TABLE OF CONTENTS

FIGURES

ANNEXURES

Annexure A: Enlarged copies of Figures

Annexure B: Copy of the RoD

Annexure C: Correspondence from GDARD – Approval of Layout Phase 1

Annexure D: Correspondence from GDARD – Fern status

Annexure E: Correspondence from GDARD – Buffer Zone

Annexure F: Documentation submitted by Bokamoso on 10 December 2007

Annexure G: Correspondence from GDARD 3 April 2008

Annexure H: Correspondence from GDARD – Appeal granted for 100m buffer

Annexure I: Correspondence from GDARD – Phase 3 Layout Plan denied

Annexure J: Offset Agreement

Annexure K: Granting of Appeal

Annexure L: Amendment Application

Annexure M: Correspondence from GDARD – Approval of Layout Plan Phase 3

Annexure N: CV of Lizelle Gregory

Annexure O: City of Tshwane requirements

Annexure P: Environmental Sensitivity Analysis

Annexure Q: Habitat Survey

Annexure R: Correspondence from GDARD – Red list classification SANBI

Annexure S: Correspondence from Ms. Lemmer

Annexure T: Visual Impact Study

Annexure U: Public Participation

Annexure V: EMP

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

M & T Development Pty (Ltd)[1] is planning a Land Development Area (LDA) to be known as **Irene X 92** on **Portion 198 of the farm Doornkloof 391 JR and Part of Portion 198 of the farm Doornkloof 391 JR.** The study area is approximately **234.0781 ha** in extent and is situated in the area of jurisdiction of the City of Tshwane Metropolitan Municipality (CTMM). ***Refer to Figure 1, Locality Map and Figure 2, Aerial Map.***

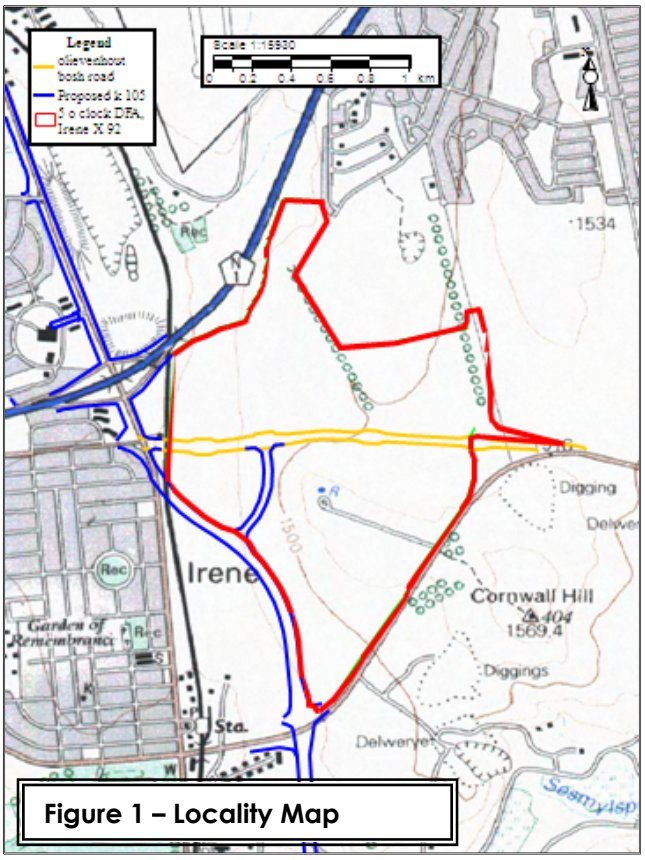


Figure 1 – Locality Map

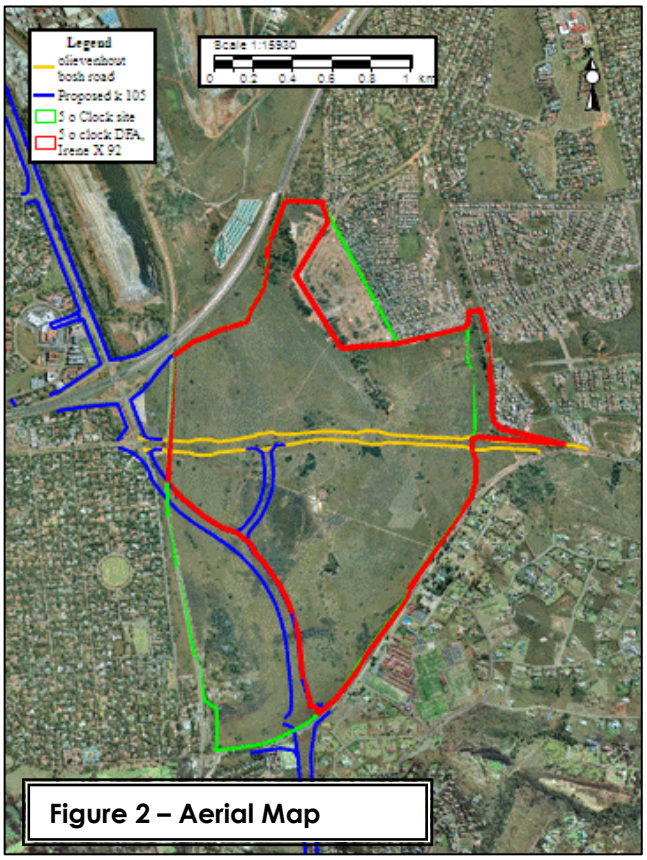


Figure 2 – Aerial Map

Please note: Enlargements of the Figures are included as Annexure A.

[1] On behalf of the registered owner of the land, JR 209 Investments (Pty) Ltd.

Irene X 92 on Portion 198 of the farm Doornkloof 391 JR and Part of Portion 198 of the farm Doornkloof 391 JR is located in the southern region of the City of Tshwane Metropolitan Municipality municipal jurisdiction, in the south-western component thereof fronting on the southern boundary of the Municipality, bordering on 3 neighbouring jurisdictions namely:

- The City of Johannesburg Metropolitan Municipality
- The Kungwini Local Municipality; and
- Ekurhuleni Local Municipality

The town planning application is done in terms of Section 31 of the Development Facilitation Act, 1995 (Act 67 of 1995) and Regulation 21 of the Development Facilitation Regulations, 2000, published in Regulation Gazette 6709 of 7 January 2000. The proposed Irene X 92 will be a mixed-use development consisting of **74 erven** with the following zonings respectively:

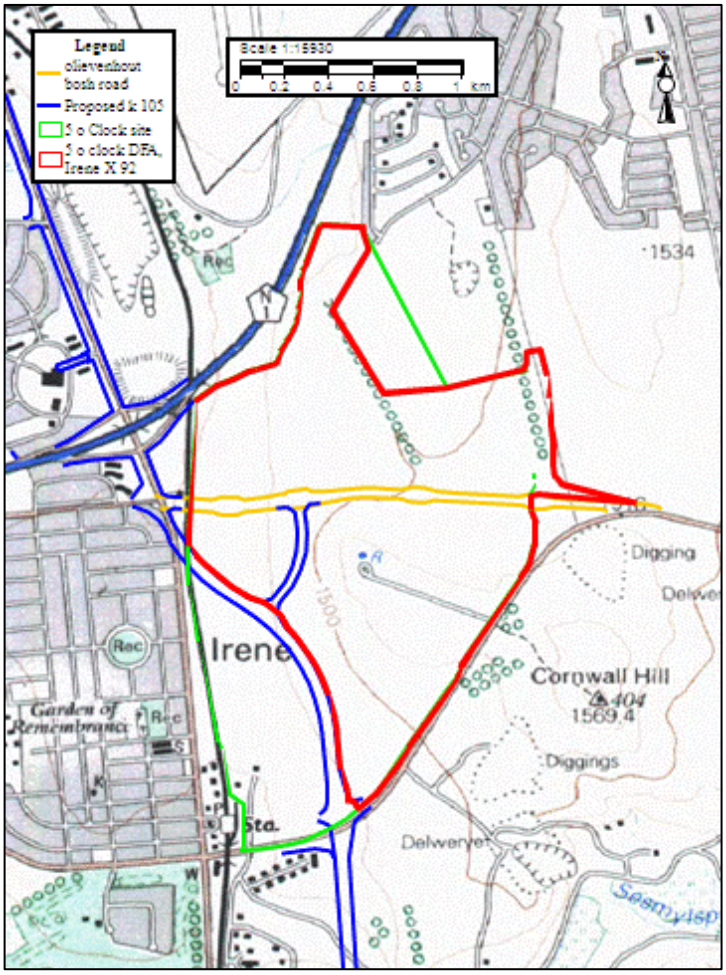
- Approximately 2200 dwelling units;
- Approximately 550 000m² of floor area to be reserved for business purposes (excluding shops and restaurant facilities)
- Approximately 65 000m² of floor area to be reserved for retail facilities (shops) and restaurants;
- Educational facilities, providing for approximately 2500 pupils in unison with subservient and related business buildings totaling approximately 60 000m²;
- A hotel measuring approximately 7000m²;
- An intermodal transport facility providing an interface between road and rail transport opportunities;
- Interspersed private open space areas and supporting facilities taking up approximately 60ha of land; and
- In total the development bulk potential that is applied for is in the order of approximately 954 184m².

Regulation 31 of the Development Facilitation Regulations, 2000, published in Regulation Gazette 6709 of 7 January 2000 requires that a scoping report containing an

environmental evaluation in line with the scoping guidelines of DEA&T as they may change from time to time be included as part of the DFA application. Bokamoso Landscape Architects and Environmental Consultants were therefore appointed by ***M & T Development Pty (Ltd)*** to compile a Scoping Report representing the Regulation 31 Report compiled for purpose of the DFA Application. This Scoping Report Represents the Regulation 31 Scoping Report of the DFA Application.

1.2 Background

During 2006 ***JR 209 Investments (Pty) Ltd*** appointed Bokamoso Environmental Consultants for the submission of an application for authorization in terms of Section 22 of the Environment Conservation Act 73 of 1989 (ECA) for the proposed Century Development on the 5 O' Clock Site ***(refer to Figure 3 for the Study Area).***



An Environmental Scoping Report was submitted to GDARD on 30 January 2006 and a conditional authorization for the proposed development was granted by the department on 13 December 2006. ***Refer to Annexure B for a copy of the Record of Decision (RoD).***

This conditional authorization allowed for development to proceed on the area to the north of the proposed Olievenhoutbosch Road. ***Refer to Figure 4, Layout Map.***

While the authorization process at GDARD was underway, a fern species *(Cheilanthes deltoidea)* had been identified at a location in the area where development was subsequently approved (north of the then-proposed Olievenhoutbosch Road), but the conservation status of the species was unresolved at the time the Record of Decision was issued.

In the Record of Decision the submission of an amended layout plan for the development to GDARD was one of the Conditions of the Authorization. It was also a requirement that the amended layout plan be approved before commencement with any construction activities. This final layout plan had to be *"informed by the confirmation of the conservation status classification of the fern species", "the application of the Gauteng Red list Plant policy"* and the final alignment for Olievenhoutbosch Road across the study area as approved by GDARD (the final alignment of the eastern section of Olievenhoutbosch Road across the study area was also dependant on the outcome of the conservation status of the fern species and the buffer zone to be implemented around such species).

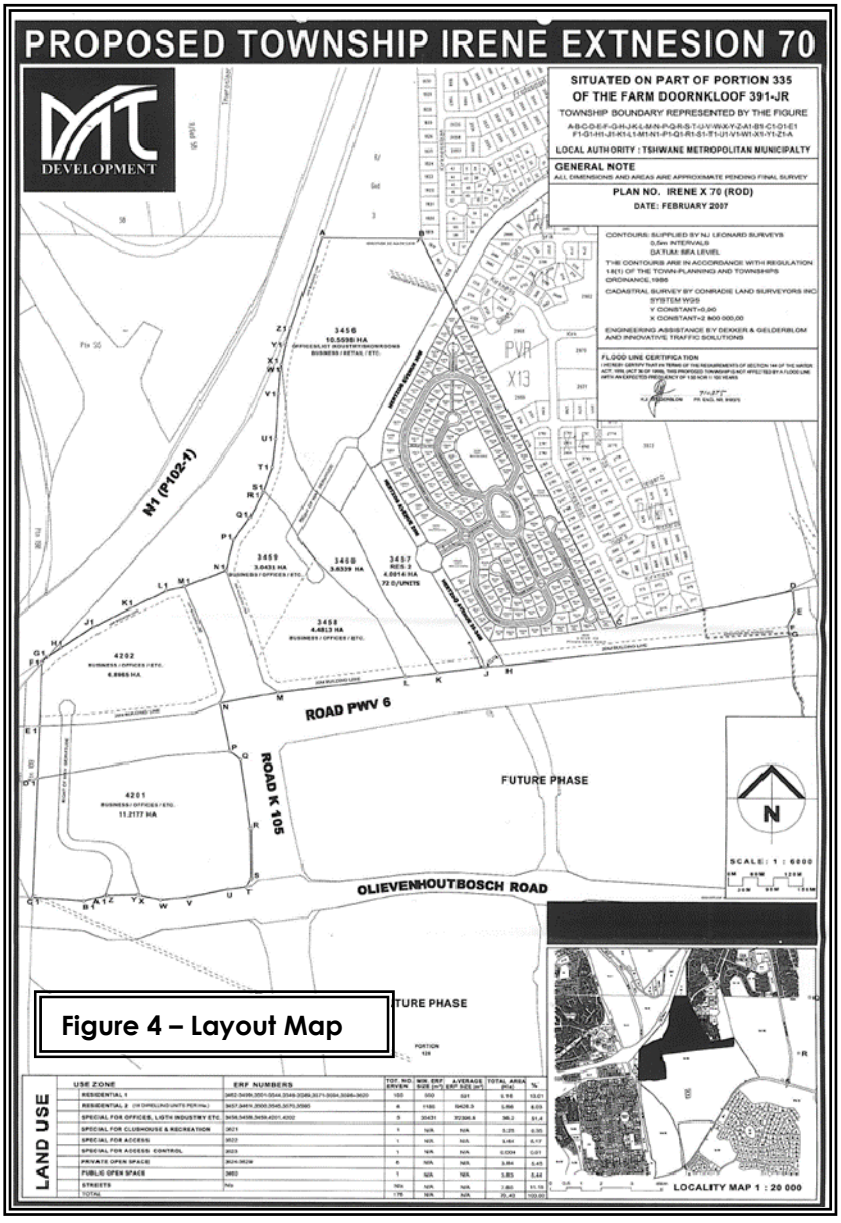


Figure 4 – Layout Map

Unfortunately M&T had no control over the timeframes for the confirmation of the classification status of the fern or the timeframes for the fixing/approval of the alignment of Olievenhoutbosch Road, because specialists appointed by GDARD had to confirm the protection status of the species and another applicant applied for the authorization of Olievenhoutbosch Road across the study area. M & T was very concerned about the fact that these two outstanding issues could cause significant delays in the process of finalizing the development layout. M&T was of the opinion that such delays could hold serious financial implications and as a consequence decided to approach GDARD regarding the possibility of a phased development solution which would allow for some development in areas (in the eastern section of the study area (where the fern species was found) to the north of the PWV 6 freeway and in the western section of the study area (where the buffer zones for the fern species could not have an impact) to the north of

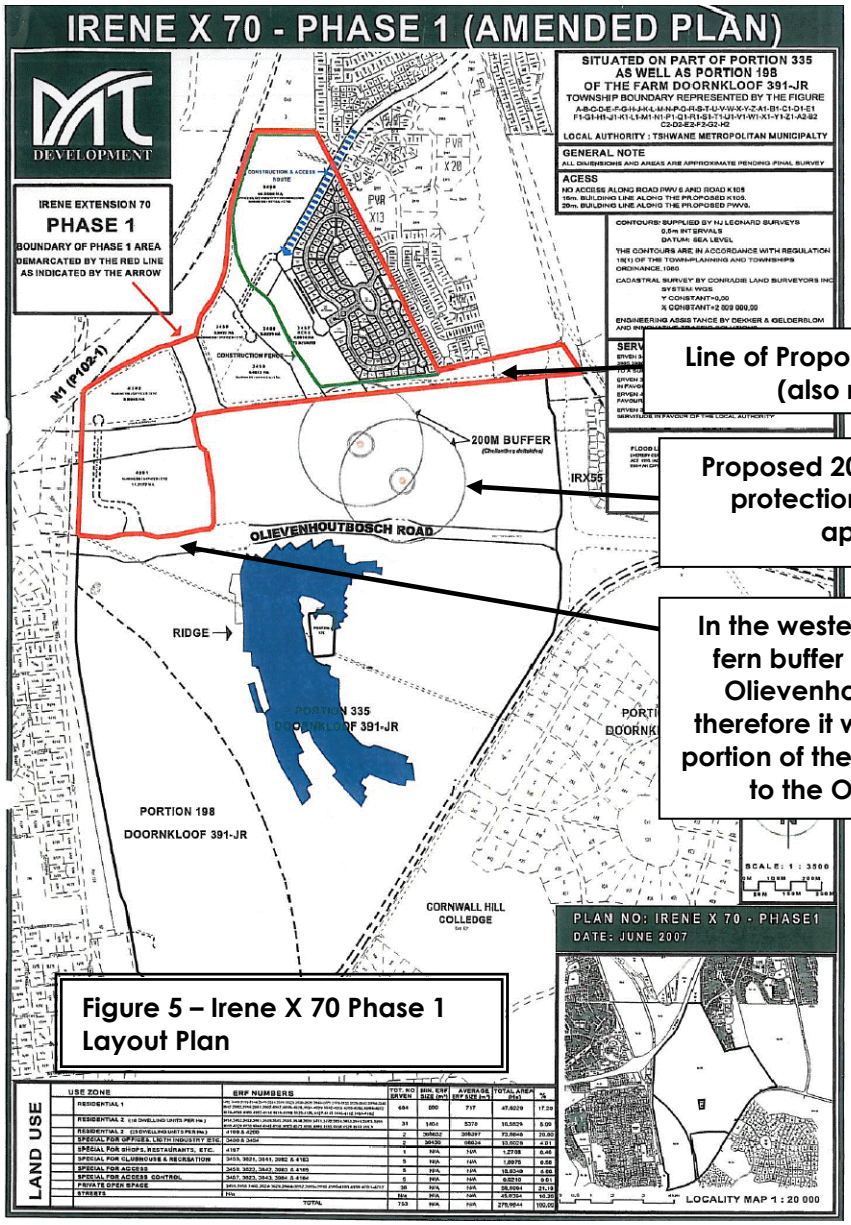


Figure 5 – Irene X 70 Phase 1 Layout Plan

Olievenhoutbosch Road.

Refer to Figure 5 for the Layout Plan for Phase 1 and Figure 6 for the Layout Plan for Phase 2.

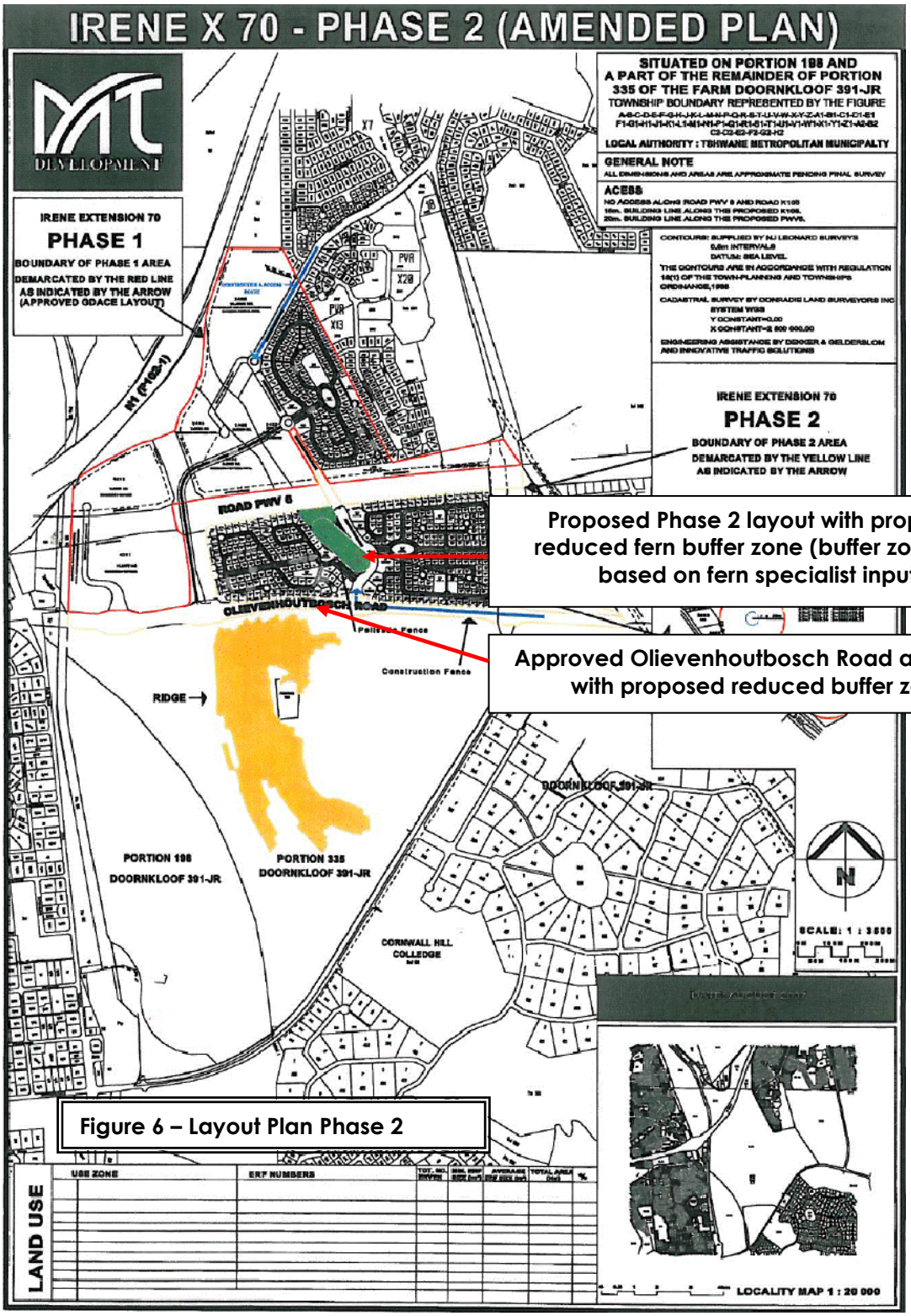


Figure 6 – Layout Plan Phase 2

In order to facilitate a partial approval of the portion of land north of Olievenhoutbosch Road, whilst the status of the above-mentioned *Cheilanthes deltoidea* and the final alignment of the road were being determined, permission was received to divide the said portion of land into two phases namely Phase 1 and Phase 2.

