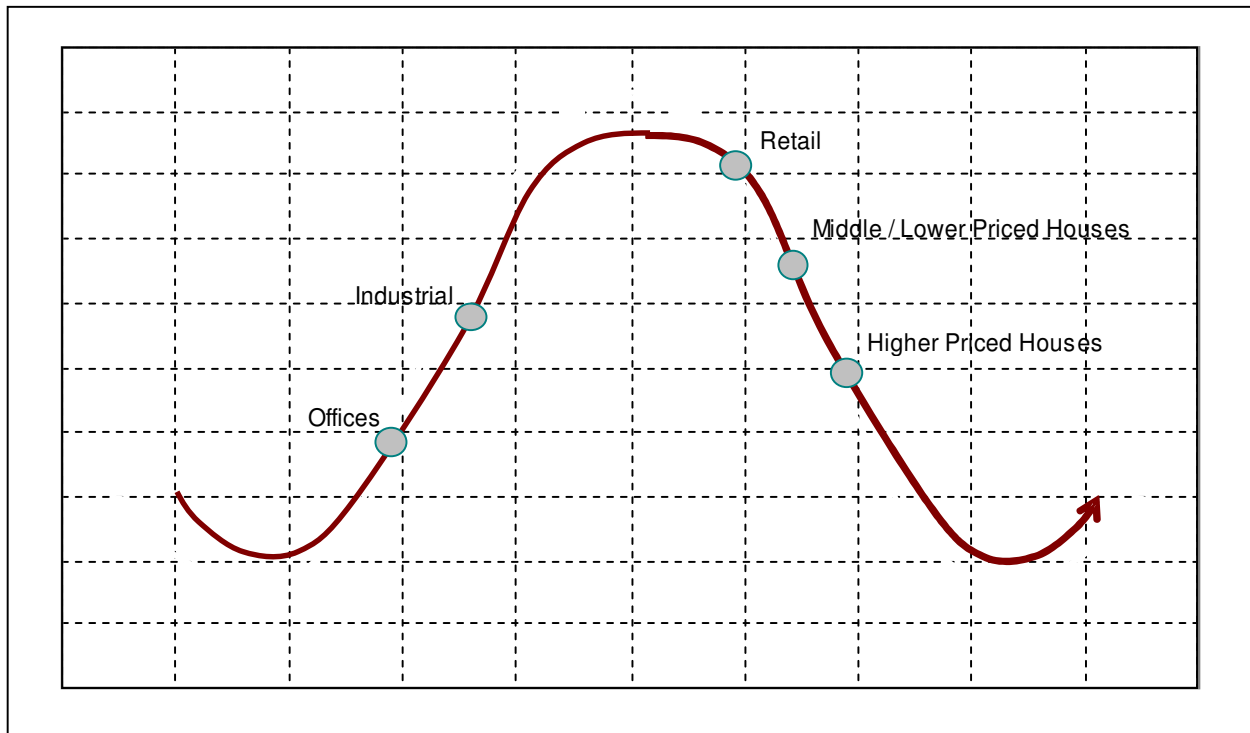
Figure 3.18: SA Planned Supply



- ✓ The commercial property growth cycle is illustrated in terms of comparisons between commercial property planned and commercial property completions. This is illustrated by the following figures:
- ✓ It is evident that the industrial property sector reflects positive growth performance and is currently in an upswing. This bodes well for future industrial developments.
- ✓ In terms of the planned supply of industrial space it is evident that industrial space outweighs the other markets – making up the largest segment of the commercial property market.
- ✓ The industrial market segment also reflects overall positive trends within the completed supply of floor space, once again outperforming the other commercial categories.

The following figure (Figure 3.19) illustrates the sectoral position that each market (offices; industrial; retail and residential) occupies in the real estate cycle in South Africa, in terms of **level of activity versus time**.

Figure 3.19: Sectoral Positioning of the South African Real Estate Cycle



Source: Demacon, 2008

Residential:

The residential market peaked in 2005 and market indicators reveal that this market is still growing, albeit at a slower pace than in 2005. Growth in metropolitan areas will continue to be fuelled by positive net immigration and population growth.

The three greatest implications in house prices after the latest interest rate increases by the Monetary Policy Committee include:

- ✓ 74% of properties sold achieve less than the original asking price of homeowners
- ✓ The time period for properties remaining on the market has increased to approximately nine weeks
- ✓ Market activity has shifted towards lower and middle priced homes (<R1.2 million).

There is general consensus that the residential market will recover towards end 2008 / 2009.

Retail:

The retail market is remains fairly buoyant and is currently experiencing growth as last seen in the 1970's. Although the effects of repeated interest rate hikes in recent months have become visible in the latest retail sales data, good growth is expected to continue for at least another three to four years.

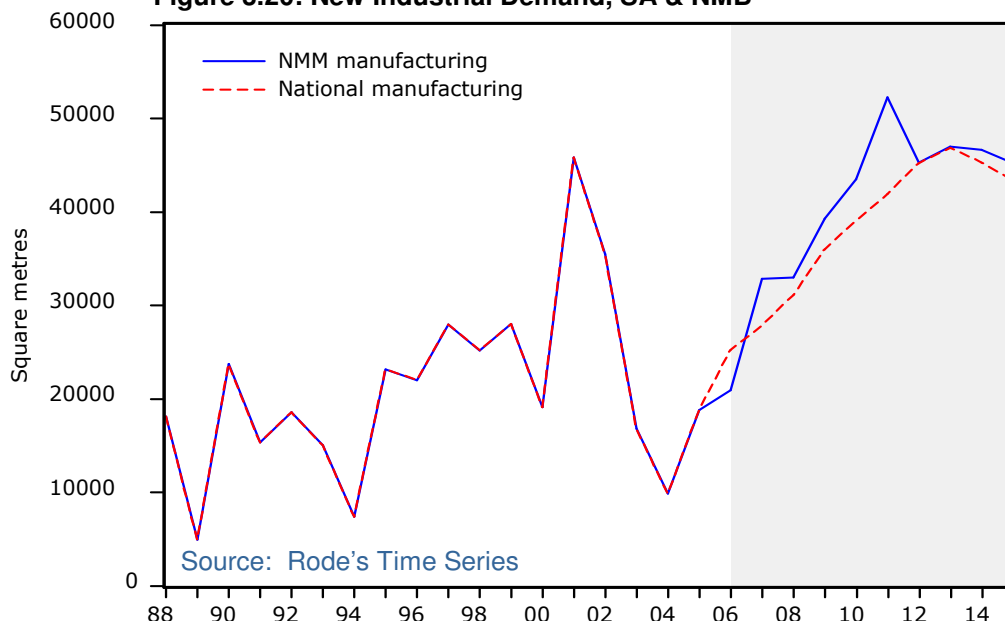
Offices:

Not only databases, but also brokers and real estate professionals, have noted the lack of stock in South African commercial markets, in particular the office and industrial market. Composite rental and vacancy indicators suggest that these markets are at the dawn of a new growth phase.

Industrial:

Similar to the office market, the industrial market is receiving increasing inquiries for stock, in particular warehouse and distribution areas. It is expected that, similar to the office market; increased levels of building activity will take place over the short to medium term. Independent DEMACON studies, coupled to an extended network of leading real estate companies, indicate that the real estate long cycle is currently in an upswing phase and will remain at buoyant levels. Market indicators suggest that this will only taper off towards 2015, which implies positive market growth conditions for most real estate sub-sectors over the medium to long term.

Figure 3.20: New Industrial Demand, SA & NMB



Independent appraisals and forecasts of the SA real estate long cycle towards 2015 (*illustrated by, for instance the industrial real estate cycle - Refer to Figure 3.20*), coupled to international reports that rank SA among to the top 10 priority global investment destinations (for the forthcoming 50 years), bode well for real estate investment and related property and consumer research fields in South- and sub-Sahara Africa.

Development implications

Since 1994, local property markets have experienced significant change. Due to economic and social openness, **disposable income** now comes from a much **wider base**.