The layout for Phase 1 and Phase 2 were both submitted to the Department and subsequently the layout of the only Phase 1 was approved. ***Refer to Annexure C for Correspondence.*** The layout of Phase 2 was refused due to the fact that the buffer zone around the *Cheilanthes deltoidea* was not indicated as 200m but 40m as proposed by a fern specialist (Ms. Petra Lemmer)[2].

JR 209 Investments (Pty) Ltd decided to submit an appeal against the erstwhile decision of GDARD (as reflected in a letter from the Department dated 3 April 2008), which rejected the proposed layout plan for Phase 2.

By letter dated 2 April 2007, GDARD communicated to the Appellant that the fern taxon in question apparently qualifies for a status of "Vulnerable" according to the IUCN (2001) system of assessing extinction risk" ***(Refer to Annexure D).*** Through the process, various communications took place with GDARD regarding the determination of an appropriate "buffer zone" around the population of fern species (situated in the envisaged Phase 2 development area) ***(Refer to Annexure E).*** As already mentioned above, this communication included submission of a specialist scientific opinion by a respected botanist, Ms. Petro Lemmer (also the identifier of the fern species on the study area) regarding an appropriate buffer zone around the area where the ferns occur. Ms. Lemmer recommended that a minimum distance of 40m be retained on both sides of the chert outcrop (where the ferns are found).

It is also important to note from the outset (for purpose of the appeal and for the determination of the Phase 2 layout plan) the specialist (Ms. Lemmer) was of the opinion that the appropriate buffer zone had to be based on site-specific and species-specific

[2] Ms. Lemmer originally discovered the fern species on the study area

information. The type of land-use around the buffer also had to be taken into consideration. According Ms. Lemmer it was possible to reduce the 200m buffer as paroposed by GDARD to 40m, because the co-existence of fern species is not dependant on pollinators. Fern species propagate by means of spores have spores consideration of an appropriate buffer zone for the fern in the situation where it is located on the properties and taking into account the nature of the proposed development associated with the properties. Various subsequent communications on the issues took place and the Phase 2 revised layout plan was prepared based on the 40 m buffer zone (including a larger green open space around the chert outcrop and the location of ferns) and was ultimately submitted by the Appellant (through the independent consultant) for approval by letter dated 10 December 2007) ***(Refer to Annexure F for Documentation submitted by Bokamoso Environmental Consultants).***

Subsequent to the above, by letter dated 3 April 2008, the Head of Department indicated that, in effect, the Phase 2 layout plan as proposed in the communication dated 10 December 2007 was not approved based on the application of 200m buffer zone derived the GDARD Red List Plant Species Guidelines. ***Refer to Annexure G.***

Negotiations with GDARD continued with regards to the above and the appeal was granted with a 100m buffer ***(refer to Annexure H).*** Further correspondence has been issued to GDARD to discuss the buffer further.

As in Phase 2, the application and motivation for approval of the Phase 3 layout plan (and, it is submitted, by necessary implication for the change or deviation from the project description as set out and approved through the Record of Decision and / or for an amendment or removal of the relevant conditions of the Record of Decision) was contained in letters dated 5 February 2008 and 12 June 2008.

Subsequent to the above, by letter dated 22 August 2008, the Head of Department indicated that the Phase 3 layout plan as proposed and motivated in the communication dated 12 June 2008 (and previously) were "denied" ***(refer to Annexure I).*** It is the above

decision of the head of Department to refuse to approve the layout plan for Phase 3 of the development, as reflected in the letter dated 22 August 2008, that formed the subject of the submitted Appeal.

M & T Development presented a Land Offset agreement to GDARD in October 2008 ***(attached as Annexure J).*** .M & T development offered to donate the sensitive portion of Portion 107 of the farm Doornkloof 391 JR as well as Portion 129 of the farm Doornkloof 391 JR***. Refer to Figure 7.***

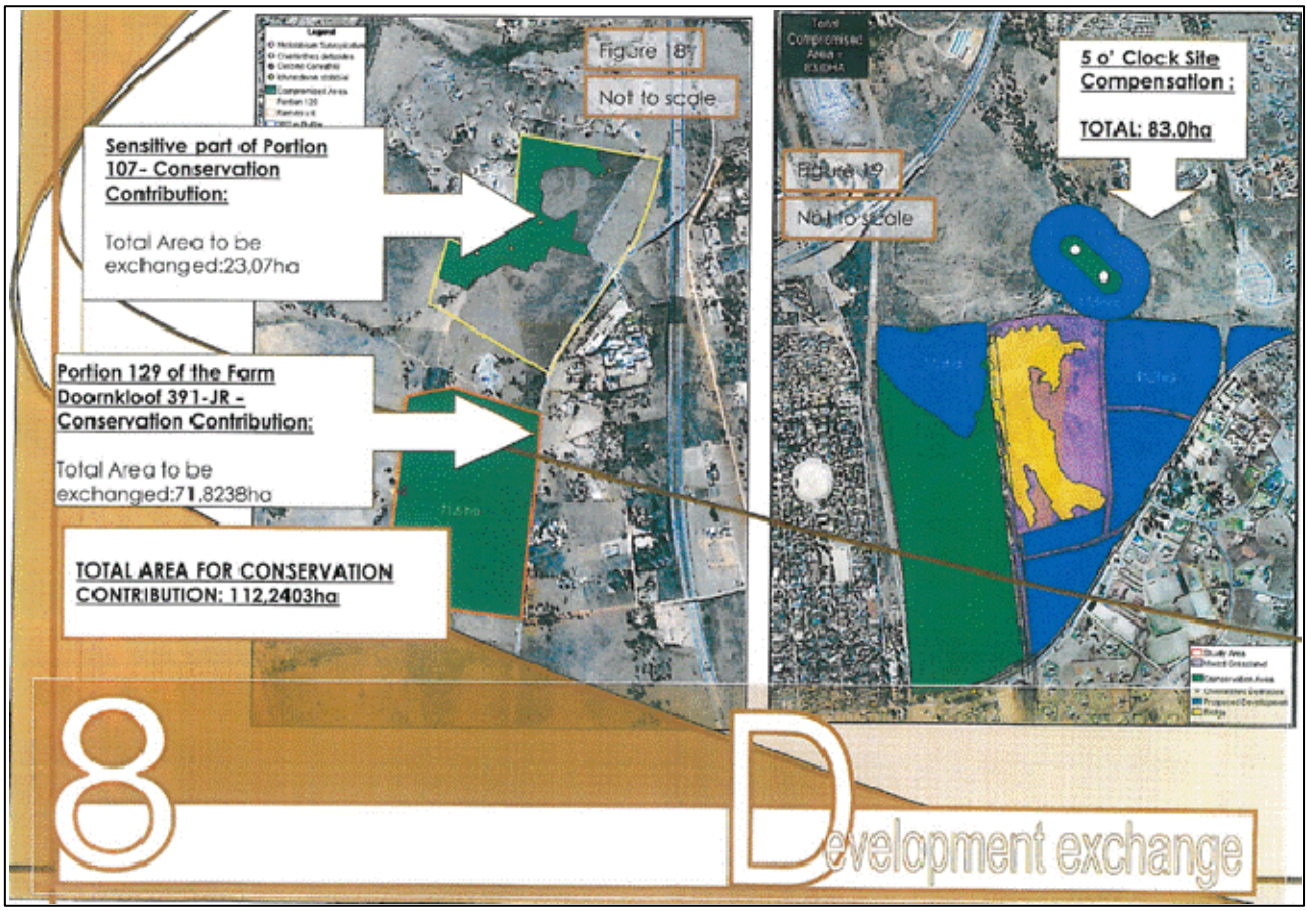


Figure 7 – Development Exchange Proposal

The above appeal for Irene X 70 Phase 3 was granted on the 23rd of December 2008 ***(refer to Annexure K).*** GDARD determined that the applicant is to ensure a minimum of 100ha of

agricultural land/grazing land (within the Kungwini Agricultural Hub) to fulfill the MEC's decision for socio-economic consideration to supplement the offset proposal.

In terms of the above approval a restriction was placed on a portion of the land and it was indicated that 100m south of Olievenhoutbosch Road was the only developable area within the western erf in phase 3. An amendment application requesting the following amendment to the approval of the appeal was submitted by the applicant to GDARD on 20/01/2009 ***(attached as Annexure L)***:

Under the letter dated 23 December 2008 Point 3.

Given the sensitivity of the north western section of the site (below Olievenhoutbosch Road), development will only be allowed along the road. Therefore the depth of the development measured from the outer edge of the road servitude must not exceed 100m.

The portion as situated within Phase 3 of the Irene X 70 development as denoted by "A-B-C-D-A" be earmarked for development as well as the approval of the layout plan as attached to the application ***(refer to Figure 8).***

The layout plan for Phase 3 was approved by GDARD in a letter dated 23/12/2008 ***(attached as Annexure M).***

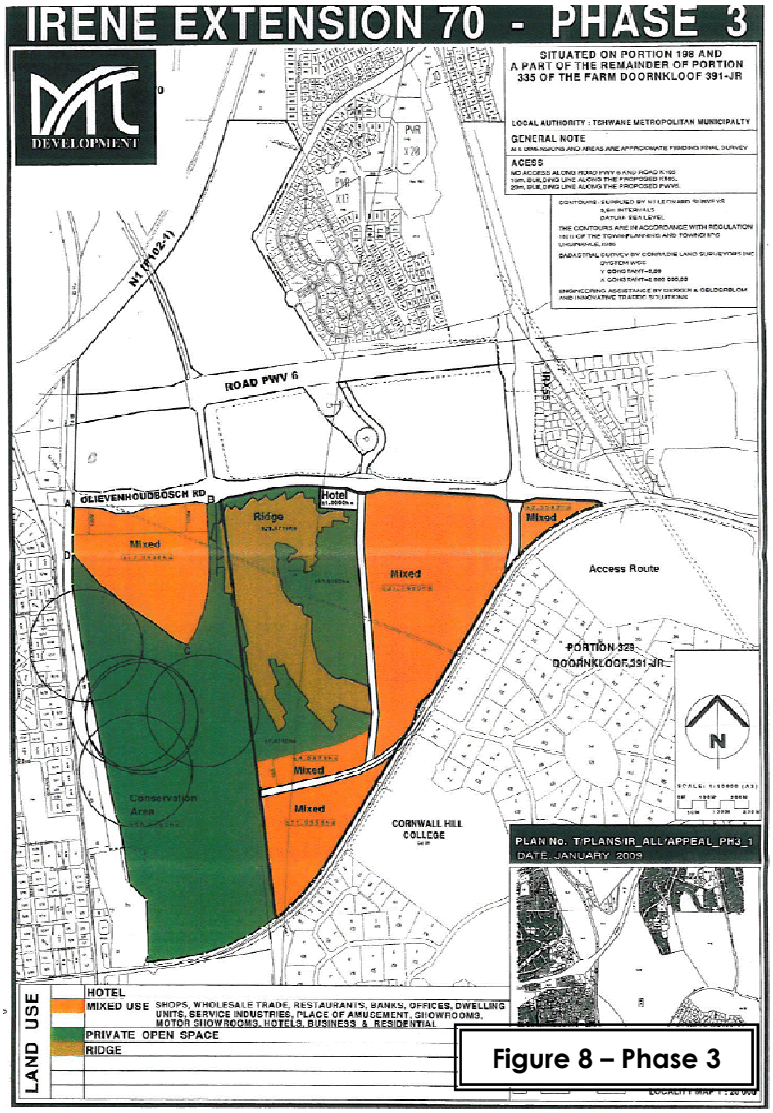


Figure 8 – Phase 3

1.3 The Town Planning Process

The intended establishment of a Land Development Area on the subject property would best be dealt with in terms of the provisions of the Development Facilitation Act, 1995. This act is specifically aimed at creating a single legal mechanism to deal with all the diverse aspects of land development in an integrated fashion. This implies that all the preparatory work must be concluded prior to the submission of the application to ensure that it may be evaluated by all role-players, taking cognisance of all the important aspects, such as access arrangements, provision of services, environmental impact etc.

1.4 Environmental Assessment Practitioner (EAP)

The new Environmental Regulations require that relevant details of the independent Environmental Assessment Practitioner be included as part of the Scoping Report. In this regard, attached as ***Annexure N*** is a copy of the CV of Lizelle Gregory as well as the company profile of Bokamoso Landscape Architects and Environmental Consultants. In summary details of the EAP are indicated below:

- **Name:** Lizelle Gregory
- **Company:** Bokamoso Landscape Architects and Environmental Consultants.
- **Qualifications:** Registered Landscape Architect and Environmental Consultant (degree obtained at the University of Pretoria) with 15 years experience in the following fields:
    - Environmental Planning and Management;
    - Compilation of Environmental Impact Assessments;
    - Landscape Architecture; and
    - Landscape Contracting

Ms. L. Gregory also lectured at the Technicon of South Africa and the University of Pretoria. She is a registered member at the South African Council of the Landscape Architects

Profession (SACLAP), International Association of Impact Assessments (IAIA), Institute for Landscape Architects in South Africa (ILASA) and the Institution for Environmental Management and Assessment (IEMAS).

1.5 Scope of Works and Approach to the Study

1.5.1 Scope of Work

This report represents a Scoping Report containing an environmental evaluation in line with the EIA Guidelines compiled in terms of Regulation 31 of the Development Facilitation Regulations, 2000, published in Regulation Gazette 6709 of 7 January 2000. It has been compiled to include in the town planning application in terms of Section 31 of the Development Facilitation Act, 1995 (Act 67 of 1995) and Regulation 21 of the Development Facilitation Regulations. The Scoping Report complies with the following requirements of Regulation 31(6) of the Development Facilitation Regulations, 2000:

31(6) The Scoping Report must indicate the extent to which the proposed activity or development will impact on the environment, and where appropriate deal with the following specific aspects of the environmental impact:

(a) The physical and landscape characteristics of the land development area and its surroundings; ***Refer to Section 6.1 of this report***

(b) The ecological characteristics of the land development area and its surroundings; ***Refer to Section 6.2 of this report***

(c) The current and potential land-uses of the land development area; ***Refer to Section 4 and Section 7.2 of this report***

(d) Existing significant archaeological, historical and cultural sites in the land development area and its surroundings; ***Refer to Section 7.1 of this report***

(e) The social and economic impact on communities in the land development area and surroundings; ***Refer to Section 7.5 of this report***

(f) The existing infrastructure and/or services in or around the land development area; ***Refer to Section 7.4 of this report***

(g) The existing social and community structures, services and facilities in or around the land development area; ***Refer to Section 7.2 of this report***

(h) The levels of present and possible pollution, including noise pollution, in the future as a result of the proposed development; ***Refer to Section 7.3 of this report***

(i) Any risks or hazards to the environment posed by the development; ***Refer to Section 9.2 of this report***

(j) The health and safety of the public; ***Refer to Section 9.2 of this report***

(k) The social costs of the proposed development; ***Refer to Section 7.3 and Section 9.2 of this report***

(l) The effect of the proposed development on different groups or individuals; ***Refer to Section 7.5 of this report***

(m) The medium and long term environmental sustainability of the proposed development; ***Refer to Section 9.2 of this report***

(n) What mitigating measures could be implemented to reduce negative impacts and enhance positive impacts of the aspects described in paragraphs (a) to (in) and, where appropriate to what extent alternative sites for the development were investigated. ***Refer to Section 5 of this report for alternatives and Section 9.4 of this report for mitigation measures of potential impacts***

The scope of work includes the necessary investigations, to assess the suitability of the study area and the surrounding environment for the proposed activities. The scoping

exercise describes the status quo of the bio-physical, social, economical and institutional environment and identifies the anticipated environmental aspects associated with the proposed development in the form of a basic issues matrix. The significance of the anticipated impacts, the assessment of the alternatives identified, and the assessment of the possible impacts and the mitigation of the impacts identified are addressed in the report.

All available material and literature were collected and used for the purpose of this study and it was further supplemented with discussions with provincial authorities, local authorities, other interested and affected parties, as well as by site surveys and photographic recording.

1.5.2. Approach to the Study

An investigative approach was followed and the relevant physical, social and economic environmental aspects were assessed.

This Scoping Report takes into consideration the environment that may be affected by the proposed activity. Therefore, the physical, biological, social, economical and cultural aspects are considered. A description of the property on which the activity is to be undertaken and the location of the activity on the property are described. The proposed activity and any feasible and reasonable alternatives were identified. In addition, a description of the need and desirability of the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have, on the environment and community that may be affected by the activity are included.

An identification of all legislation and guidelines that we are currently aware of is considered in the preparation of this Scoping Report. Furthermore a description of environmental issues and potential impacts, including cumulative impacts, are identified and discussed. Information on the methodology that will be adopted in assessing the potential impacts is furthermore identified, including any specialist studies or processes that

were undertaken. In addition the mitigation of identified impacts that will be necessary to facilitate the design and construction of an environmentally acceptable facility are addressed.

Details of the Public Participation process to date are included: (i) the steps that were taken to notify potentially interested and affected parties of the application; (ii) proof that the notice boards, advertisements and notices, notifying potentially interested and affected parties of the application, have been displayed, placed or given; (iii) a list of all persons or organisations that were identified and registered; (iv) a summary of the issues raised by the interested and affected parties; (v) the date of receipt of and the response of the EAP to those issues.

2 LOCALITY

See Figure 1 for Locality Map and Figure 2 for Aerial Map

The study area is situated within Irene, Centurion and falls within the jurisdiction of the City of Tshwane. It is situated directly south of the N1 Freeway and located between the existing Cornwall Hill Residential Estate / Pierre van Ryneveld Extensions and the suburb of Irene.

The southern as well as the south-eastern boundary of the study area is defined by the existing road alignment of Nellmapius Drive. A portion of the eastern boundary, directly north of Nellmapius Drive, is defined by the township boundary of Irene Extension 55, whilst the north-eastern boundary of the site is constituted by the township Irene Extension 70. The western boundary is spatially defined by the existing Pretoria-Olifantsfontein railway line and the proposed realignment of the K105. The northern boundary is defined by the N1 Freeway.

3 REGISTERED OWNERS AND TITLE DEEDS

Table 1: Title deed information:

Property	***Title Deed no.***	***Registered Owner***
Portion 198 of the farm Doornkloof 391 JR	T 125729/05	JR 209 Investments (Pty) Ltd
The Remainder of Portion 335 of the farm Doornkloof 391-JR	T 125729/05	JR 209 Investments (Pty) Ltd

The properties are not bonded.

4. ZONING AND LAND USE

4.1 Existing Zoning and Land Use

The properties on which the LDA stands to be established are currently zoned as follows:

Table 2: Current Zoning

Portion No.	**Farm Name**	**Part**	**Zoning**
198	Doornkloof 391 JR	NA	Undetermined
R/335	Doornkloof 391 JR	Part A	Agricultural
R/335	Doornkloof 391 JR	Part B	Undetermined

The study area is currently 'vacant' except for illegal squatting and some dumping that has taken place on the site. A Rand Water pipeline had been installed across the most sensitive sections of the study area and the ground works caused a significant amount of damage to the environment as no conservation fence was erected to protect the red data species and other sensitive areas.[3]

[3] When Bokamoso realized that some construction works commenced on the study area, Bokamoso immediately reported the matter to GDARD. The feedback was that exemption was granted for the installation of the Rand Water Pipeline and therefore it was not possible for GDARD to stop the excavation works that were taking place on the site. No EMP was followed, no red data species or ridge buffer zones were taken into consideration and no ECO was appointed to monitor the works on the site. The Draft Red Data Species Policy and the Draft Ridges Policy were already compiled in 2001 – surely, the policies were applicable when the application for exemption was submitted.

In the past, the study area was used for cattle grazing, but this agricultural activity was found not to be financially feasible.

Servitudes

A professional Land Surveyor's Certificate as required in terms of Section 61(4)(a) of the Development Facilitation Act, 1995 is supplied as ***Annexure E of the DFA Application***. This certificate was prepared by the appointed professional Land Surveyor, Mr. Stefan Janse van Rensburg from SVR Land Surveyors Incorporated.