In short, consider the following:

- ✓ South Africa has a diverse population and broad geographic spread
- ✓ Although KwaZulu Natal is the most populous province, the spending power of South African consumers is located largely in Gauteng and the Western Cape
- ✓ 53% of the population is younger than 24 years old - for retailers, this means that the bulk of the population, although not responsible for shopping, has a major influence on consumer spending
- ✓ With regard to the product category to which consumers direct the bulk of their spending, food is and always will be one of the greatest avenues for spending
- ✓ In terms of discretionary disposable income, an interesting shift took place in this spending dynamics around 2000, with the arrival of legalised casino's - at this point, there is a noticeable decrease in the percentage of income spent on food and a noticeable increase in spending in the entertainment industry
- ✓ Allied to this, the burgeoning cellular telephone market has seen an increase in consumer spending from 2001 (8,3-million customers) to 2004 (18,2-million customers). This trend is indicative of the progress of and accessibility to technology, as well as the increased importance of such technology in our daily lives.
- ✓ The advent of the National Lottery created another avenue for consumers to channel their money into, thus further increasing the market share of the entertainment industry. However, disillusionment has led to a recent drop in Lotto sales.
- ✓ Increased levels of consumer confidence among all racial and income groups since 2003, coupled to stable inflation and interest rates have translated into higher spending on durables, in particular new cars - where the number of new cars purchased is at its highest level in four years.

3.5 SYNTHESIS

This module provided an overview of the macro-economic trends underlining the Centurion local economy, supported by an overview on the performance of the trade sector, and a brief overview of the residential market trends within the local economy.

- ✓ The demand for real estate is essentially a derived demand and positive market performance can be traced to favourable and stable market indicators pertaining to economic growth, inflation, interest rates and exchange rates
- ✓ Macro economic indicators indicate that the South African economy is at positive levels, as were last seen during the Post-1945 World War period. This positive economic climate is expected to prevail over the short to medium term, up to at least 2010

- ✓ Both of these aspects bode well for the retail sector. It is therefore anticipated that the trade sector will experience higher levels of growth over the next five years, especially with the anticipation of the Soccer World Cup in 2010
- ✓ The SARB deliberately increased the Repo Rate by 400 basis points between June 2006 and December 2007. Consequently, the average R500 000 home loan will cost approximately R1 667 per month per household more since June 2006
- ✓ Although the initial impact on the retail market was negligible, the effect is expected to become gradually more pronounced during 2008
- ✓ The market is in an upwards swing of the interest rate cycle and is predicted to last for between three to four years. This cycle will last over a shorter period and be less intense than what the markets experienced in the late 1990's
- ✓ This upward cycle will influence the segment of the market with high priced property and positive growth is predicted for lower to middle priced houses.

In summary: the South African domestic economy is currently experiencing its longest, uninterrupted period of positive economic growth since the post 1945 WWII period. These positive and fairly stable macroeconomic conditions create positive spin-off effects for domestic property markets. There is general consensus among economists and real estate investors that the residential property market has tapered off, albeit that growth is still positive, and that the commercial boom lies ahead in spite of moderately rising interest rates.

Barring a major exogenous shock, these above conditions are expected to remain positive and stable for the foreseeable future. Even if commodity prices continue to increase dramatically, the impact on the retail sector will only be indirect, for instance, fuel prices only impact on approximately 10% of total product cost.

Market potential is not influenced by economic and demographic trends, but also by macro and micro area dynamics. In the context of the above, Chapter Four provides a demographic / consumer market profile of the study area.

CHAPTER 4: CONSUMER MARKET PROFILE

4.1 INTRODUCTION

The demand for commercial activities is a derived demand. Hence, the current level and depth, as well as anticipated future growth in demand are a function of the local consumer market profile. The purpose of this chapter is to delineate the trade area and to provide a concise overview of the local consumer market, its income and expenditure patterns as well as retail shopping behaviour and expectations. The consumer market profile is outlined in terms of the following headings:

- ✓ Market area delineation and population size
- ✓ Age profile
- ✓ Highest level of education
- ✓ Employment status
- ✓ Occupation profile
- ✓ Ownership of household goods
- ✓ Average annual household income
- ✓ Living standard measurement
- ✓ Synthesis

The following section provides an overview of the delineation of the market area as well as the population size of certain the sub-places in the market area.

4.2 MARKET AREA DELINEATION AND POPULATION SIZE

The market area is informed by an anticipated 10km radius. Given the expected regional significance of the precinct, the market area has been identified for the mixed use development based on empirical research of customer origins at similar nodes. Refer to map 4.1 for the indication of the market area.