The following servitudes affect the Land Development Area:

Table 3: Servitudes

Property Description	**Servitudes which affect the LDA**	**Servitudes that do not affect the LDA**
Portion 198 Doornkloof 391-JR	None	See Land Surveyor's Certificate attached as Annexure E of DFA Application
R/335 Doornkloof 391-JR	B. Servitude of Aquaduct, Powerline, Right of Way, and Dam Wall held under Deed of Transfer 17417/79. This servitude is proposed to be disposed of. D(1) Servitude of Right of Way i.f.o. City Council of Centurion vide Notarial Deed K1636/72S. This servitude will be accommodated in the layout plan and transferred into the respective Title Deeds. D(2) Servitude of Aquaduct i.f.o. City Council of Centurion vide Notarial Deed K1636/72S This servitude will be accommodated in the layout plan and transferred into the respective Title Deeds. G(4) Servitude of Flood Water i.f.o. City	See Land Surveyor's Certificate attached as Annexure E of DFA Application

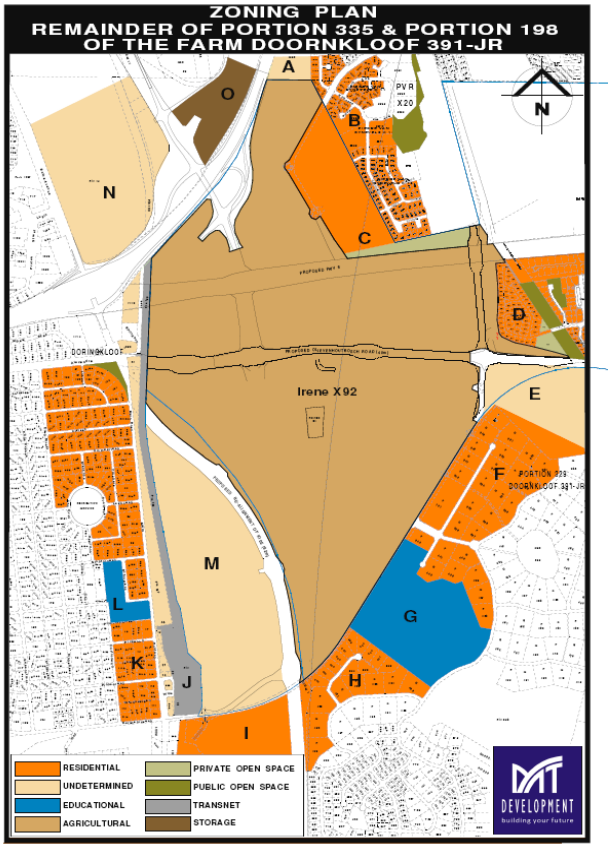
	Council of Centurion vide Notarial Deed K1118/92S This servitude will be accommodated in the layout plan and transferred into the respective Title Deeds. K(a) Servitude of Powerline i.f.o. City Council of Centurion vide Notarial Deed K6038/1995 This servitude will be accommodated in the layout plan and transferred into the respective Title Deeds. L. Servitude of Road and Municipal Purposes i.f.o. the City of Tshwane Metropolitan Municipality vide Notarial Deed K3322/2002S This servitude will be accommodated in the layout plan and transferred into the respective Title Deeds. M. Servitude of General Municipal Services (stormwater) held vide Notarial Deed K3115/2008S This servitude will be accommodated in the layout plan and transferred into the respective Title Deeds. N. Servitude of Sewer i.f.o. Council held vide Notarial Deed K3116/2008S There is an unregistered servitude S.G. 12311/2004 (3m Sewer Servitude) that affects the LDA. This servitude will be accommodated in the layout plan and registered and transferred into the respective Title Deeds. There is an unregistered servitude S.G. 1452/2006 (Water Pipe line Servitude) that affects the LDA. This servitude will be accommodated in the layout plan and registered and transferred into the respective Title Deeds.	

4.2 Surrounding Zoning and Land Uses

The area surrounding the Land Development Area is characterized by mainly residentially zoned townships. From the ***Zoning Plan, Figure 9*** below (also attached as Annexure K to the DFA application) it is eminent that the property is bordered by the following developments:

A: R/Ptn3 Waterkloof 378-JR: Zoned Agricultural

B: Pierre van Ryneveld Ext13: Zoned Residential



C: Irene Ext.70: Zoned Residential;

D: Irene Ext. 55: Zoned Residential;

E: Ptn 330 Doornkloof 391-JR; Zoned Agricultural;

F: Cornwall Hill Residential Estate: Zoned Agricultural;

G: Cornwall Hill College: Zoned Agricultural;

H: Irene Ext.: Zoned Residential;

I: Irene Middle School:

J: Pretoria-Olifantsfontein Railway Line: Zoned S.A.R.;

K: Irene Proper: Zoned Residential;

L: Irene Primary School: Zoned Educational;

M: Ptn 198 of the Farm Doornkloof 391-JR; Zoned Agricultural;

N: Ptn 759 Doornkloof 391-JR: Zoned Agricultural;

Figure 9 – Zoning Plan

4.3 Proposed Zoning and Land Use

Information supplied by M & T Development Town Planners

The development rights, zoning and control measures applied for includes the following:

- Approximately 2200 dwelling units;

- Approximately 550 000m² of floor area to be reserved for business purposes (excluding shops and restaurant facilities)
- Approximately 65 000m² of floor area to be reserved for retail facilities (shops) and restaurants;
- Educational facilities, providing for approximately 2500 pupils in unison with subservient and related business buildings totaling approximately 60 000m²;
- A hotel measuring approximately 7000m²;
- An intermodal transport facility providing an interface between road and rail transport opportunities;
- Interspersed private open space areas and supporting facilities taking up approximately 60ha of land; and
- In total the development bulk potential that is applied for is in the order of approximately 954 184m².

Table 4: Proposed Zoning, Control and Development Rights

ERF	USE ZONE	PRIMARY RIGHTS	HEIGHT	COVERAGE	FSR / FAR
1-11; 13-16;	SPECIAL	BUSINESS BUILDINGS, SHOPS, PLACE OF REFRESHMENT	7 - 8 STOREYS	50%	1.0
35-36; 41-42	SPECIAL	BUSINESS BUILDINGS, SHOPS, PLACE OF REFRESHMENT	6 – 8 STOREYS	50%	0.8
55	SPECIAL	SHOPS	1 - 3 STOREYS	50%	0.4
17; 18;	SPECIAL	BUSINESS BUILDING & PLACE OF REFRESHMENT	4 - 5 STOREYS	50%	0.6
19; 21	SPECIAL	BUSINESS BUILDING & PLACE OF REFRESHMENT	1 - 4 STOREYS	50%	0.5
24	SPECIAL	TRANSPORT INTERCHANGE, SHOPS, BUSINESS BUILDING, RESIDENTIAL, PLACE OF REFRESHMENT	8 - 12 STOREYS	50%	1.2
25-32; 34	SPECIAL	BUSINESS BUILDING, RESIDENTIAL, SHOPS,PLACE OF REFRESHMENT, VEHICLE SALES MART, SHOWROOM, PLACE OF INSTRUCTION, CAFETERIA, COMMERCIAL USE, CONFECTIONERY, INTERNET CAFÉ, LIGHT INDUSTRY, MOTOR DEALERSHIP, RETAIL	8 - 14 STOREYS	50%	1.3

		INDUSTRY			
43	SPECIAL	BUSINESS BUILDING, RESIDENTIAL, SHOPS,PLACE OF REFRESHMENT, VEHICLE SALES MART, SHOWROOM, PLACE OF INSTRUCTION, CAFETERIA, COMMERCIAL USE, CONFECTIONERY, INTERNET CAFÉ, LIGHT INDUSTRY, MOTOR DEALERSHIP, RETAIL INDUSTRY	1 - 4 STOREYS	50%	0.5
46-48	SPECIAL	BUSINESS BUILDING, RESIDENTIAL, SHOPS,PLACE OF REFRESHMENT, VEHICLE SALES MART, SHOWROOM, PLACE OF INSTRUCTION, CAFETERIA, COMMERCIAL USE, CONFECTIONERY, INTERNET CAFÉ, LIGHT INDUSTRY, MOTOR DEALERSHIP, RETAIL INDUSTRY	6 - 8 STOREYS	50%	0.8
33	SPECIAL	SHOPS, RESIDENTIAL	8 - 14 STOREYS	50%	1.3
39	SPECIAL	SHOPS, RESIDENTIAL	6 - 8 STOREYS	50%	0.8
50; 53	SPECIAL	SHOPS, RESIDENTIAL	4 - 5 STOREYS	50%	0.6
38	SPECIAL	RESIDENTIAL (MEDIUM)	4 - 5 STOREYS	50%	0.6
40	SPECIAL	RESIDENTIAL (MEDIUM)	6 - 8 STOREYS	50%	0.8
56	SPECIAL	RESIDENTIAL (MEDIUM)	1 - 3 STOREYS	50%	0.4
57	SPECIAL	RESIDENTIAL (MEDIUM)	1 - 4 STOREYS	50%	0.5
45	SPECIAL	HOTEL	6 - 8 STOREYS	50%	0.8
51-52	SPECIAL	RESIDENTIAL (LOW/MEDIUM)	1 - 4 STOREYS	50%	0.5
60-62	SPECIAL	BUSINESS BUILDING, RESIDENTIAL (MEDIUM)	1 - 4 STOREYS	50%	0.5
63-69	SPECIAL	EDUCATIONAL, BUSINESS BUILDING	1 - 3 STOREYS	50%	0.4

71	SPECIAL	PLACE OF REFRESHMENT, BUSINESS BUILDING, CONFERENCE CENTRE, BIODIVERSITY INFORMATION CENTRE	1 - 4 STOREYS	50%	0.5
12; 20;22-23; 37; 44; 49; 54;58-59; 70;72-74	PRIVATE OPEN SPACE	na	AS PER SDP	AS PER SDP	AS PER SDP

5 ALTERNATIVES IDENTIFIED

5.1 The "No-Go" Alternative

The study area is currently vacant and squatters have already settled under nearly every tree cluster of the site. Other illegal activities like dumping have also in the past taken place on site. The site is located inside the urban edge and is almost completely surrounded by residential land-uses. Due to the area's strategic locality (close to Midrand, Pretoria CBD and suburbs and Johannesburg) and the freeways and major roads that surround the area, development pressure in this area is extremely high.

The site is however regarded as very sensitive from an environmental point of view and the applicant is aware of the fact that previous development applications for the study area were declined to protect the valuable environmental features.

Before the developer purchased the property, several meetings were held with the involved authorities (GDARD and the City of Tshwane) to determine the risks involved and the development possibilities of the study area. ***(Please refer to Annexure O for the City of Tshwane Metropolitan Council Requirements.)***

For the purpose of these meetings, the applicant appointed specialists to do a preliminary sensitivity analysis of the site. All the sensitive features together with their applicable buffer zones were thereafter overlaid onto an aerial photograph and formed the basis of a

sensitivity maps that were discussed at these meetings. The most significant environmental issues that were identified are:

- The red data plant species (Draft Red Data Species Policy applicable);
- The ridge (Draft ridges policy applicable);
- The noise zones;
- The cultural and historical features;
- The Bankenveld;
- The visibility of the site; and
- The existing road and service servitudes on the study area.

The sensitivity analysis indicated that if all the policies (especially the draft ridges policy) were rigidly applied, it would not be economically viable to develop the site (less than 20% of the site will be available for development).

The above-mentioned environmental information as well as the economical viability of the development (especially if all the policies are rigidly applied) was discussed with GDARD. Bokamoso and the applicant proposed that a section of the ridge (the southeastern section immediately adjacent to Cornwall Hill and Nellmapius Drive) be compromised for development purposes, because most of the high sensitivity areas occur on the lower lying sections of the study area. The implication of this proposal is that it will not be possible to apply the Draft Ridges Policy.

Bokamoso pointed all the restrictions of the site out to GDARD and the developer wanted to know whether they should not rather cancel the property transaction. The response of GDARD was that the Ridges Policy is only a Draft Policy that is used by the Department as guideline document for the evaluation of applications on ridges. GDARD stated that they would consider a development on a ridge, but they stated that it would be necessary to motivate the proposed land-use and layout in terms of the anticipated ecological and social impacts.

During discussions with Tshwane, it became clear that Tshwane supported development on the study area, because they do not have the capacity to manage or maintain the study area as part if the public open spaces of Tshwane. Tshwane was of the opinion that a suitable development would rather assist with the management and maintenance of the valuable ecological and social features of the site that is currently threatened by illegal squatters and dumping. Tshwane also indicated that they would only consider some compromises in the ridge area if the developer proofs the willingness to compromise other sensitive areas on the site.

The applicant and the owner offered the study area to Tshwane at a market related price for conservation purposes, but Tshwane indicated that they do not have the financial capacity to obtain or manage the site. They indicated that they would support the private development of the site on the condition that the environmental issues and the links with the larger open space system are taken into consideration.

The "No-Go" option will only lead to the further neglect ion and damage of the site and is therefore not regarded as a viable option.

5.2 Land-Use Alternatives

Agricultural:

According to the previous owners of the property, the study area used to form part of a larger farm that was originally used for cattle farming (grazing). The development of residential areas and roads around the study area caused the segmentation of the larger farm and the size and cattle theft on the property eventually brought an end to economically viable agricultural activities on the study area.

Because of the above-mentioned impacts on the agricultural activities and due to surrounding developments, the previous owners (farmers) decided to sell the property to developers for development purposes.

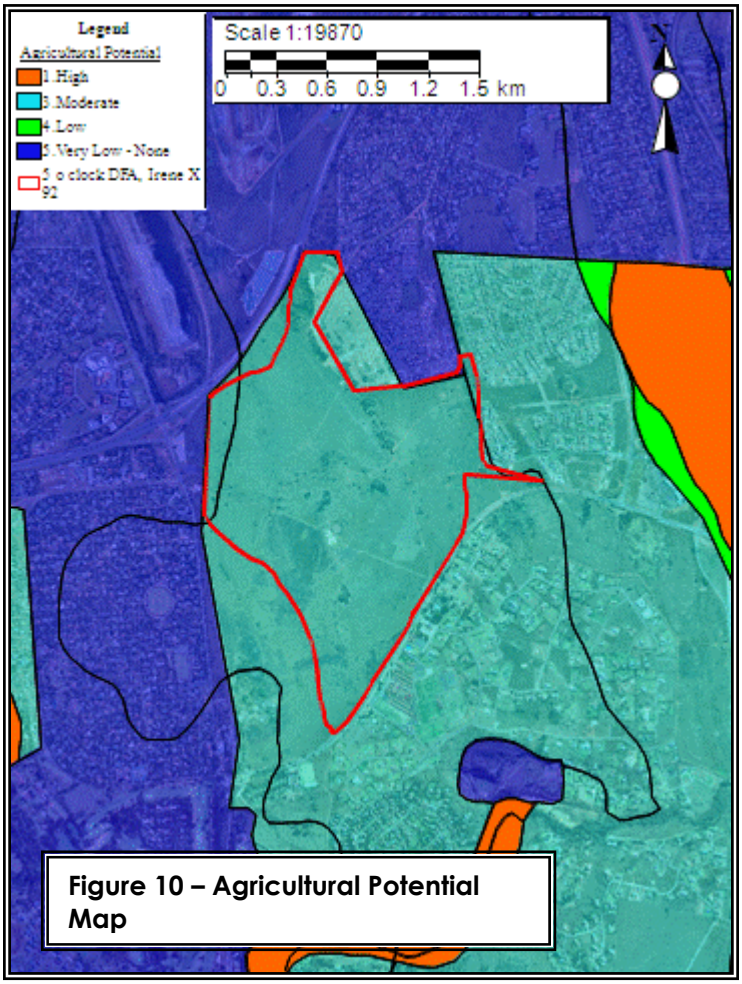


Figure 10 – Agricultural Potential Map

According to GAPA 3 the study area is located on **moderate** agricultural potential soils. ***(Refer to Figure 10)***.However the study is located within the provincial urban edge and is not located within an **Agricultural Hub**, an area identified for agricultural use by GDARD according to the **Draft Policy on the Protection of Agricultural Land (2006).**

The development of the Study Area as a Conservation Area

As the study area has so many conservation worthy elements and sensitive areas it was considered to sell the land or parts of it to Tshwane or the Gauteng Government to ensure the protection of these areas and features. Unfortunately, the government departments are experiencing capacity problems and financial constraints and will therefore not be able to obtain, develop, manage, or monitor the site in a sustainable way. Tshwane did however indicate that they would support the development of the site by a private developer if a sustainable development approach is followed throughout all the development stages of the project.

A Development with Mixed Land-Uses

During the planning phases of the development the market research team of the developer attempted to identify a land-use/ a combination of land-uses that are suitable for the study area (from an economical, institutional and ecological point of view), which is located within the urban edge and adjacent to a very busy and important highway (the Ben Schoeman Highway).

The market research team of the developer indicated that residential developments in line with the surrounding residential developments would be suitable for the study area. The other proposed land-uses as described under item 1 of this report, were also regarded as appropriate.

Demacon Market Studies were recently appointed by M & T Development to compile a comprehensive, specialist site specific market study to establish the capacity of the local market to sustain a mixed use development situated adjacent to the N1 Freeway, Irene, Centurion.

The market study revealed that a mixed use development consisting of residential, retail, offices, hotel and a private school were regarded as appropriate. ***Refer to Section 7.5 for a detailed discussion on the Market Study compiled by Demacon.***

Apart from the market research results, some site-specific environmental aspects also had an impact on the proposed land-uses. These aspects are:

- The geology (i.e. some zones are not suitable for residential developments);
- The noise impacts of the airport, freeways and other major roads (i.e. some areas are regarded as too noisy for residential developments);
- The impacts on the visual qualities of the study area (the topography of the site and the visibility of sections of the site restrict the number of storeys of the proposed structures); and

- The ecological and cultural and historical features of the site (the areas most suitable for development from a geotechnical point of view are the most sensitive from an ecological point of view).

5.3 Layout alternatives

Due to the sensitivity of the study area and the diversity of elements that need to be considered during the planning and designing stages of this development the layout was only finalised after specialist studies were conducted to establish the sensitivities and the design criteria for the site. As already mentioned, various meetings were held with both the provincial and the local authorities to discuss the development potential, opportunities, and constraints of the study area.

The existing vegetation, fauna, topography, geotechnical constraints, noise impacts, cultural historic/ archaeological elements, views, and visibility, Policies on Red Data species and ridges were considered as the main form giving elements for the layout.

Once the market research team of the developer determined the land-use alternatives, a concept layout was produced and presented at multi-disciplinary planning meetings. During these meetings the concept layout was placed over an already prepared environmental sensitivity map compiled by Bokamoso ***(Refer to Figure 11 for the Environmental Sensitivity Map and Refer to Annexure P for the Environmental Sensitive Analysis, a copy of which was submitted to GDARD and Tshwane prior to the submission of the Plan of Study for Scoping)*** and the layout was altered to accommodate (as far as possible) the environmental opportunities and constraints as reflected on the sensitivity map.

The involved traffic engineer, storm water engineer, electrical engineer, town planners as well as the developer were also present at the meetings and they supplied their valuable inputs regarding their fields of expertise. The layout was thereafter altered to accommodate the requirements of the above-mentioned disciplines.

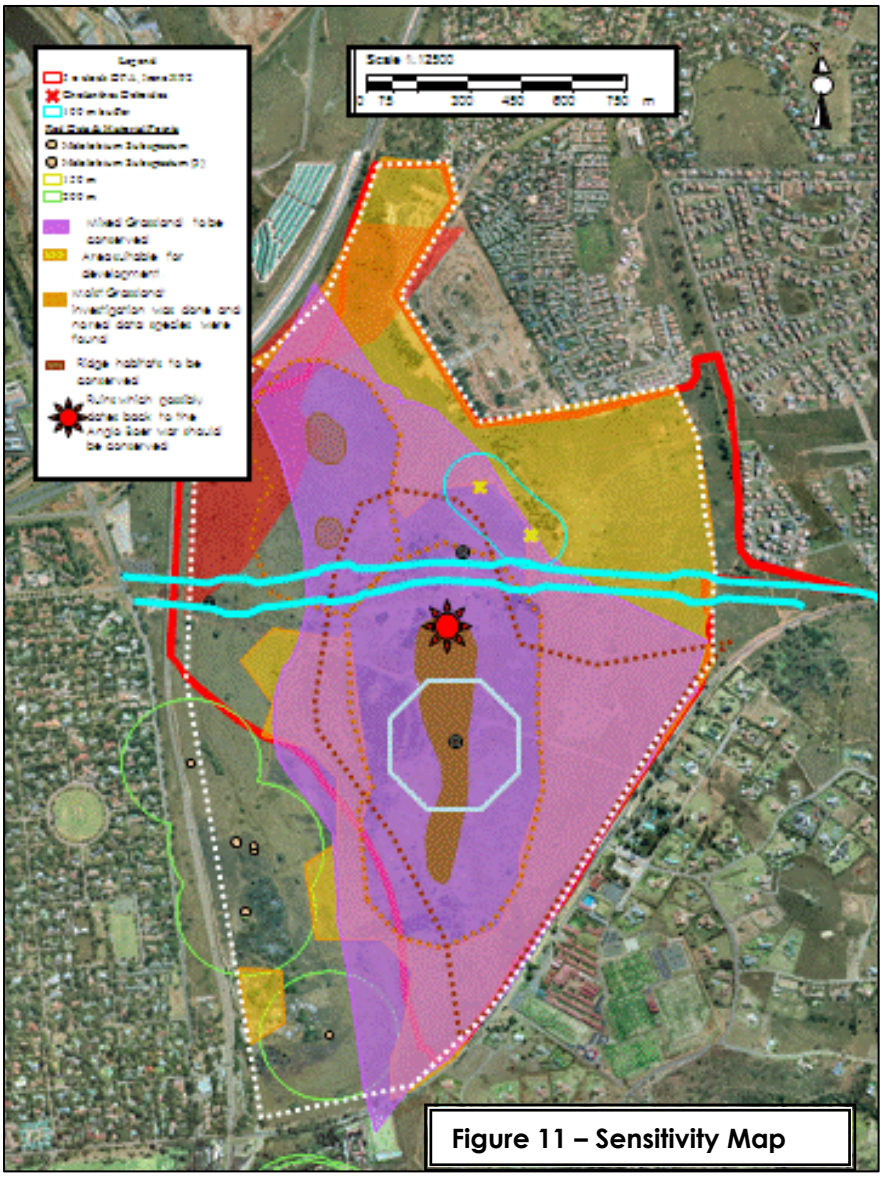


Figure 11 – Sensitivity Map

5.4 Finalized Layout

The final layout is a product of an integrated planning process, which considered all the planning environments. ***Refer to Figure 12 for Final Layout.***

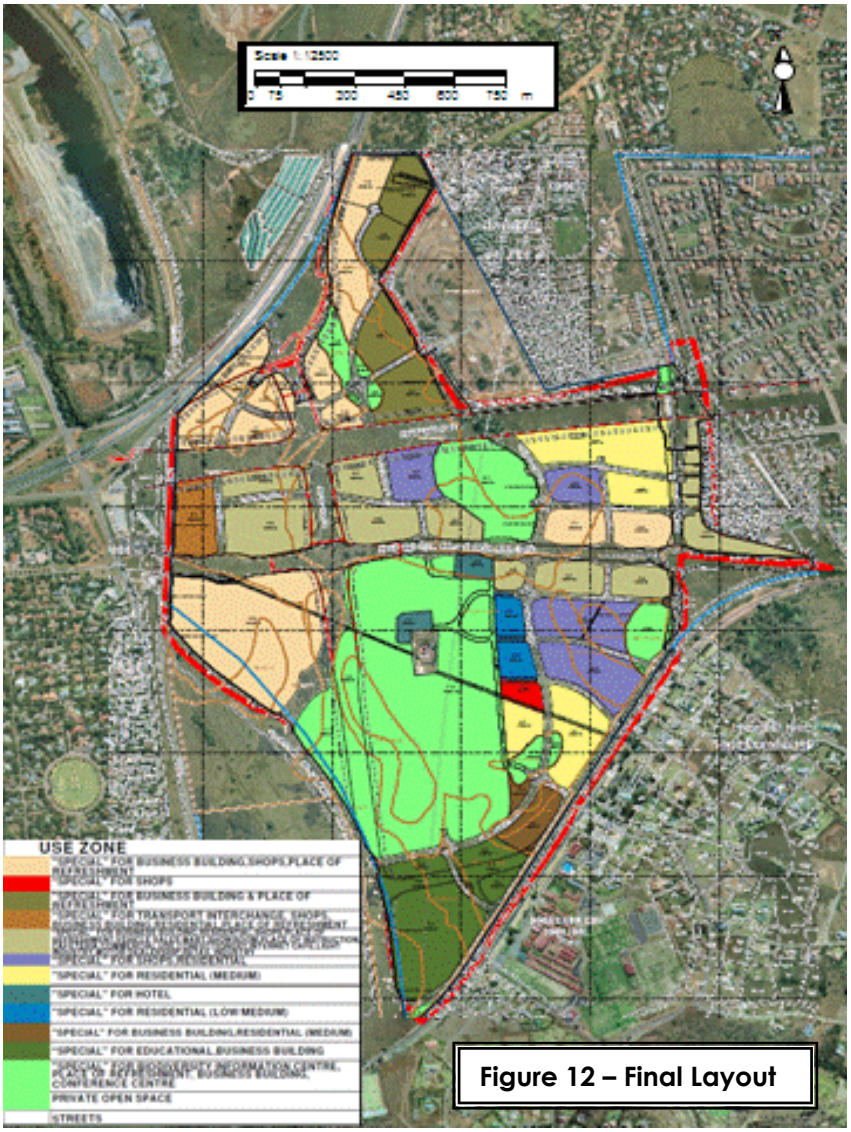


Figure 12 – Final Layout

The final layout was also tested against an environmental sensitivity map that was compiled by layering all the constraints and sensitivities that were identified in the specialist studies to find the areas that area suitable for development ***(Refer to Annexure P for the Environmental Sensitive Analyses)***. The approach was to conserve the most sensitive areas and elements and to compromise (where necessary) on some of the required buffer zones to make the development viable from an ecological and economical point of view.

The final layout is thus a product of a multi-disciplinary series of studies conducted by the appointed professionals. The following studies were conducted:

- A noise impact study;
- A geotechnical report;
- A cultural/ archaeological study;
- A fauna and flora report; and
- A traffic impact study.

Development Concept

The vision which has been formulated to guide the planning process and the overall conceptualization of the development concept can be summarized as follows:

"....to create an urban precinct that promotes overall functionality and liveability through adhering to the principles of overall sustainability and responsible planning. The development shall strive to optimally utilise existing resources in order to contribute the process of restructuring our cities into healthy sustainable environments through providing opportunities for the densification of existing low density areas, promote higher density and integrated environments with typical urban characteristics to counteract suburban sprawl, ensure that residents have access to a range of choices with regard to housing typologies and integrated mixed-use facilities; integrate residential development, movement systems, social facilities and employment opportunities; and focus residential densification around areas of opportunity (economic opportunity, transport opportunities etc)...."

The proposed land uses of the Land Development Area will promote more compact development of urban areas and will limit urban sprawl and will further promote the use and development of land that optimises the use of existing resources such as engineering services.

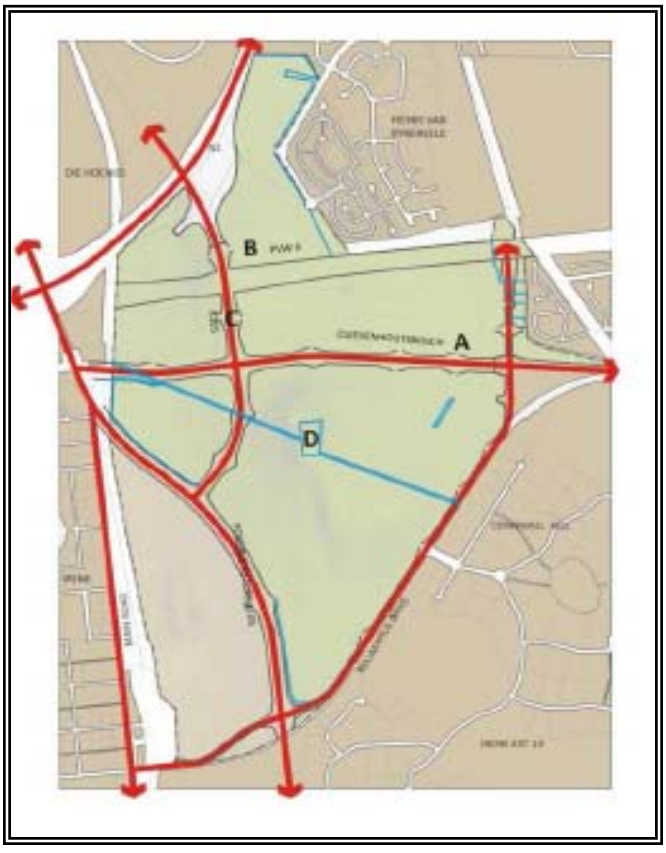


Diagram 1: Roads and Servitudes

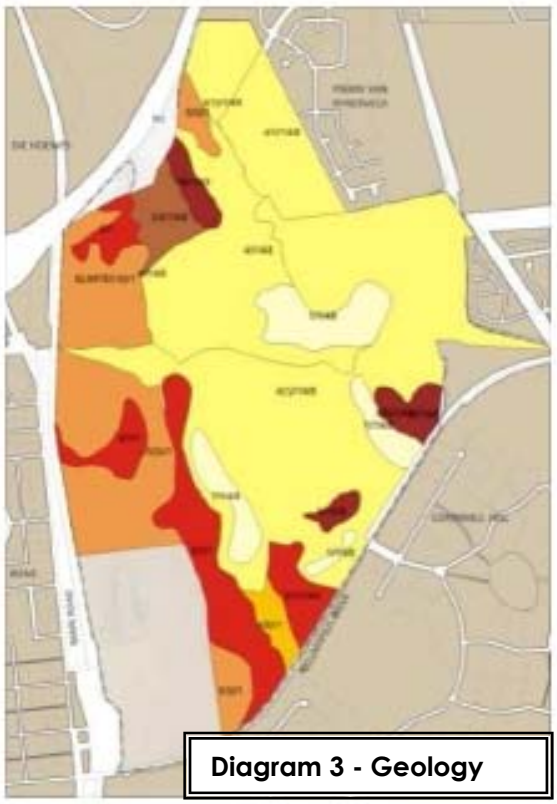


Diagram 3 - Geology

The process of developing the development framework commenced by means of firstly carrying out an audit of those site specific considerations that structured planning by means of its physical presence.

The following considerations initially provided structure in the process of compiling a spatial development framework:

Roads and Servitudes:

The primary structuring roads and servitudes across the site include:

(a) Olievenhoutbosch Road
(b) PWV 6
(c) K105
(d) Water pipeline servitude

Diagram 2 - Environmental

Environmental:

The area indicated as B has been earmarked as open space as a result of the presence of red data flora specie located within the site.

The area indicated as A and C in the centre of the site forms part a ridge and shall also be conserved as a natural open conserved space.
These two areas form the basis of the substantial green belt that will be provided through the site.

Geology

Two small pockets of land can not be developed as a result of dolomitic soil conditions.

No-Go Areas

The process of overlapping the constraints results in substantial areas not available for development (indicated in red). These areas will be utilised as establishing and strengthening the green belt continued through the development.

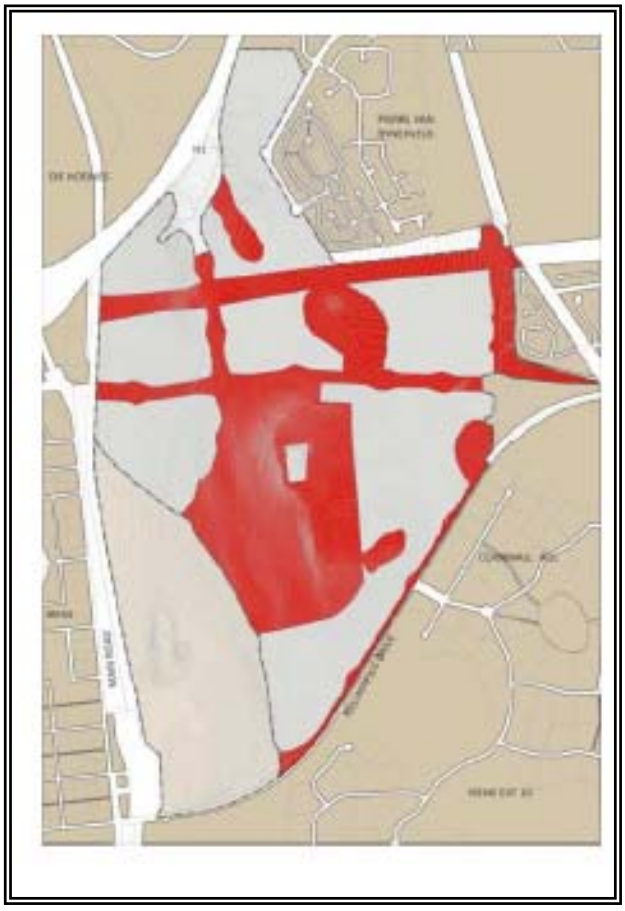


Diagram 4 – No – Go Areas

Subsequently to identifying those elements structuring development a framework plan was developed in order to spatially direct the attribution of land-uses to individual erven.

Although the majority of the precincts/erven within the proposed Land Development Area comprise of mixed-use rights, 6 broad land use categories can be determined and is illustrated by means of the following illustration.
As can be evidenced from the above illustration, the land uses of the proposed Land Development Area can be classified into the following broad categories:

- Business/Commercial
- Transport Interchange
- Mixed use Urban & Residential Precinct
- Low to High Residential Precinct
- Open Space
- Educational

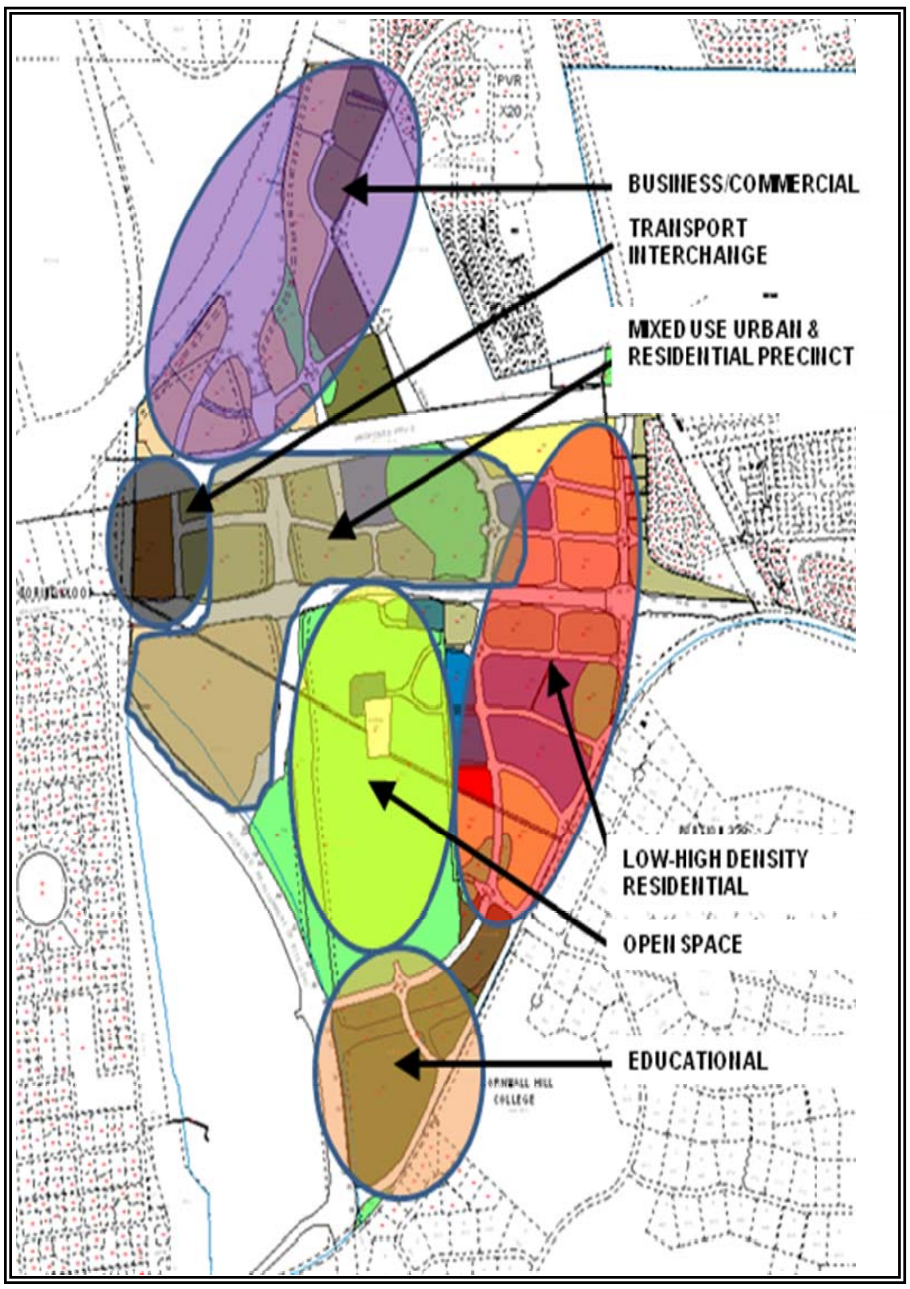


Diagram 5 – Layout Plan

6. THE DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

This section briefly describes the biophysical environment.

The following information incorporates the most important information supplied by specialist studies and reports.

Note: Sensitivity maps (based on the information supplied below) were compiled by using overlays, to identify the most sensitive areas of the site. The environmental aspects (ecological, economical, social, and institutional) of the site were regarded as the form giving elements for the proposed layout. Refer to ***Annexure P*** for the sensitivity analysis that was done for the study area.

6.1 The Physical Environment

6.1.1 Geology

A Geotechnical investigation of the area was conducted by VGI Consult Consulting Engineering Geologists and Engineers.

The geological investigation carried out in respect of all the property forming part of the Land Development Area has been documented in four separate reports, namely:

- GSFH-2, Phase 1 Geotechnical Investigations: Proposed Irene Extension 80, 81 and 82; (Areas C, D and E)
- GFSH-2, Phase 1 Geotechnical Investigations: Proposed Irene Extension s 78 and 79; (Areas A and B)
- GSFH-2, Phase 1 Geotechnical Investigations: Proposed Irene Extension 71; and (Areas F)

- GFSH-2, Phase 1 Geotechnical Investigations: Proposed Irene Extension s 78 and 79: Dolomite Suitability Investigation of the "Further Work Zone" In Irene Extension 78 (Area A and B)

Geotechnical Reports attached as O of the DFA Application.

It is important to note that the six respective areas that was investigated in unison provided for a detailed investigation covering the total extent of the Land Development Area.

The investigations involved field inspections, a review of available data, analyzing of an existing gravity survey, a phase borehole drilling program based on the gravity survey, excavation and profiling of test pits, sampling, analysis and reporting.

The most important recommendations and conclusions contained within the reports can be summarized as follows:

- Areas A and B: The site is underlain by dolomite and chert of the Chuniespoort Group, Transvaal Supergroup. Weathered soil derivatives blanket the dolomite bedrock over the entire site. A thick sequence of Karoo materials, transported (reworked) Karoo materials or Post Eccels Formation deposits consisting of shale and chert overlie the dolomite bedrock and associated residual materials in sub-areas of the site. Shallow dolomite conditions exist on the western portion of the site. A major quartz vein bisects the site. Residual intrusive material is intercepted in some boreholes drilled near the quartz vein.

- Areas C, D and E: The study area is underlain by dolomite and chert of the Chuniespoort Group, Transvaal Supergroup. Weathered soil derivatives blanket the dolomite bedrock over the entire site. Shallow dolomite conditions exist on the western portion of the site. A major quart vein bisects the site. Residual intrusive material is intercepted in some boreholes.

- Area F: The site is underlain by dolomite and chert of the Chuniespoort Group, Transvaal Supergroup. Weathered soil derivatives blanket the dolomite bedrock over the entire site. Shallow dolomite conditions exist on the western portion of the site. A major quartz vein bisects the site. Residual intrusive material is intercepted in some boreholes.

- Areas A and B - Further Work Study Area: The site is underlain by dolomite and chert of the Chuniespoort Group, Transvaal Supergroup. Weathered soil derivatives blanket the dolomite bedrock over the Inherent Risk Class area.

Based on the results of the investigation the site is characterised in terms of 11 primary Inherent Risk Class areas, namely:

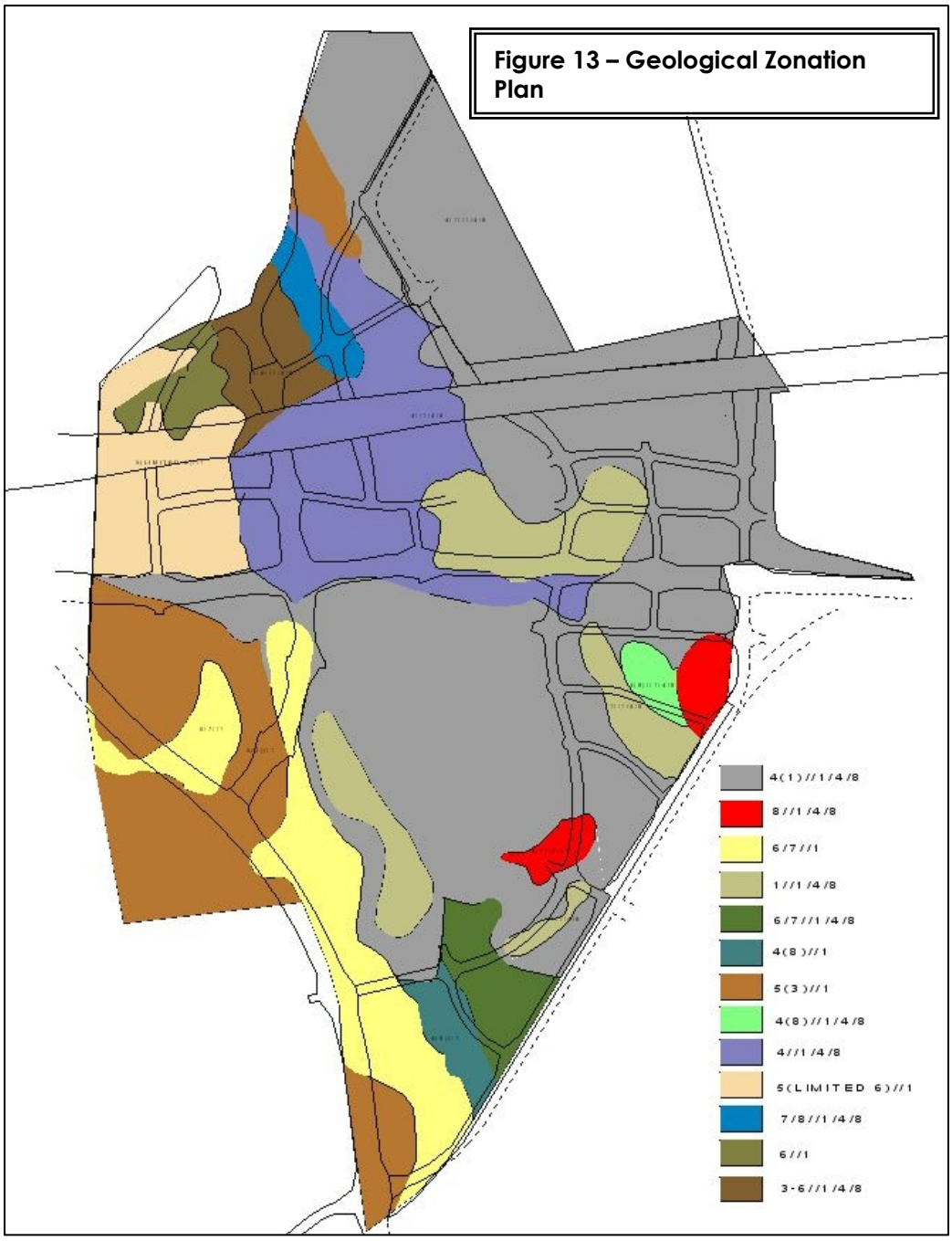
Table 5: Inherent Risk Classes

Inherent Risk Class	Description
Inherent Risk Class 1//1/4/8	Area characterised as largely reflecting a low Inherent Risk of all-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater level drawdown.
Inherent Risk Class 4(1)//1/4/8	Area characterised as largely reflecting a medium (with sub-areas of low) Inherent Risk of all-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater level drawdown.
Inherent Risk	Areas characterised as largely reflecting a medium

Class 4//1/4/8	Inherent Risk of all-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater level drawdown.
Inherent Risk Class 4(8)//1/4/8	Areas characterised as largely reflecting a medium (with sub-areas of high) Inherent Risk of all-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater level drawdown.
Inherent Risk Class 3-6//1/4/8	Areas characterised as largely reflecting a medium Inherent Risk of small- to large-size and a high Inherent Risk of small- to medium-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater drawdown.
Inherent Risk Class 5(3)//1	Areas characterised as largely reflecting a high Inherent Risk of small-size (and sub-areas of medium Inherent Risk of medium-size) sinkhole and doline formation with respect to ingress water, and low Inherent Risk of all-size sinkhole and doline formation with respect to groundwater level drawdown.
Inherent Risk Class 5(limited sub-areas of 6)//1	Areas characterised as largely reflecting a high Inherent Risk of small-size (and possibly medium-size) sinkhole and doline formation with respect to ingress water, and low Inherent Risk of all-size sinkhole and doline formation with respect to lowering of the groundwater.
Inherent Risk	Areas characterised as largely reflecting a high

Class 6//1	Inherent Risk of up to medium-size sinkhole and doline formation with respect to ingress water, and low Inherent Risk of all-size sinkhole and doline formation with respect to lowering of the groundwater.
Inherent Risk Class 6/7//1	Areas characterised as largely reflecting a high Inherent Risk of medium- to large-size sinkhole and doline formation with respect to ingress water, and low Inherent Risk of all-size sinkhole and doline formation with respect to groundwater level drawdown.
Inherent Risk Class 7/8//1/4/8	Areas characterised as largely reflecting a high Inherent Risk of large to very large-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater drawdown.
Inherent Risk Class 8//1/4/8	Areas characterised as largely reflecting a high Inherent Risk of all-size sinkhole and doline formation with respect to ingress water, and low to high Inherent Risk of large-size sinkhole and doline formation with respect to groundwater level drawdown.