Table 4.1: Population size of the market area (2008)

Sub-places	Number of people in sub-place	Number of household in sub-place	Household size	Population density (people/km ²)	Household density (HH/km ²)
Bronkhorstspruit NU	3,014	1,000	3.0	2	1
Doornkloof SH	1,831	928	2.0	236	120
Kempton Park NU	2,992	1,086	2.8	24	9
Clayville	2,892	860	3.4	292	87
Clayville East	2,616	735	3.6	1,301	366
Olifantsfontein	129	55	2.3	495	212
Sun Lawns AH	218	83	2.6	176	67
Duduza	17,584	6,515	2.7	19,757	7,321
Hospital View	10,169	2,536	4.0	4,273	1,066
Makulong	6,558	1,972	3.3	13,383	4,025
Maokeng	8,396	2,343	3.6	11,661	3,255
Meriting	6,667	2,272	2.9	19,609	6,683
Sethokga	11,539	10,833	1.1	25,641	24,074
Tlamatlama	4,785	1,365	3.5	12,593	3,591
Tsepo	4,294	1,190	3.6	15,335	4,250
Winnie Mandela	10,494	3,373	3.1	11,925	3,832
Winnie Mandela Ext 10	5,354	1,713	3.1	10,296	3,294
Winnie Mandela Ext 12	6,808	2,336	2.9	11,738	4,028

Sub-places	Number of people in sub-place	Number of household in sub-place	Household size	Population density (people/km ²)	Household density (HH/km ²)
Winnie Mandela Ext 4	17,553	5,338	3.3	11,941	3,631
Winnie Mandela Ext 5	4,757	1,524	3.1	8,201	2,628
Winnie Mandela Ext 6	5,951	1,924	3.1	7,533	2,436
Winnie Mandela Ext 7	5,724	1,893	3.0	12,179	4,028
Winnie Mandela Park	1,290	338	3.8	7,167	1,876
Ivory Park	10,500	3,423	3.1	22,341	7,283
Randjesfontein AH	1,733	578	3.0	163	54
Bronberrick	1,001	320	3.1	1,352	433
Centurion Central	28	-	0.0	41	-
Cornwall Hill	1,599	469	3.4	120	35
Die Hoewes Ext 100	409	195	2.1	786	376
Die Hoewes Ext 119	412	224	1.8	1,874	1,018
Die Hoewes Ext 14	372	181	2.1	1,772	864
Die Hoewes Ext 16	635	278	2.3	2,117	927
Die Hoewes Ext 19	5	-	0.0	8	-
Die Hoewes Ext 25	1,012	533	1.9	1,406	740
Die Hoewes Ext 31	348	242	1.4	3,164	2,203
Die Hoewes Ext 6	191	82	2.3	515	220
Doringkloof	4,929	1,556	3.2	2,028	641
Hennops Park Industrial Ext	62	32	1.9	70	36
Highveld Exts	5,254	2,147	2.4	1,294	529
Irene	2,789	1,050	2.7	911	343
Irene Research Institute	241	78	3.1	18	6
Louwardia	219	103	2.1	15	7
Lyttelton AH	998	415	2.4	1,109	461
Lyttelton Manor	10,599	3,741	2.8	1,366	482
Midstream Estate	9,450	3,500	2.7	-	-
Pierre van Ryneveld	10,670	3,663	2.9	2,325	798
Rooihuiskraal Ext	101	64	1.6	53	34
The Reeds Ext 10	803	260	3.1	730	236
Waterkloof AFB	969	173	5.6	108	19
Zwartkop Ext 4-5-6-8	5,084	1,686	3.0	1,656	549
Zwartkop Ext 7	1,790	777	2.3	2,183	947
Zwartkop Ext 7-16	918	455	2.0	2,353	1,166
Elarduspark	10,590	3,662	2.9	2,751	951
Rietvalleirand	768	435	1.8	1,478	837
Rietvlei Nature Reserve	190	91	2.1	4	2
Waterkloof AH	1,125	408	2.8	707	256
Wingate Park	5,266	1,712	3.1	2,025	658
Total	232,675	84,747	2.7	264,604	103,991

Source: Demacon, 2008

Findings: (Table 4.1)

- ✓ A total of **232,675** people and **84,747** households reside in this study area. The average household size in this market is **2.7** persons per household.
- ✓ The above population figures and subsequent demographic indicators reflect market characteristics of the trade area population as a whole.
- ✓ The population growth rate in the market is **2.0%** per annum.

Map 4.1: Indication of the market area