In light of the above-mentioned investigations as well as the subsequent recommendations in respect of the inherent risk class classification of the Land Development Area a zonation plan was prepared in order to guide spatial planning. This zonation plan spatially delineates the various risk classes within the context of applicability in as far as the Land Development Area is affected and has been incorporated in the layout plan.



The above geological zonation plan has been incorporated into the Land Development's layout plan along with the description of the inherent risk class. Recommendations pertaining to the type of land-use which corresponds with the type of inherent risk class

are contained within the above-mentioned geological report and can be summarized as follows:

Table 6: Inherent Risk Classes and Associated Appropriate Development

Inherent Risk Class	Appropriate Development
Inherent Risk Class 1//1/4/8	All types of recreational uses, places of instruction, detention and worship, all types of commercial use, exhibition halls and museums, all types of industrial use, hospitals and institutional use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking
Inherent Risk Class 4(1)//1/4/8	All types of recreational uses, places of instruction, detention and worship, light commercial use, exhibition halls and museums, light dry industrial use, hospitals and institutional use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking
Inherent Risk Class 4//1/4/8	All types of recreational uses, places of instruction, detention and worship, light commercial use, exhibition halls and museums, light dry industrial use, hospitals and institutional use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking
Inherent Risk Class 4(8)//1/4/8	Where proven Inherent Risk Class 4: All types of recreational uses, places of instruction, detention and worship, light commercial use, exhibition halls and museums, light dry industrial use, hospitals and institutional use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking Where proven Inherent Risk Class 8: No development, park land and Public and Private Open Space
Inherent Risk Class 3-6//1/4/8	Where proven Inherent Risk Class 3 or 4: All types of recreational uses, places of instruction, detention and worship, light commercial use, exhibition halls and museums, light dry industrial use, hospitals and institutional use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking Where proven Inherent Risk Class 5: All types of recreational uses, places of instruction and worship, light commercial use, exhibition halls and museums, light dry industrial use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking Where proven Inherent Risk Class 6: Out door sport, light commercial use, light dry industrial use, offices with appropriate remedial measures and 1 person per 15m², storage and parking

Inherent Risk Class	Appropriate Development
Inherent Risk Class 5(3)//1 area	All types of recreational uses, places of instruction and worship, light commercial use, exhibition halls and museums, light dry industrial use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking
Inherent Risk Class 5(limited sub-areas of 6)//1	All types of recreational uses, places of instruction and worship, light commercial use, exhibition halls and museums, light dry industrial use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking
Inherent Risk Class 6//1	Where proven Inherent Risk Class 5: All types of recreational uses, places of instruction and worship, light commercial use, exhibition halls and museums, light dry industrial use, shops, offices, hotels, dormitories, dwelling houses and units, storage and parking Where proven Inherent Risk Class 6: Out door sport, light commercial use, light dry industrial use, offices with appropriate remedial measures and 1 person per 15m², storage and parking
Inherent Risk Class 6/7//1 area	Where proven Inherent Risk Class 6: Out door sport, light commercial use, light dry industrial use, offices with appropriate remedial measures and 1 person per 15m², storage and parking Where proven Inherent Risk Class 7: Storage, parking park land and Public and Private Open Space
Inherent Risk Class 7/8//1/4/8	Where proven Inherent Risk Class 7: : Storage, parking park land and Public and Private Open Space Where proven Inherent Risk Class 8: No development, park land and Public and Private Open Space
Inherent Risk Class 8//1/4/8 area	No development, park land and Public and Private Open Space

The Dolomite Area Designations for the dolomite stability zones identified on the site is as follows:

Table 7: D Designations

Inherent Risk Class Area	D Designation
Inherent Risk Class 1//1/4/8	D3 for commercial and residential
Inherent Risk Class 4(1)//1/4/8	D3 for commercial and residential

Inherent Risk Class Area	D Designation
Inherent Risk Class 4//1/4/8	D3 for commercial and residential
Inherent Risk Class 4(8)//1/4/8	In IRC 4 areas: D3 for commercial In IRC 8 areas: D4
Inherent Risk Class 3-6//1/4/8	D3 for commercial and D3 for residential (IRC 3-5), D4 for residential (IRC 6)
Inherent Risk Class 5(3)//1	D3 for commercial and residential
Inherent Risk Class 5(limited sub-areas of 6)//1	D3 for commercial and residential , D4 for residential (IRC 6)
Inherent Risk Class 6//1	D3 for commercial D4 for residential
Inherent Risk Class 6/7//1	D4 for residential, D3 for commercial (IRC 6)
Inherent Risk Class 7/8//1/4/8	D4
Inherent Risk Class 8//1/4/8	D4

Based on the stability zonation of the site, alternative land uses may typically be considered provided that appropriate remedial and stringent water precautionary measures, as outlined in this report are applied.

Implications for Development

- A stormwater management plan should be implemented according to the recommendations provided by the NHBRC.
- A Dolomite Risk Specialist should actively assist in the process of developing an appropriate master plan for the site.
- In addition, the Specialist is required to sign confirming that final layouts for the various townships established on the site conform to the stability zonation.
- All service trenches in the development must be inspected during construction to permit further detailed verification of soil and stability conditions e.g. attention must

be paid to the presence of potential paleosinkhole conditions in the trenches and open works.

- All properties should be sold with an "escape clause".
- The foundation recommendations and water precautionary measures provided by the NHBRC must be adhered to.
- A Dolomite Risk Management Plan must be established and adhered to at all times.
- A Dolomite Risk Management system must be set in place for this development and managed by the Home Owner's Association on behalf of the local authority.

6.1.2 Hydrology

6.1.2.1 Surface Water

Neither 1:100 nor 1:50 year flood lines influence the property and no storm water drainage channels or detention/ retention ponds are developed on site.

The proposed township has five main catchment areas draining in various directions. The stormwater run-off management from these catchments is discussed in detail in the Service Scheme Report: Roads and Stormwater attached as ***Annexure Q of the DFA Application.***

Implications for the development

The current surface water flow pattern poses no restrictions for the development. However, if any disturbance on the especially the ridge area takes place erosion problems are likely to occur due to the slope. It is very important to rehabilitate any disturbance to the natural slope or vegetation growth immediately after works in that area has been completed.

- The storm water design for the proposed development must be designed to:

- Reduce and/ or prevent siltation, erosion and water pollution. If erosion, siltation and water pollution is not addressed, the sustainability of the drainage and the open space systems lower down in the catchment area can be negatively impacted by the development.
- Storm water runoff should not be concentrated as far as possible and sheet flow should be implemented.
- The vegetation must be retained as far as possible, and rehabilitated if disturbed by construction activities to ensure that erosion and siltation do not take place.
- No trees should be planted within five meters of the line of the water bearing services.

6.1.2.2 Ground water

The results of the geotechnical survey indicated the groundwater level to be located at great depth and within dolomite rock.

Implications for development

- It is essential that groundwater management should form an integral part of the Dolomite Risk Management Strategy. Any local or artificial lowering of the groundwater level may impact negatively on the stability of portions of the site and the surrounding densely developed centurion area.
- The foundation recommendations and water precautionary measures provided in the Geotechnical Reports must be adhered to.

6.1.3 Topography

The topography of the property is structures by a rocky outcrop running north-south through the centre of the site, with slopes of varying degrees leading away from the outcrop, and with more gentle slopes towards the edges of the site.

The slope from the crest towards the west is approximately 13% before the ground levels off at a more gradual slope of approximately 6%. For the purpose of this application the topography of the site of application was surveyed by NJ Leonard Surveys and the contours are subsequently indicated on the Layout Plan ***(Annexure I of the DFA Application).***

The topography is a very important form-giving element on site and has the ridge that strongly contributes to the character of the site but also of the area. The site and the ridge are highly visible from the N1 Freeway and the Irene area. This element will form an important consideration in the visual impact analyses (section 8.3.4).

Refer to ***Figure 14*** for the three-dimensional illustration of the site that clearly marks the ridge as a visual landmark. The area below the ridge towards Irene main road has a very gentle to flat slope. The ridge has a slope of 5-8% and steeper, which makes the GDARD and Tshwane Ridges Policies applicable to the application (refer to section 8.3.3).

Implications for the development

- According to the ridges policy development is not allowed on ridges in the Tshwane area, defined as areas with slopes of 5% and higher.
- A buffer zone of two hundred meters is also applicable around ridges.
- The visual character of the ridge should be conserved, as due to the location of this ridge the visibility is very high.
- The higher lying section of the study area is very visible (not only from surrounding properties, but also from a major road the N1, and therefore the architecture and the colours, finishes and placements of the permanent structures should be done

with great sympathy towards the receiving environment (this aspect will be addressed under section 7.3.1).

- According to the engineering report the topography will not hamper the installation of cost effective services.

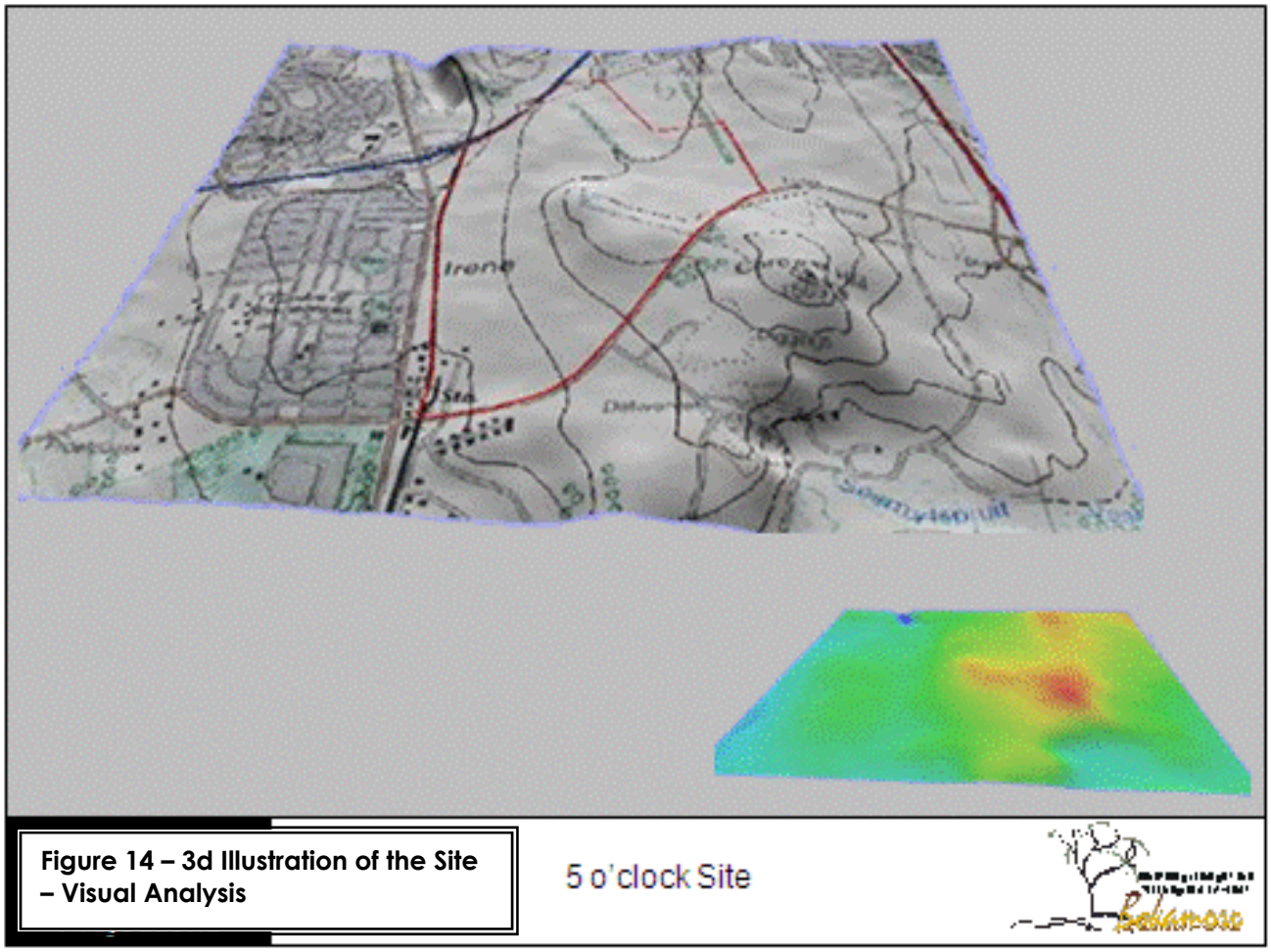


Figure 14 – 3d Illustration of the Site – Visual Analysis

6.1.4 Climate

The climate is typical of the Transvaal Highveld with mild to hot summers and mild winters. It is a summer rainfall region with a mean annual precipitation of approximately 700mm. The moisture index is between 0 – 20, indicating a sub-humid area. The Weinert N value is approximately 2,4, which indicates that chemical decomposition is the predominant form of weathering of rock.

The climatological data for the site was obtained from the Irene weather station:

- **Wind:** During summer months the prevailing wind is northwestern and during winter months southeastern winds.
- **Temperatures:** The average maximum temperature is 26,7 °C with the average minimum of 14,4 °C in summer. Winter average temperatures are: maximum 18,2°C and minimum 2,7°C.
- **Rain:** Maximum annual rainfall is 960mm with a minimum of 559mm and an average of 717mm per year.
- **Mist**: 10 Days per annum
- **Lighting:** 87 Days of the year
- **Hail:** 4 Days per year

Implications for development

The climatic character of the region should have no significant impact on the development.

Should the construction phase be scheduled for the summer months, frequent rain could cause very wet conditions, which makes it extremely difficult to build in and to do rehabilitation works of the disturbed areas. These wet conditions often cause delays to building projects and cause erosion, sedimentation and pollution of the drainage system of the catchment.

If dry and windy conditions occur during the construction phase, dust pollution could become a problem. During the dry winter months, the southeastern wind will most probably carry some dust over Irene, the N1 and Botha Avenue and during the summer months the north-western winds will most probably carry some dust over Nellmaphius Drive and the Cornwall Hill Residential Development.

The prevention of dust pollution should be a very important goal during the construction phase as it could be unpleasant to the surrounding residents (the site is surrounded with residential suburbs) and can further cause dangerous driving conditions on the N1 and roads in the area like Nellmapius Drive. Although this impact will only be a short term impact, mitigation will be necessary during the construction phase.

6.2 The Biological Environment

Refer to ***Annexure Q* for the *Habitat survey*** that was conducted in December 2004 by the Galago Ventures specialist team: Ms. Vanessa Marais, Dr. I.L. Rautenbach, Mr. W.D. Haacke, Mr. R.F. Geyser and Mrs. P. Lemmer.

The study included a mammal, bird, reptile, amphibian and plant survey with the objective to determine which species 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 and focuses on the current status of threatened vertebrate and plant species occurring, or which are likely to occur on the site.

The study area and the region

The proposed site lies in the quarter degree grid square 2528CD (Rietvleidam) and covers about 262 ha. The area is classified as moist, cool Highveld grassland, of which 72% is transformed and 0,29% conserved. Its conservation status is very poor and activities like crop cultivation and grazing have led to degradation of most of this type of grassland.

A narrow but straight vein of quartz and chert extends across the site from the direction of Cornwall Hill to the Northwest. A chert ridge runs for about 200 m from South to North through the middle of the southern half of the site while several smaller rocky outcrops appear on the western slope where sand and rock has been excavated in the past. The soil consists of clayey erosion products of the existing rock formations.

Two disturbing issues were evident during our visit: The site is currently used for the dumping building and household rubble, especially from the new construction activities in Irene X 8 along the eastern boundary. The second issue is the large number of vagrants camping unhindered amongst the trees and shrubs all over the site. From an aesthetic, safety and conservation point of view, these illegal activities are totally unacceptable since it will in no time degrade the site into a biological wasteland. The area below the western slope towards the railway line appears to have been used for sand and stone excavations.

Apart from the illegal activities that were identified in December 2004, some additional (apparently legal) excavation activities commenced on the sensitive areas of the site during 2005, without any construction fence or EMP to protect the sensitive site. The activities were reported to GDARD, but according to GDARD exemption was granted for the installation of a Rand Water Pipeline and therefore the activities were perfectly legal and out of their hands. Unfortunately, the uncontrolled construction activities caused an enormous amount of damage to the sensitive lower lying areas as well as a section of the ridge (the western slope).

6.2.1 Vegetation survey

A list of the Red Data species that occur in the area was obtained and the occurrence of these species verified by e-mail from GDARD with guidelines to ascertain the habitat of the Red Data species concerned. The site was visited on 26 November, as well as on 8, 9 & 13 December 2004.

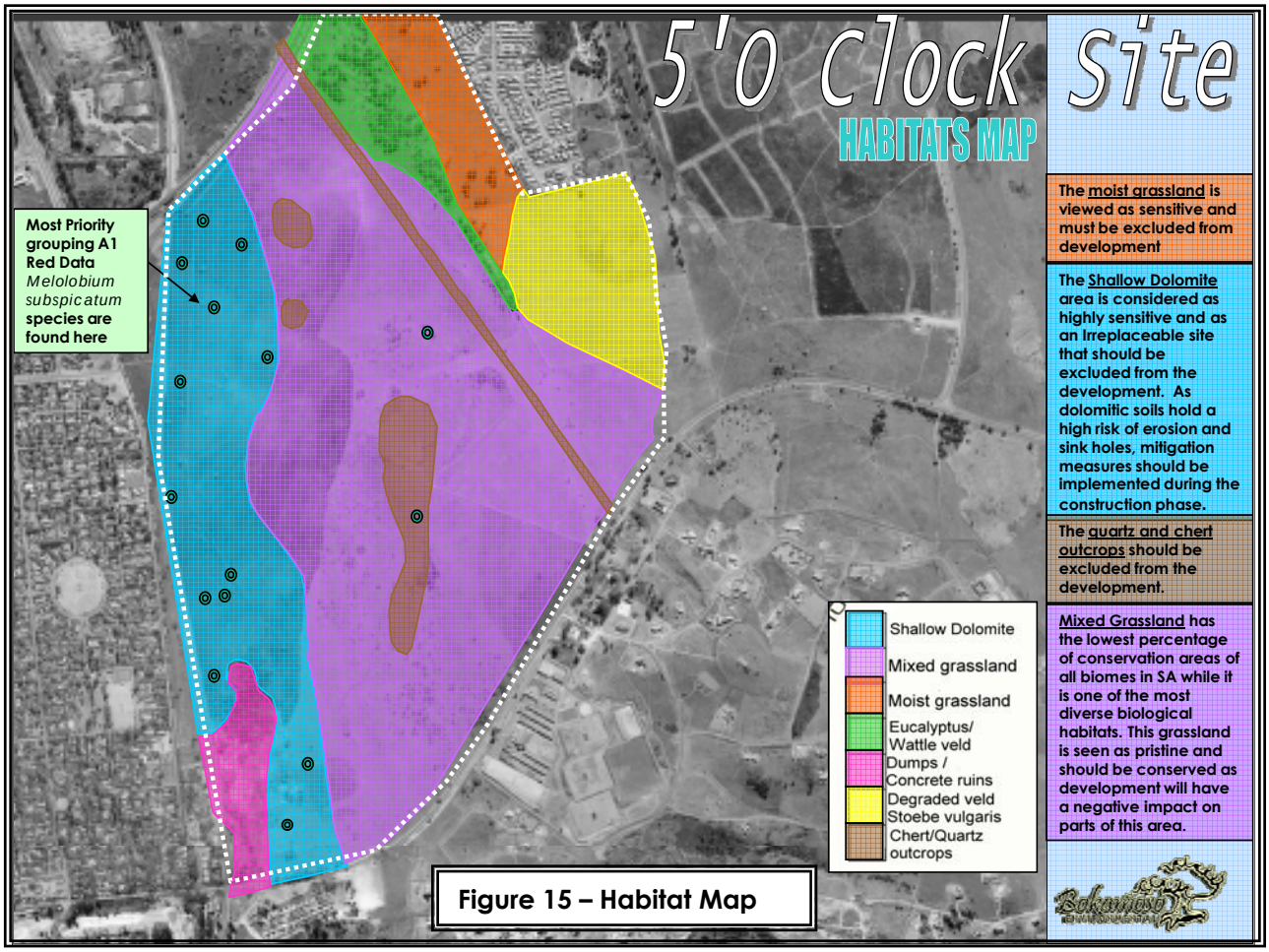


Figure 15 – Habitat Map

All surveyed sections were meticulously searched for the presence of *Melolobium subspicatum*, the Priority grouping A1 Red Data plant species known to flower during the time of the survey and for seed capsules of *Holothrix randii*, the Priority grouping B Red Data species that had already flowered. If a Red data species was found, a waypoint was taken and the number of Red Data plants in the vicinity of the waypoint counted. Refer to ***Figure 15*** for the ***Habitat Map*** where red Data species are plotted according to the GPS Coordinates provided by Galago Ventures. All the waypoints of red data species that were found were supplied to GDARD for record purposes.

- Area with shallow dolomite

This area of the site consisted of shallow, subsurface dolomite with a dark, slightly sandy soil. This part of the site was burned during the winter and herbs, geophytes, and suffrutices could easily be seen. Most of the grasses have sprouted, but have not yet formed inflorescences, thus making identification of grasses difficult.

A total of 24 plants of *Melolobium subspicatum* were recorded in this section of the site. More than 65 specimens of this plant were found on site. The Priority grouping A1 Red Data species *Habenaria mossii* shares the habitat of *Melolobium subspicatum*, but is inconspicuous when not in flower. Further surveys should be conducted later in the season to search for this species. This area of the site should be regarded as irreplaceable due to the combination of valuable elements:

- occurrence of Red Data species
- historical elements and graves
- the great biodiversity of this part of the site.

It is however ironic, because the geotechnical investigation earmarks the shallow dolomitic areas as the most suitable for development.

- Mixed grassland

Most of this area has red, stony soil with pristine mixed grassland, with small copses of trees and shrubs scattered throughout. Trees to the west of the koppie are mostly *Acacia caffra* and that east of the koppie a mixture of *A. caffra* and *Acacia karroo.* The dominant grass species were the climax grasses *Themeda triandra*, *Hyparrhenia hirta* and *Eragrostis chloromelas.*

A few alien plants occur mostly in and along a semicircular scour that ran from the overflow valve of the reservoir to two rubble-filled sinkholes north of the reservoir. The veldt in this area is very degraded with a great number of weeds. Just north of the scour outlet a single specimen of *Melolobium subspicatum* was found.

Small ridges of chert and quartzite ran more or less from south to North in various parts of this area. The habitat of these outcrops is suitable for the terrestrial orchid, *Holothrix randii*, and they were searched for the presence of these plants, but none were found as they had already flowered. No other Red Data species can be expected to occur on this part of the site.

As most of this mixed grassland is considered pristine, development of this area should be approached with great care since any construction activities will have a negative impact on this part of the site.
Mention must be made of the dozens of homeless persons that use the clusters of trees and even the tall grass as overnight shelter. Their rubbish, litter and sanitary waste were spread over large parts of this otherwise pristine grassland. Their impact will definitely be negative even in the short term[4].

- Moist grassland

This part of the site don't have a great diversity of plant species and the plants that occur include *Selagi densiflora*, *Chascanum hederaceum* var *hederaceum*, *Hypoxis argentea* var *argentea*, *Nidorella anomala* and *Kyllinga erecta* var *erecta* were that are all typical of moist grassland habitats.

The habitat seemed suitable for the Red Data grass species *Agrostis eriantha* var. *planifolia*, which may due to late rains flower later in the season.

- Wattle and Eucalyptus grove

This area of the site lay between the areas of moist grassland and the quartz and chert ridge and is this cluster of trees seems to have spread from a line of trees originally planted along a fence line.

[4] One Saturday morning during a site visit, some homeless women were preparing food in the shallow dolomitic area where the red data plant species were found. Blankets and flattened cardboard boxes were used to cover the veldgrass and many homeless people gathered on the blankets and flattened cardboard boxes to eat and rest. Small fires for cooking were scattered all over. If the "No-Go" option is followed, this problem will most probably increase and it will most definitely have a significant detrimental impact on the bio-diversity of the site and the existing red data species on the site. The homeless people could also cause some damage to the valuable cultural and historical assets of the site.

Just north of these trees in a large hollow, there is a proliferation of plastic shelters and rubbish of yet another community of informal settlers. The dominant plants are wattle and eucalyptus trees.

- Plants recorded behind Irene station

Vegetation in the area behind the Irene railway station is very degraded with broken down concrete structures, stone walls, excavations and ruins of buildings as clearly indicated on the photograph.

This area of the site consisted mostly of alien plants, many of which are listed as Category 1, 2 and 3 alien invaders in accordance with the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended. These plants and other plant species should be removed as part of this project.

- Degraded veld in the north-east of the site

The northeast of the site that borders Pierre van Ryneveldt has severely degraded vegetation. The dominant plant species in this section are *Stoebe vulgaris* with the Category 1 declared weed *Campuloclinium macrocephalum*. A large area that seemed to have been a dumping site for builders' rubble from the adjacent development was scraped clear of vegetation and leveled.

- Rocky outcrop around reservoir

A ridge of quartz and chert is situated in the centre of the site with a fenced off water reservoir built on top, in the centre of the ridge. The plant species diversity on the slopes of the ridge is very high, with few alien species.

An exceptional cluster of trees and understudy shrubs occur on the slope west of the reservoir, consisting mostly of *Acacia robusta*, Scolopia *zeyheri*, *Ehretia rigida*, *Canthium*

spp., *Pavetta gardeniifolia* and *Euclea crispa.* Geophytes such as *Freesia grandiflora* and four different species of terrestrial orchids were also found in this area.

On the slope to the south of the reservoir between rocks and scattered *Acacia caffra* trees a number of the terrestrial orchid *Eulophia leontoglossa*, together with *Protea welwitschii* occur. The Red Data species *Holothrix randii* was reported to occur on this slope, but none were found probably because the flowering time has already passed making it difficult to spot these plants.

A group of eucalyptus trees grow further south on the slope. The entire koppie (with the exception of the eucalyptus cluster, which should be eradicated) is considered sensitive and should be excluded from development.

- Quartz and Chert vein and various rocky outcrops

The quartz and chert vein runs from southeast to north-west and contains only a few trees in its northern half but further southwest some trees and shrubs grow on and near the vein. Many *Protea welwitschii* plants occurred in its vicinity along the entire length of the vein. At about the centre, and just northeast of the vein, four specimens of *Burkea africana* occur, which can be considered unusual for this area. On the other side of the vein a great diversity of plant species are present.

The entire length of the vein was considered very sensitive and was recommended to be excluded from development.

Please note that after the submission of the Scoping Report to GDARD Galago Environmental observed a specimen of a small form of the specie *Cheilanthes deltoida* adjacent to the study area. Further on-site investigations by the Nature Conservation Directorate of GDARD however confirmed that the specimen was in fact located on the

study area and a survey for this species as well as the confirmation of the confirmation of the Red List classification by SANBI was requested by GDARD ***(refer to Annexure R for correspondence from GDARD).***

The presence of a few *Cheilanthes deltoida* species located in the chert outcrop was confirmed by Ms. Petro Lemmer from Galago Environmental ***(refer to Figure 16).*** Ms. Lemmer is of the opinion that the most damaging edge effects associated with this fern specie are changes in micro climate and the pollutants from vehicles and humans. A buffer zone of **40m** was regarded as adequate to protect the fern specie from these edge effects. ***(Refer to Annexure S for correspondence from Ms. Lemmer).***

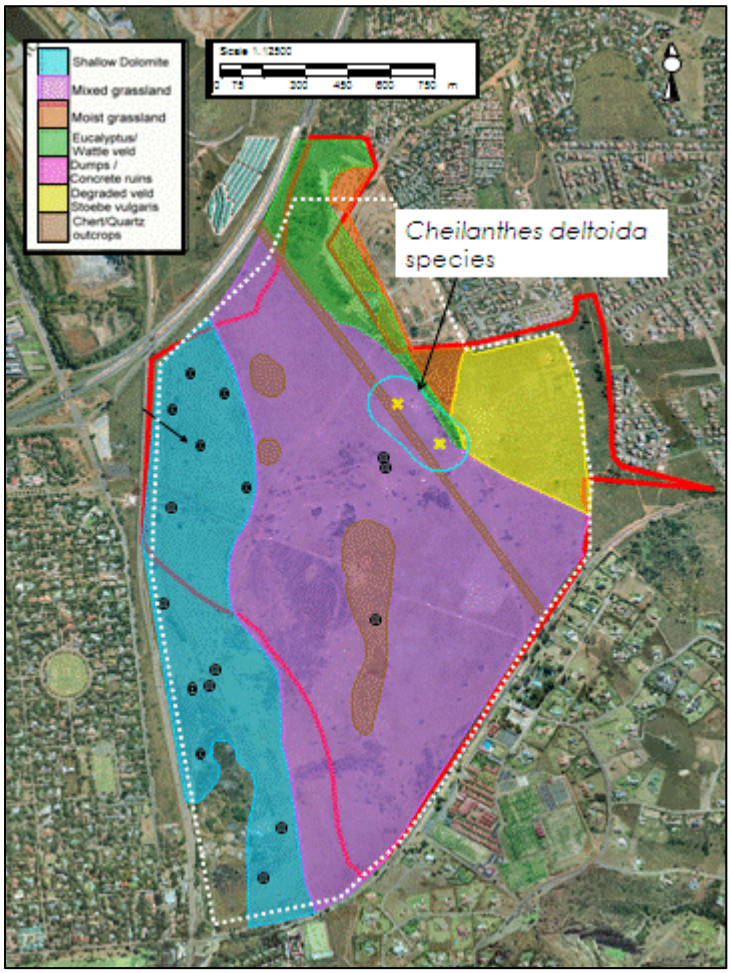


Figure 16 – Position of *Cheilanthes deltoida* species

6.2.2 Fauna survey

Members of the Galago Ventures fauna team visited the 5 'O Clock site on 4 December 2004. No trapping or mist netting was conducted since the terms of reference did not require such intensive work. The area was walked and in the process, signs (tracks, runways, burrows, nests and scats) of animal occurrences were recorded. Potential occurrences of mammals were furthermore evaluated in terms of specific habitat availability.

- Mammals

Large mammals have not been present in this area for some time. Some medium-sized mammals with retiring habits have been reported to survive to this day, notably mountain reedbuck. Even the cunning brown hyena is more than likely to still wander on this site and adjoining open areas.

There are no permanent water features on the site, which means that semi-aquatic species are very unlikely to occur on the study area. The tree canopy is also too underdeveloped for arboreal mammals, none of which are thus recognized as inhabitants.

The soil is too compacted to allow for the occurrence of Juliana's golden mole. There is evidence of the occurrence of other burrowing mammals such as aardvark and springhare. The aardvark burrows provide sanctuary for a number of other species, notably aardwolf.

The rocky outcrops and ridges are rather well developed, and a number of rock-dwelling small mammals are considered to be present on site (rock elephant shrew, rock dormouse and Namaqua rock mouse). No signs of rock hyraxes or red rock rabbits were encountered, probably due to the isolated nature of the rock formations on the study area.

The grassland on the undulating plain is in a healthy state of ecological repair, hence those small terrestrial mammals adapted to highveld grasslands, are all considered to be

present, including hedgehog and even possibly the white-tailed rat. The disused termitaria in the grasslands would provide shelter to dwarf shrews and pygmy mice.

The many nooks and crannies amongst the rock outcrops would provide daytime sanctuary for a number of bat species known to occur on the highveld grassland. There is a shallow bat cave near the southern border and some of the abandoned mining activities towards the southeast could also provide daytime roosts for a number of bat species.

Insectivorous bats can be expected to over fly the site while hawking for insect prey during night. Fruit bats are not considered present but given fruit-bearing trees in future gardens, epauletted fruit bats may eventually migrate into this area during summer.

Considering the relative pristine state of the study area, house mice and house rats cannot be expected. However, several feral dogs were observed during our visit, and it is therefore reasonable to also expect feral house cats.

The small predators typical of the highveld plains are all assumed to still be present on site.

- Birds

The entire site was walked to cover and identify all possible bird habitats within the area and to identify all bird species within these habitats. Birds were identified visually using a 10X30 binocular and a 20X-40X spotting scope and by call and verified from Sasol Birds of Southern Africa (Sinclair et. al., 2002) and Southern African Bird Sounds (Gibbon, 1991). The possible occurrence of bird species were selected according to habitat and food availability and known distribution range.

Four of the Red Data bird species listed in the Eskom Red Data Book of Birds of Southern Africa, Lesotho and Swaziland (Barnes, 2000) are likely to occur on or make use of the site for foraging purposes.

None of these red data species was observed on site although the habitat on site is ideal for these species. Development of the site will reduce the habitat available for these birds, forcing them to move onto other areas that will cause further fragmentation of the habitat. They might also be forced to move into conservation areas such as Rietvlei Nature Reserve where there are already current populations of these species and as a result will be forced to move further out of their range to sub optimal habitat conditions. This will result in the decline of their populations.

1. Secretarybird *Sagittarius serpentarius*

The Secretarybird is classified as Near Threatened according to Barnes (2000) and according to Harrison *et al.* (1997) there are no reports of this species for the 2528CC quarter degree grid cell. This species was however recorded as a breeding record for the same cell according to Tarboton (1987). This clearly shows that Secretarybirds used to occur in the area in the past but due the fragmentation of their habitat was forced to move out, and were not recorded during the Bird Atlas period.

Secretarybirds do occur and breed at Rietvlei Nature reserve (2528CD) to the east and disbursed fledglings may use the area for foraging purposes. Secretarybird pairs occupy large areas (100 – 230 square kilometers). They are sensitive to habitat degradation from overgrazing, bush encroachment, crop cultivation (Barnes 2000) and changes through development, which results in fragmentation of their habitat.

Their habitat requirements are for open country, mainly savannah, open woodland, grassland and dwarf shrubland (Harrison *et al.* 1997). The habitat on site is favourable for this species and if managed correctly, they might also breed on site.

2. Lesser Kestrel *Falco naumanni*

The Lesser Kestrel is classified as Vulnerable according to Barnes (2000) and according to Harrison *et al.* (1997) the reporting rates is very low (> 2.0 %) for the 2528CC quarter degree grid cell and records also exist for the same cell according to Tarboton (1987).

The Lesser Kestrel does not breed in southern Africa as they prefer Palearctic breeding grounds. This specie favors semi arid grasslands, sweet and mixed grasslands and avoids wooded areas but forages in agricultural lands (Barnes 2000). The habitats found on site would favour this species for foraging purposes and they may on occasions hunt over the area.

3. Barrow's Korhaan *Eupodotis barrowii*

The Barrow's (White-bellied) Korhaan is classified as Vulnerable according to Barnes (2000). According to Harrison *et al.* (1997) the reporting rates is very low (> 2.0 %) for the 2528CC quarter degree grid cell. Breeding records exist for the same cell according to Tarboton (1987).

Their habitat requirements are tall, fairly dense grassland in open or lightly wooded regions (Harrison *et al.*1997), which means that the habitat on site is ideal. The Barrow's Korhaan has suffered population decline and local extinction throughout its distribution range as a result of habitat loss through crop farming, overgrazing, burning, and high human densities (Barnes 2000). Even where suitable habitat exits, the habitat conditions are often modified by inappropriate burning and grazing practices.

If the site is managed correctly, it has potential of accommodating Barrow's Korhaan populations. Development will result in further fragmentation of this species preferred habitat.

4. **Melodious Lark *Mirafra cheniana***

The Melodious Lark is classified as Near Threatened according to Barnes (2000) and has a very low reporting rate (<2.0%) for the 2528CC quarter degree square grid cell as well as most of the central Gauteng area according to Harrison *et al.* (1997). According to Tarboton *et al* (1987) this specie has also been recorded for the same cell probably during which period this species was more common prior to 1987. The population decline is clear from records according to Tarboton *et al* (1987) during which period this species was recorded breeding in the quarter degree grid cell directly north (2528CA) and east (2528CD) but not a single sighting of the species was made during the Southern African Bird Atlas period from 1987 to 1992 (Harrison *et al.*, 1997) for the same grid cells.

Their habitat requirements in general are dry open climax grassland dominated by *Themeda triandra* grass. Melodious Larks were however observed displaying and possibly breeding in the same quarter degree grid cell in an area west of this proposed development site in undisturbed climax grassland dominated by *Hyparrhenia hirta.*

This species is localized in suitable habitat, where it may be common (Tarboton 1987) and for this reason it is important to preserve the habitat on site as suitable habitat exists on site and in order to ensure it future survival of this species in the central Gauteng area.

The specialist recommended that as this species may occur on other properties with suitable habitat surrounding the site, the entire area especially the grassland should be left undeveloped to prevent any further fragmentation of its natural habitat. It is however true that the other properties could also be under development in the near future.

- **Reptiles and Amphibians**

This site is a large undeveloped area of which most of the southern part seems to be in a pristine condition. The fact that the substrate is fairly stony to rocky probably contributed to unsuitability for agricultural utilization.

Apart from chameleons and dwarf geckos, no specialized arboreal reptiles are expected. Chert and dolomite boulders and outcrops do not develop cracks, which are suitable as retreats and therefore attractive to reptiles or amphibians. Some skinks, however, will utilize these formations occasionally.

The thickets of exotic gum trees and Black Wattle are also not of interest to arboreal species, but some terrestrial species will utilize accumulated leaf litter and fallen logs as shelter and retreats.

The fauna, which would use these open areas, are fast-moving, diurnal snakes and lizards, which require retreats, such as burrows, holes or cavities in the ground, amongst grass or under stones or rocks. Grass fires are a serious hazard in these open homogeneous areas. Slower moving nocturnal species are naturally also dependent on suitable shelter and dead termitaria are of great significance for these species.

This site does not appear to have suitable habitat for amphibians.

Implications for the development

- Road construction must be planned to ensure that as little as possible of the natural vegetation is damaged.
- Only plants endemic to the area should be introduced as future garden plants or in the landscaping of the proposed estate. No exotic plant species, especially lawn grasses and other ground-covering plants should be used.
- The integrity of the remaining wildlife should be upheld, and no trapping or hunting by construction personnel should be allowed. Caught animals should be relocated to the conservation areas in the vicinity (with the assistance of the conservation division of Tshwane or GDARD/ a suitably qualified fauna specialist).
- Medium to large indigenous trees should ideally be left as part of the eventual landscaping. The cultivation of more endemic trees and shrubs in gardens should be encouraged. With proper cultivation of specific indigenous plant species

natural to the area, bird numbers and species in the area would increase. A list of plant species, which attract birds to gardens, is available. The site has good potential to attract bird life if managed and planned correctly.

- During the construction phase, noise should be kept to a minimum to reduce the impact of the development on the fauna and the development should be done in phases to allow faunal species to temporarily migrate into the conservation areas in the vicinity.
- It is also important to maintain clumps of thick bush and tall grass areas under selected trees for the smaller animals to hide in.
- In order to ensure the future survival of the red data bird species that may use the study area, and to prevent further habitat degradation through development and fragmentation of their preferred grassland habitat, the appropriate areas should be left undeveloped and managed as a natural green area.
- The southern half of this site appears pristine and it is assumed that faunal components would still be intact. This area is thus suitable for conservation purposes and might be considered a 'Green Lung' for the area, which will also be subjected to high-density occupation. It must also be stated that the proposed road alignments (Olievenhoutbosch road, PWV6 and the K109) roads through this area would only fragment it and lower the conservation potential of the entire area.
- It is recommended that the following areas be excluded from development and be fenced off during the construction phase and that dumping of rubble and other waste on this area be prohibited:
    1. The shallow dolomite area east of the railway line,
    2. The moist grassland in the far north-east of the site,
    3. The quartz and chert outcrops of the vein,
    4. The ridge and
    5. Section Q and U (shown in brown in Figure 7)

The Galago Ventures Team included the following remark in their conclusion:

"It should be noted that Highveld Grassland has the lowest percentage of conservation areas of all the biomes in South Africa, in spite of the fact that it is next to the Cape Macchia, biologically the most diverse. This is directly correlated with the highest economic activity in the country and concomitant pressure for more accommodation. As a unit, the 5 'O Clock property is at present a viable conservation unit and is a textbook case illustrating the conflict between human requirements and conservation priorities. However, this status quo is seriously threatened by dozens of homeless people camping and living on site. The number of dogs observed during our visit, suggests some hunting activity, and snaring is assumed to further erode the status of wildlife. This habitation by homeless people, hunting and gathering of wood/bark for fire or medicinal purposes, is severely impacting on the fauna and flora of the site. Should these practices continue, then the integrity of the site will degrade over time until the sensitive habitat is of no value for future generations. Unless this phenomenon is speedily curbed, there is no further sense in considering any conservation measures deemed necessary for the site and the proposed development may as well proceed."

7 DESCRIPTION OF EXISTING SOCIAL ENVIRONMENT

7.1 Archaeology/Cultural History

The aim of the survey was to locate, identify, evaluate, and document sites, objects, and structures of cultural historical or archaeological importance found on the study area.

An extensive Cultural Historical Survey has already been done, that included the study area, by Jean Beater (Heritage Consultant). A copy of this report can be obtained from Mr. Henry van der Bijl from the Irene Dairy Farm. The findings of this report by Jean Beater was used in this study and included in the report.

History of the Site

It should be noted that the study area falls within an area of historical significance.

The study area is located adjacent Cornwall Hill, which During the second Anglo-Boer war was used by the Duke of Cornwall's light infantry regiment to built a fort to guard the railway line across the Hennops River. It was recorded that a British regiment ran into strong opposition from the Boer forces at the Irene Station during the occupation of Pretoria.

Portions 198 and 335 lie in the direct proximity of both Cornwall Hill and the Irene Railway Station, therefore it is highly probably that the study area has seen some activity during the War.

Important existing buildings, structures and other finds:

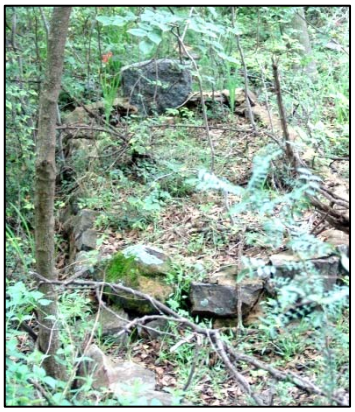
(Please note that the following information was obtained from the Heritage Resources Assessment done by Jean Beater for Mills&Otten. Mia Marais (cultural and historical specialist) added some additional information).

(Refer to Figure 17)

1. Four sites with old water troughs or feeding containers/bins for cattle and two old fence poles or standards were situated at one end of the structure.
   Significance: The structure does not seem to have any cultural historical / archaeological significance. However, the structure seems to be older than 60 years and is therefore protected in terms of section 34(1) of the National Heritage Resources Act (NHRA).

2. Eight mounds of soil were found at this site. It is unclear whether these indicate very old graves or if the mounds are indications of disturbances made to the area during the maintenance works of Nellmapius Road.
   Significance: Uncertain, it is recommended that an Archaeologist investigate the mounds to establish whether is has any significance or not.

3. A group of flattened, weathered mounds of rock that runs along an old fence. A similar set of weathered mounds of rock occur at 25°51'685"S; 28°14'071"E. Their origin is uncertain. They could be graves or only heaps of stones that were created by the clearing of the area for agricultural fields.
   Significance: Dependent on archaeologist's findings: if they are graves, they will be of historical, religious, and social significance and depending on their age will probably be protected by the NHRA. The site requires further investigation by an archaeologist.



4. A cemetery of at least 100 graves under cluster of trees with at least 15 graves marked by inscribed headstones. Some of the headstones are made from granite or marble and have been manufactures professionally. The others are made from slate on which details have been hand carved.

   Three of the graves have recently been tended to which indicates that the site is visited on a regular basis. The youngest grave dates to 1973 that also shows that the graveyard is still in use or was used until recently. The oldest marked grave (that of J. Nkuna) dates back to 1922 and many of the unmarked graves are probably older still since the mounds of stone have weathered over the years and trees and shrubs are growing on some of the graves.
   Significance: The cemetery is of high historical, religious and social significance. Many of the graves are older than 60 years and are therefore protected in terms of section 36(3)(b) of the NHRA.

5. A quarry or crusher area as there are evidence of gravel and lime (cement) lying around the site.
   Significance: The site could have a historical connection to or be the site of the Irene Lime Works and would therefore have historical significance. Alois Hugo Nellmapius, who bought two thirds of the Farm Doornkloof in the late 1880's, established the lime works.

6. Old stone building, a section of which is partially demolished and is presently inhabited.
   Significance: The structure is deemed to be older than 60 years and is thus protected in terms of section 34(1) of the NHRA.

7. Structure built with unfired bricks, partially demolished. It could have been used as a pit latrine for labourers but no evidence could be found to support this assumption.

Significance: The structure is probably older than 60 years and is therefore protected in terms of section 34(1) of the NHRA. It does however not appear to have any cultural historical / archaeological significance.

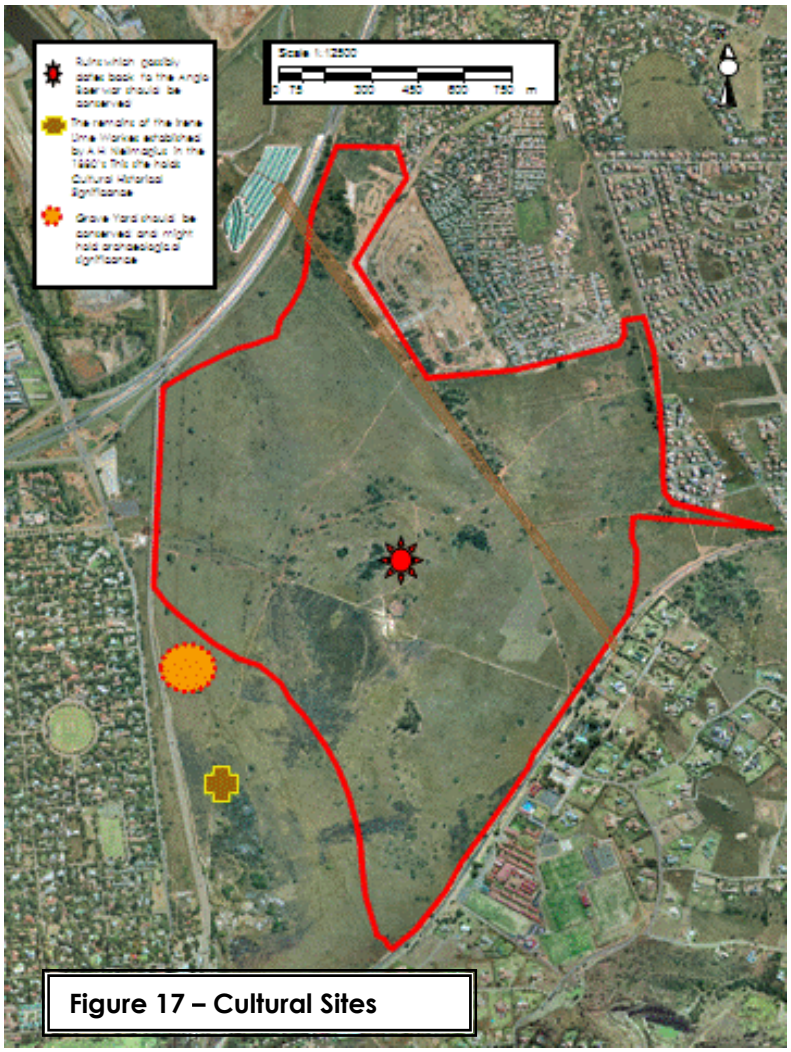


Figure 17 – Cultural Sites

Implications for the Development

The site was visited on 29 November 2004, 2 December 2004 and 19 January 2005.

Both Beater and Mia Marais felt that the cemetery is of cultural historical / archaeological significance (it has religious, ethnographic and cultural significance) and has conservational value. Many of the graves are still in good condition and the cemetery serves as a good example of a black cemetery established in the early 1900's or even earlier. It is clear that the graveyard is still visited regularly and It should also be noted that it is said that the graveyard for black people that died in the Irene Concentration Camp during the Anglo-Boer War is in this area and may well be on the study area.

Beater recommended that an archaeologist to determine whether the stone mounds are graves or merely stones piled from farming activity investigate the stone mounds further.

The old lime works also has cultural historical / archaeological significance even though little evidence of the remains of the works could be found. The site has great historical significance.

All sites older than 60 years are to be protected in terms of the NHRA. This means that application will have to be made to the South African Heritage Resources Agency (SAHRA) for permission to demolish or alter any such structure.

The developer should keep in mind that the area has a rich an interesting history and that there is a strong possibility that valuable cultural historical / archaeological resources will be uncovered during construction. If anything of significance is found during excavations and construction, an archaeologist and/or the South African Heritage Resource Agency (SAHRA) and/or a museum has to be informed or contacted immediately so that an investigation and evaluation of the finds can be made.

Even though no sites directly relating to the war were found during the general survey, the study area can be described as a Cultural Landscape, and therefore has cultural historical significance. It is also rumoured that the grave yard for black people that died in the Irene Concentration camp is in the vicinity of the site and may even be situated somewhere on the site! It is preferable that the site remains undeveloped but be conserved as a valuable cultural historical terrain. However, should development proceed, the developer must keep these facts in mind during the construction phases and should treat the study area as a sensitive cultural historical terrain.

7.2 Social aspects of the proposed development

7.2.1 Existing Land Use

The study area is currently vacant except for some illegal squatters. Previously the site was used for cattle farming, but as it is no longer a feasible business on the study area the farmer sold the land to M&T Development for development purposes.

7.2.2 Proposed Land Use

Note - Important: *As already mentioned in this document, the environmental sensitivity maps were used as form giving elements for the proposed layout. Apart from one red data species buffer just below the north-eastern section of the ridge that was relaxed to allow for development, the other red data species buffers were applied and the areas within the buffer zones, were incorporated as part of the open space system of the study area.*

The red data buffers exclude the grey areas in area A on the diagram below, and the developer is therefore planning future developments in this area. Ms. Madeleine Oosthuizen of the Land and Environmental Planning Division of the Tshwane Metropolitan Municipality did however indicate (during a site visit) that they do not support the proposed layout for Area A. They want a wider open space link in area A to prevent edge effects and to preserve the bio-diversity in the area.

According to Tshwane they would only consider it to compromise the south-eastern section of the ridge, sections of the proposed 200m buffer around the ridge and the north-eastern section of the study area for development, if the remaining open spaces are large enough to allow for free species movement, the protection of the bio-diversity, the red data species and the cultural and historical assets of the study area.

Due to the fact that Tshwane does not currently support the extent of the proposed development in area A, the Town and regional Planners have not finalised their planning in this area yet. The final layout/ development proposal for the western section of the study area will be supplied to Tshwane and GDARD for comments as soon as it has been finalised. The comments and concerns that were raised by the local authority will be taken into consideration during the finalisation of the layout for this section.

The initial development concept was to do a "clutter and space" layout design (as proposed in the sensitivity map) that will allow for large continuous open spaces rather than small isolated open spaces with narrow linear links at strategic points that have no/ limited conservation value or purpose.

From the above mentioned information it is clear that the developer tried (with the assistance of the authorities and specialists) to take the most sensitive environmental issues as well as the

applicable GDARD draft policies into consideration during the layout design phase of the project. Due to the fact that there are many sensitive features and issues (i.e. servitudes) scattered all over the site, it was not possible (from an economical point of view) to preserve the entire site. The proposed layout for the development should be evaluated in the same spirit and the developer (although the proposed layout is regarded as fairly fixed) is more than willing to discuss layout issues identified during the evaluation process.

Certain compromises had to be made to ensure a sustainable development. The developer and Tshwane are aware of the fact that the study area has high conservation value, but they are also aware of the fact that the "No-Go" option is not the most sustainable option for the co-existence of the valuable features of the site. If the authorities are adamant that the entire site should be preserved, the relevant government departments should purchase the study area from the developer at a market related price, and manage the site as a non-profitable environmental education facility or eco-tourism facility. The study area is strategically located for development and therefore the monetary value of the study area is extremely high and almost unaffordable to government institutions.

M & T Development Town Planners supplied the following inputs regarding the Proposed Land-Use:

As illustrated in ***Figure 12*** the land uses of the proposed Land Development Area can be classified into the following broad categories:

- Business/Commercial
- Transport Interchange
- Mixed use Urban & Residential Precinct
- Low to High Residential Precinct
- Open Space
- Educational

Refer to ***section 4.3*** of this report for a detailed description of the different proposed activities/ land uses.

Business and Commercial use

Adjacent to the N1 Freeway, in the northern quadrant of the site, provision is made for erven that will facilitate the development of office buildings, business orientated services as well as subservient and related land-uses. The spatial incorporation of the business and commercial uses adjacent to the freeways was planned in such a manner to make use of the respective advantages that property adjacent to the freeway offers, such as remarkable visibility, accessibility and exposure. From previous experiences the land owner has been exposed to the ever increasing demand and need for companies to locate in these locations. This strategy is also in line with the vision and planning principles underpinning the strategic planning approach follow in developing the N1 promotional belt strategy. The proposed land-uses will also offer the added advantage of forming a transitional zone between the freeway and the residential component situated to the south-east of the business/commercial erven.

In addition to the above statement that the land-owner has experienced the modern trends and demand of businesses to locate in areas that offers potential benefit the planning process was additionally also guided by a holistic analysis of the requirements and needs of these type of land occupiers. Additionally to the concept of accessibility and exposure does the location of the precinct within the Land Development Area also offer the benefit of being in close vicinity to a range of potential clients situated within the economic core of Centurion, therefore guaranteeing good linkages to other economic activities, the location of a quality skilled labour pool is available in close proximity, the critical mass and clustering of the proposed precinct shall contribute to the success of the environment, the address of the site of application shall promote the demand to locate within the precinct and the planned future expansion shall establish the precinct as a strategic nodal development within the context of an ever expanding development corridor found and planned upon key town-planning principles.

The provision of a business and commercial precinct in the northern component of the Land Development Area was specifically incorporated into the Land Development Area as a result of the aforementioned considerations.

Mixed use Urban & Residential Precinct

This precinct is located between two major routes which will form an integral part of the proposed Land Development Area. The opportunity presents itself to create a mixed use living precinct, situated between the proposed extension of Olievenhoutbosch Road end the proposed PWV6 Road, that will provide a vibrant integrated area in which to work, live and shop. This mixed use node will benefit the development by providing a critical mass of both permanent residents and office workers required to keep the area active throughout the week and weekend. It will also ensure that the development maintains a balance between residents leaving for work during the week and those entering during the day, forming a sustainable pattern of movement and land use. This critical mass will also be able to support the new proposed transport interchange precinct, situated to the west of the mixed urban and residential precinct, which will provide a new rail station which will further be integrated with a local bus system and a wider catchment BRT system.

In addition to the above, a main internal boulevard within the precinct will function as an urban activity spine, with a well balanced combination of retail, offices and high density residential development along its edges. The retail and office uses will provide activity during the day, while the residential uses above will activate the area at night and during weekends.

In conjunction with the above uses, showrooms might also be envisaged for the precinct, which will be equally alluring to shoppers, as the nature of exhibitors will relate mostly to an upmarket leisure lifestyle not to be found in secular shopping outlets. The showrooms will be situated along the edge of Olievenhoutbosch Road and the proposed PWV6, making use of the good accessibility and visibility along these important arterials.

The vision for this precinct is to have living streets which are well used by its citizens. A range of different streets and public spaces will be provided within the mixed use node/precinct with generous consideration given to pedestrians and cyclists.

Low to High Residential Precinct

The township was designed to provide for a mix of low to high density residential development. A number of different residential precincts are envisaged for the development. The majority of the lower density residential development is situated in the southern part of the precinct (opposite Cornwall Hill Estate) whereas the higher density residential development will be situated in the northern part of the precinct (situated closer to important access routes and closer to the higher density mixed use urban and residential precinct).

The residential precinct will vary in density and cost in order to accommodate a variety of income groups and target markets. It is further envisaged that the higher density nodes will range from small areas containing ground floor retail possibilities on corner sites overlooking local parks, to larger nodes that will contain a full mixed use range of land uses including office components. The central idea of the additional subservient land uses is to prevent the design of mono-land-use suburbs, and to provide people with a variety of choices.

Higher residential densities within this precinct will correspond to general residential units at a variety of sizes ranging from bachelor units to two and three bedroom units. The general residential within the medium to high density areas will mostly consist of three storey walk-up units and four storey apartment buildings. The higher density areas will be associated with central parks and spaces that will form important structuring elements within these areas/neighborhoods.

The lower residential densities will be incorporated into the design in order to facilitate conformity to the surrounding residential areas and will ensure that the residential

character within the local area is not lost. The residential precincts/neighborhoods will be divided into security development schemes which will provide safety and security to residents by means of controlled access. Within these developments green belts are incorporated to act as pedestrian and fauna movement corridors. Each individual development will most probably incorporate a clubhouse which will boast an assortment of sport and recreational facilities. The clubhouses and recreational facilities will function as communal facility for the exclusive use of the local residents which will in addition intensify the feeling of a neighborhood. The proposed security residential developments will further ensure a neighborhood where the inhabitants can be guaranteed a safe and stress free lifestyle with a unique environmental and cultural historical element incorporated in the urban structure.

Open Space

As mentioned previously the incorporation of natural features on the site was a key consideration in the township design. Existing documentation pertaining to the environmental considerations guided the design to a great extent and explains the fact that approximately 21% of the site will not be developed, but preserved as open space (this figure excludes the internal open spaces which will be provided in especially the residential developments which will form an integral part of the precincts). The idea is that the maintenance of the open area be made the responsibility of local home owners which will ensure that these sensitive areas be sustained in future. The open area is in direct proximity to the residential components and will add a special ambiance to the Land Development Area. All open areas are linked and will in future form a continuous flow of open area that continuous into the respective residential areas.

It is also envisioned that a green belt will be home to an environmental information centre and restaurant on the ridge, providing outstanding views over the green belt and neighbouring suburbs.

Education

A large educational precinct is proposed at the southern edge of the proposed Land Development Area, adjacent to Cornwall Hill College, across Nellmapius Drive. This precinct will have good access from Nellmapius and the proposed re-aligned K105 and will be centered around sports facilities and a park. The educational facilities shall geographically form part of the mixed land use hub of the broader Land Development Area. It would add a much needed social function to the proposed and existing residential development. The promotion of educational facilities together with such a vast mixed use constitutes for a sustainable neighbourhood that provides residential, employment and social opportunities in close proximity to each other.

Transport Interchange

The envisaged transport interchange node will form a crucial aspect of the proposed Land Development Area and will have good pedestrian and public transport links within close proximity to it. The proposed transport interchange will be situated adjacent to the proposed Olievenhoutbosch Road along which the proposed Bus Rapid Transit (BRT) system will be implemented. It is further envisaged that this transport interchange node will provide the opportunity for safe, easy transit between rail, local bus systems and the BRT system. It is further envisaged that a square will form an integral part of the transport interchange system which will be wrapped with office and retail uses that could pertain to the interchange land use, integrating it into the surrounding urban fabric.

Need and Desirability

M & T Development Town Planners supplied the following inputs regarding the Need and Desirability:

In order to attain a comprehensive understanding of the appropriateness and desirability of the proposed Land Development Area, a macro-overview of the spatial characteristics is provided below.

Irene Extension 92 is situated partially on Portion 198 and partially on the Remaining extent of Portion 335 of the Farm Doornkloof 391 JR. This development can undoubtedly be regarded as a model attempt to introduce a mixed use "activity node" into the local spatial environment. It is envisaged that the development will eventually establish a nucleus of an "activity node" strategically placed on a development corridor which is a crucial supporting element of the local urban lattice.

Irene extension 92 is situated directly west of the proposed re-alignment of the future K105 route, north of Nellmapius Road and directly south of the N1 National freeway. The proposed Olievenhoutbosch Road further forms an integral part of the proposed Land Development Area, dissecting the township and running in an east-west direction through the township.

The proposed mix, balance and combination of land uses within the Land Development Area is of crucial importance in order to ensure that it lives up to all expectations in becoming a modern urban environment aspiring to sound development principles and providing an unrivalled living experience.

Seen from a spatial perspective the proposed Land Development Area forms an integral part of the southern part of the City of Tshwane and also Centurion which has in recent times become an important focus point for market driven development. Urbanisation is taking place at a huge scale specifically due to the many regional and even national routes that intersect the area that makes it a very central place in Gauteng. The progressive development of the Land Development Area will progressively stimulate growth in the local area but more importantly bring about a more dynamic approach to the spatial organization of the southern area of Tshwane.

Due to many challenges faced by several municipalities, they are depending on development and developers to provide a huge slice of the upgrading of key elements of required infrastructure. The present scale of developments and proposed developments in

and around Centurion is huge enough to provide a total new dimension in the movement system of the area. Not only will it be able to accommodate the proposed developments but generate new economic potential for intensifying the land use pattern. The proposed Land Development Area will – by building only a few transport links - bring about a new high order road grid spanning the N1-21 from the Old Johannesburg Road in the west to Main Road along the railway line in the east and further east towards the intersection of Nellmapius Drive with the R21. M&T Development will contribute towards building:

- a part of Olievenhoutbosch Road from Main Road in an easterly direction, connecting with Nellmapius Drive which further connects with the R21;and
- the construction of a new off-ramp from the N1 National freeway together with the re-alignment of the proposed K105.

The addition of this infrastructure to the urban environment will integrate many urban and open space areas north and south of the N1, and east and west of the Hennops River that were previously fragmented by these strong interstitial elements. The above-mentioned action will create a super structure of roads north and south of the N1 – this super structure is conjointly formed by the following: Old Johannesburg Road, Lenchen Avenue and Olievenhoutbosch Road with K109, John Vorster Road, Jean Avenue and Main Road in the east along the railway. This superstructure will further be strengthened through the construction of the additional portion of Olievenhoutbosch Road and the proposed re-aligned K105 situated on the Land Development Area. Olievenhoutbosch Road is open ended and connected to the highest order intercity roads. It will add tremendous vitality to the urban lattice indicated.

This grid of high order roads will transform the status quo from a few single connections to a system of interrelated roads and thus creating a powerful and dynamic urban access system for development to cling to. These linkages will thus form the infrastructures supporting flows from, to and between existing and future nodes.

The intended urban form that is taking shape to the south of the N1 will be nearly infinitely more powerful in transferring urban energy to land uses within the system. The accessibility spine will be continuous and will span from the N1 to the R21.

The above described road system is also part of a powerful corridor development system in the making. This will connect the above described road system with a known effective urban form and an open and connected road system.

In addition should it be noted that since 1998 during the initial planning phases of the Integrated Development Plans and its Spatial Development Frameworks a lot of attention had been focused on this area to provide urban structure in future. For the area south of the N1 opportunity emerged to function concurrently with the N1 like a corridor. This entails the extension of Olievenhoutbosch Road to the east of the N1 freeway and then further to the north all along the N1 up to Main Road in Irene. From this point a bridge over the railway line, Main Road and the K105 will enable Olievenhoutbosch Road to connect to the R21 freeway in the east. This road will be the access spine of the corridor. Olievenhoutbosch Road will therefore be able to generate and focus a huge amount of urban energy.

Olievenhoutbosch Rd will be connected to the N1 and R21 freeways via 5 off ramps (Old Johannesburg Rd connection included). As the Midrand strip is connected via 3 off ramps to only the N1 it is clear what levels of accessibility and urban dynamics the corridor will have. Cognisance should also be taken of the proposed off-ramp to be constructed from the N1 freeway which will provide direct access to the Land Development Area.

It is important to remember that the Gauteng Province Spatial Development Framework is champion to the development corridor principle along the N1 and R21 freeways. The Olievenhoutbosch Rd corridor is also included in the draft MSDF of the City of Tshwane. The corridor concept is also dependent on the development of activity nodes of a relevant scale on prominent intersections along its course. The proposed Land Development Area is

just one of many important developments that will contribute hugely to the diversity and vitality of the land uses that will be needed.

The following graphic illustrates the concept of Olievenhoutbosch Road as the access spine along the "N1 – 21" freeway to function as a corridor.

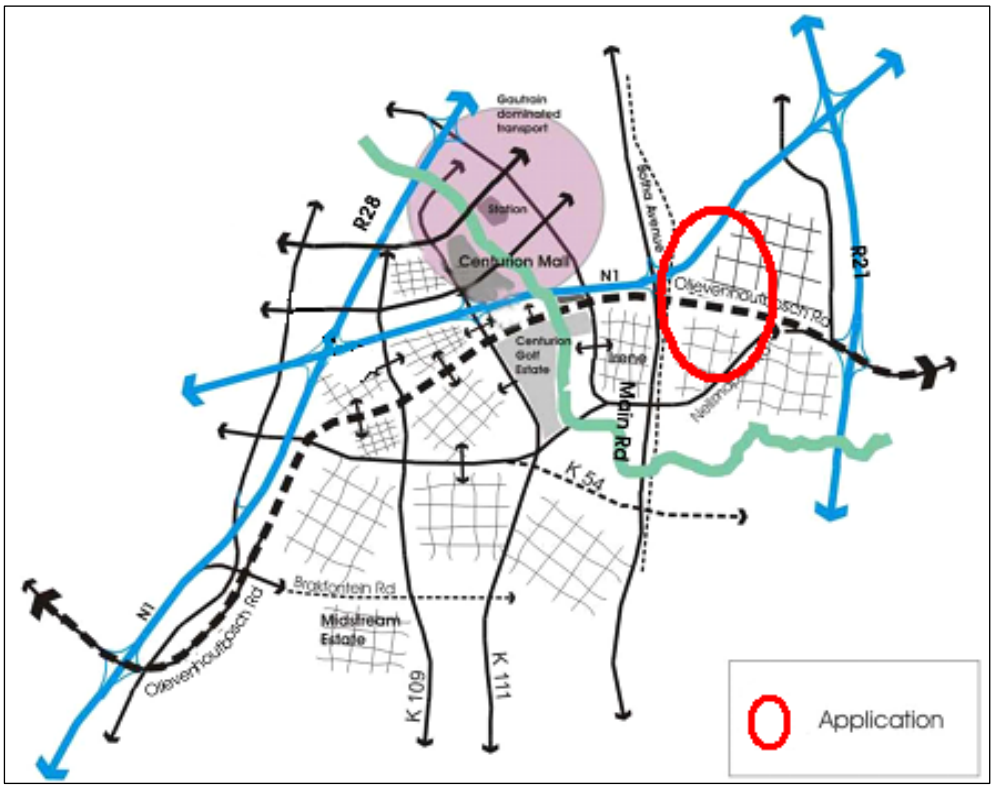


Diagram 6 - The importance of Olievenhoutbosch Road

The development spine Olievenhoutbosch Road will connect a phenomenal mix of land uses. In the south it comes from the SAMRAND light industrial and business area situated on the west of the N1. Then it moves through a massive concentration of warehouses that constitutes a distribution point of commercial goods on a provincial scale. Moving northwards there are manufacturing, transport and commercial orientated land uses – located between the spine road and the N1. There are also huge residential estates being developed just east of it. The area North of the K54's crossing of the N1 is the Eco-Park development. Further – east of K109's crossing of the N1 the nearly fully developed

Highveld Technopark is situated as well as a Denel weapons manufacturing plant (The Government's weapons manufacturer). The Highveld residential precinct is also situated within this district. Moving further east, the Irene residential areas can be found and at the intersection of the R21 more commercial/office orientated uses can be found.

The above-mentioned scenario means that the Olievenhoutbosch development corridor is already a reality and that development will explode even further the moment the different sections of Olievenhoutbosch Road are built and connected. This will trigger smaller development events like infill development, urban renewal, densification and intensification. The result will be a fully corridor-like urban form with integrated precincts for residential, commercial and industrial land uses. This whole system will be fully integrated with the present urban core area situated around the Centurion Mall area via the new development lattice that will be created by Olievenhoutbosch Road and its connections (K109, John Vorster Dr, Jean Ave, Main Rd, and the proposed road that will further connect Olievenhoutbosch Road with the proposed new off-ramp from the N1 Freeway) with Lenchen Avenue and H Verwoerd Drive.

The proposed Land Development Area will further form part of an activity corridor. Activity nodes are defined as being an area of high accessibility where both public and private investment tend to concentrate and are often associated with mixed use development. Activity nodes offer the opportunity to locate a range of activities from small to large enterprises. It is said that although activity nodes can differ in size and character they do tend to have a common set of features. Some of these features are described as:

- Incorporating a business component,
- Provide for the creation of job opportunities
- A concentration of facilities,
- Many people can live in these nodes,
- High density residential component are catered for,
- Community facilities are provided and

In recent years it has become evident that the Centurion property market, especially commercial and office usage, has experienced considerable growth due to especially its favourable and strategic location along the north-south development axis between Johannesburg and Pretoria. Centurion has further become a very strong office development node and strengthened the southward link to Johannesburg. The area has a strong residential profile to attract more executives from Johannesburg to come and live in the area.

The growth in the market has been successfully harvested and has become transparent in the way the area's economic base has been transformed to a modern and future orientated economy. Centurion's extensive network of infrastructure and communications network has meant the full integration of the area into the global village. The area shares in the central link in the high technology development corridor between Johannesburg and Pretoria and increases in high-tech clean industry and related activities are eminent.

Evidently this growth was surely not an artificial phenomenon and cognisance should be taken of the dynamics that drove this growth. A particular aspect that is regarded as common knowledge is the fact that the property market is a demand driven entity. According to this reasoning it is quite obvious that a specific demand existed within the local area for development of this nature. This demand was fuelled by the fact that the decision where to locate and investment in property is predominantly location orientated and include amongst other the investment in property which will provide optimal accessibility and high visibility.

7.3 Qualitative Environment

7.3.1 Visual Aspects

The following visual assessment criteria have been used to determine the impact of the proposed Development on the state of the environment – the significance is indicated by the respective colour coding for each of the impacts, being high, medium and low:

TABLE 8: Visual Impact Criteria

		IMPACT	
CRITERIA	**HIGH**	**MEDIUM**	**LOW**
Visibility	A prominent place with an almost tangible theme or ambience	A place with a loosely defined theme or ambience	A place having little or no ambience with which it can be associated
Visual quality	A very attractive setting with great variation and interest – no clutter	A setting with some visual and aesthetic merit	A setting with no or little aesthetic value
Compatibility with the surrounding landscape	Cannot accommodate proposed development without the development appearing totally out of place – not compatible with the existing theme	Can accommodate the proposed development without it looking completely out of place	The surrounding environment will ideally suit or match the proposed development
Character	The site or surrounding area has a definite character/ sense of place	The site or surrounding environment has some character	The site or surrounding environment exhibits little or no character/ sense of place
Visual Absorption Capacity	The ability of the landscape not to accept a proposed development because of a uniform texture, flat slope and limited vegetation cover	The ability of the landscape to less easily accept visually a particular type of development because of less diverse landform, vegetation and texture	The ability of the landscape to easily accept visually a particular type of development because of its diverse landform, vegetation and texture
View distance	If uninterrupted view distances to the site are > 5Km	If uninterrupted view distances to the site are < 5Km but > 1Km	If uninterrupted view distances to the site are > 500m and < 1000m

Critical Views	Views of the site seen by people from sensitive view sheds i.e. farms, nature areas, hiking trails etc.	Some views of the site from sensitive view sheds	Limited or partial views of the site from sensitive view sheds
Scale	A landscape with horizontal and vertical elements in high contrast to human scale	A landscape with some horizontal and vertical elements in some contrast to human scale	Where vertical variation is limited and most elements are related to the human and horizontal scale

Also Refer to Annexure T for the Visual Impact Study (3D modelling and photographs of the study area)

Due to the topography and location of the study area, the proposed development could have a significant visual impact if it is not planned correctly. It could however also have positive impacts if the development is well-planned and integrated with the natural and residential surroundings.

The ridge is a strong visual element that is observed from the N1 and Irene, which contributes to the "Sense of Place" of this region. Unsympathetic developments on the ridge would detrimentally damage the attractive natural visual experience towards the study area, especially when viewed from Irene and the N1 Freeway.

It is however important to note that many unsympathetic developments that affect the ridgeline already took place on the involved ridge. It seems that various types of developments (i.e. the Cornwall Hill Residential Development) have been approved in this area without real regard for the visual impact or the original character/ "Sense of Place" of the area. This mixture of styles, colours, and buildings scattered over the landscape has become part of the character of the area. The current setting cannot be regarded as completely natural/ pristine.

As a result of the visual impacts already experienced in the area, we are of the opinion that the proposed development (although it will add to the visual impacts) will not cause

major visual pollution of a pristine and undeveloped area and therefore the anticipated visual impacts will not cause more harm to the environment than the existing structures that currently surround the property.

We are also of the opinion that it will be possible for the developer to mitigate/ prevent the anticipated visual impacts through thorough layout planning that takes the topography and aesthetical features of the site into consideration and by using finishings that blend in with the natural mosaic of colours displayed in the area.

Due to the existing visual impact already experienced in the area, the impact of one development is not of great importance. From a visual point of view this development will simply become part of the visual context and mirror the developments on the remainder of the ridge that are just as visible from the surrounding areas and roads. This does however not mean that the developer is free to develop what he wants, because the surrounding developments already caused enough damage to the visual qualities of the area.

This development should rather set an example of how developments can contribute positively to the "Sense of Place" of an area/ of how a development can be planned to blend in with its natural surroundings.

The views of the ridge experienced from Irene and the N1 freeway are very attractive and although the study area is situated in an urban environment, the natural vegetation that stretches from the bottom of the study area over the top of the ridge creates a feeling of openness and tranquillity. Every attempt possible should therefore be made to preserve as much of the visible open space along the northern and western slopes of he ridge as possible. The same feeling is however not experienced from Nellmaphius Drive, because some developments already took place on the section of the ridge that is located to the south of Nellmaphius Drive. Development along the southern and eastern slopes of the study area will not appear completely out of line with the character of the surrounding environment. It will simply become a mirror image of what already took place on the other

side of Nellmapius Drive. If the structures along these slopes are strategically placed and designed, it will not have a significant detrimental effect on the visual qualities experienced from the north and the west.

It is important to note that large sections of the attractive and highly visible western and northern slopes will remain open space in any way, because the ecological sensitivity of these areas and the cultural and historical features that were identified do not allow for development in these areas.

The proposed development on the flatter northern section of the site is for commercial/ industrial/retail due to the high visibility of this section. This is in line with the N1/21 strategy and offers a prime location to businesses due to the high visibility of this section. This land use will visually be associated with similar uses that stretch from Johannesburg, through Midrand into Tshwane and will only be an extension thereof.

Implications for the Development

The placement of buildings on this site is the main consideration. Where possible, the skyline of the ridge should be preserved.

The western section of the site that is also considered to be sensitive from a visual point of view, and if any structures area is placed in this section of the site the visual impact need to be considered carefully and the architectural designs and finishings must blend in tastefully with the surrounding environment. A "clutter and space" layout concept with extensive natural looking, indigenous landscaping to 'hide' the development and 'camouflage' it within its natural surroundings would be preferable for this visible area. Large parking areas and buildings higher than two storeys will have a high visual impact and should not be allowed in the prominent sections.

The Irene and Cornwall Hill area has a very specific visual pallet and it will be important to contribute to this sense of place by using these unifying elements in the landscape and

architecture. These elements include: stonewalls, no high rising buildings or structures, natural colours and materials, and tree-rich landscaping.

The architectural styles, colours, textures and construction materials will thus determine the visual impact of the proposed development on the surrounding areas.

Architectural guidelines to minimize the visual impact:

- The proposed development will be seen from a distance and therefore the roofs should not reflect the sun or be covered with roofing materials that have bright colours. Black or charcoal coloured roofs will blend in tastefully with the surrounding environment.
- The colour scheme should be taken from the palette of colours in the natural surroundings.
- Existing trees should be retained as far as possible. The trees will soften the impact of the proposed permanent structures and they will bring the scale of the structures within the urban context down to a more human scale.
- Buildings in areas that are highly visible should not be any higher than two storeys.
- The skyline should not be broken by architecture but should be kept natural.
- Materials and architectural styles that will be used on site should mimic the already established architecture in the area and blend into the surrounding environment.
- Architectural themes for the individual homes should be evaluated and approved by a panel of professionals as put together by the HOA, to ensure that all the above-mentioned measures are implemented.

It is also proposed that additional indigenous (preferably endemic) trees be planted in the areas that were previously disturbed by agricultural activities (although many of the structures will be placed in these areas, trees should be used in the landscaping around these structures).

Landscaping should be done in concurrence with the building construction in order to create an instant visual enhancement of the development.

The landscaping of the proposed development should blend in with the natural vegetation that occurs on site and in the area. Trees, shrubs and groundcovers that are endemic to the area and/or indigenous should preferably be used – landscaping that is in line with the natural vegetation of the area will not only help to reduce the visual impact of the development, but it will also create habitats for fauna and flora species. The private gardens and green areas within the individual estates will become and extension of the natural conserved area.

7.3.2 Sense of Place

The concept of "Sense of Place" does not equate simply to the creation of picturesque landscapes or pretty buildings, but to recognise the importance of a sense of belonging. Embracing uniqueness as opposed to standardisation attains quality of place.

1. In terms of the natural environment it requires the identification and the emphasis of the distinguishing features and characteristics of a landscape, which people respond to. Different natural landscapes suggest different responses. Accordingly, settlement design should respond to nature.

2. In terms of the human made environment, quality of place recognises that there are points where elements of settlement structure, particularly the movement system, come together to create places of high accessibility and special significance. These are the meetings places of townships e.g. parks. The importance of these places must be recognized and become the focus of public investment, aimed at making them attractive, user-friendly and comfortable to experience.

The landscape is usually experienced in a sensory, psychological and sequential sense, in order to form an image of place ("genius loci") of that landscape. A landscape is thus an

integrated set of elements, which respond to different influences and is experienced as the unique spirit of place, or "genius loci". Each landscape has a distinct character, which makes an impression on the mind, an image that endures long after the eyes have moved to other settings. **Sense of place is the subjective feeling a person gets about a place by experiencing the place visually, physically, socially and emotionally. The "Sense of Place" of an area is one of the major contributors to the "Image of the area".**

The *image of an area* consists of two main components, namely ***place structure*** and ***sense of place.*** These could be defined as the following:

- **Place Structure** refers to the arrangement of physical place making elements within a unique structure that can be easily legible and remembered.
- The **Sense of Place** is the subjective meaning attached to a certain area by individuals or groups and is linked to its history, culture, activities, ambience and the emotions the place creates.

The image of the study area and It's surroundings

The Irene and Cornwall hill area is regarded as one of the areas in Pretoria with the best-defined image. People immediately think of the Irene dairy, Irene Country Lodge, the Smuts House, Irene Village, the stonewalls, neat streets and masses of large trees that line many of the streets. All these features contribute to a sense of an established well balanced area within a special/ unique landscape where history, historic uses and landscapes blend in with a vibrant loci urban life where each individual and element plays its role.

The highly visual ridge forms the main visual feature of the site and contributes to the uniqueness of this area. The aesthetic value of this site within the area is considered to be high.

The attractive views experienced from the study area contributes to the "Sense of Place" of the study area and although the occurrence of sensitive plant species and other

environmental aspects will prevent the erection of structures on the higher lying sections of the ridge, the attractive views create an opportunity for hiking trails and view points in the natural setting of the ridge. The advantage of hiking trails and view point is the fact that the views can be enjoyed by everybody – not just be the private land-owners.

The proposed development could become an important extension of the Irene character by combining the human social network and the genius loci by establishing a suburban community with a variety of land uses and integrated open spaces that are true to the surrounding character and sense of place, while also offering the social support commodities (that will also be enjoyed by the existing community in the area).

Today one aspect of South African city life (especially in Gauteng) that add frustration and break down the city-experience: must be traffic congestion. Most Public meetings for developments are dominated by discussions of traffic and roads. People want development but not more traffic, more roads to be built but not on their properties.

The 5 O'Clock site is very big and even though large portions of the site will consist of open space, the traffic that will be added to the local roads will have a significant impact. If no major traffic relief is implemented (i.e. through the upgrading of existing roads and the construction of additional roads), this will definitely impact on the sense of place of the area.

The developer is however committed to contributing towards the construction of Olievenhoutbosch Road (one of the three proposed roads that traverse the site). The success of the proposed development also depends strongly on the construction of the much needed Olievenhoutbosch Road[5].

[5] During two of the public meetings that were held in the Centurion area, many of the residents in the area requested that the section of Olievenhoutbosch Road that cuts across the study area be constructed as a matter of urgency. Even if the proposed development is not authorized, the existing traffic congestion on Botha Road and Nellmaphius Road causes major frustration in the area. Mr. Adriaan Venter (an attorney) even submitted an objection against the development (on behalf of the Cornwall Hill College) in order to prevent any further traffic congestion in the area. According to Mr. Venter the people in the area want the construction of Olievenhoutbosch Road to commence as soon as possible and were of the opinion that the objection against the development would help to speed up the process. At the time when the objection was lodged, the RoD for the involved section of the road was still pending. The RoD has now been issued and all the construction planning for the road has been completed. The construction of the approved section of Olievenhoutbosch Road will commence shortly.

Implications for the Development

Design considerations:

- The study area and its surroundings have a unique "Sense of Place" that will enrich the design and layout of the development. The special character should be taken into consideration during the design stage of the project and the conservation of the ridge and skyline should be an absolute priority.
- The architectural theme of the proposed development should blend in and compliment the surrounding environment fitting into the loci quiet but vibrant urban setting.
- Building material and finishes should preferable consist of raw materials and earthy colours that blend into the 'Irene theme';
- The views towards and from the ridge should be considered during all stages of the project and should form one of the leading factors in the layout and design of buildings and infrastructure
- If planned and managed correctly, the proposed development will enhance the "Sense of Place" and value of the study area and its surroundings.
- The implementation of Olievenhoutbosch Road is now guaranteed, because GDARD already issued the RoD for the construction of the involved section of the road and all the construction and programme planning for the proposed road has been completed.

7.3.3 Noise Impact

Refer to Annexure Z of DFA Application for the Noise Impact Study

Noise will play an important part in the layout planning of the proposed development.

At present the study area is affected by noise levels created by the Waterkloof Airport, the N1 freeway, Botha Avenue and the occasional noise caused by passing trains on the railway line that forms the western boundary of the study area.

Background Regarding The Noise Study That Was Done:

Several site visits were conducted during July 2003 in order to gain insight into the physical properties of the development sites. This included the topography of the area, the typical ground conditions in terms of their probable sound propagation characteristics and their location in relation to the environment.

During the site visit and noise measurements, it was evident that noise caused by traffic on the numerous routes bordering the area was dominant source of noise. Therefore, in order to obtain more complete insight into the noise climate the total noise levels due to road traffic had to be calculated. The following are at present the major sources of road traffic noise:

- The N1 highway bordering the North of Area 1.
- The R21 passing in a North-South direction through Areas 2 and 3.
- Nellmapius Road marking the southern border of Area 1 and passing along Area 2 and 4.
- The M57, or the old airport road, passing Area 3 and running parallel to the R21.

Although Waterkloof Airport is also a landmark feature in this environment, flights are at present on a non-scheduled basis. This means that the noise contribution is at present on a non-scheduled basis. This means that the noise contribution is at present characterised by noisy single events, which occur at irregular intervals, in contrast to the roads traffic noise, which forms a continuous source of noise.

Measured ambient noise levels

The measured ambient noise levels are summarised in Table 9 together with the levels calculated for the corresponding measurement points.

TABLE 9.

Summary of the measured and calculated ambient noise levels.

Measurement Point	Laeq,I dBA		Difference dBA
	Measured	Calculated	
1	60,5	63,4	2,9
2	45,9	49,4	3,5
3	42,7	46,4	3,7
4	46,9	48,1	1,2
5	59,2	57,9	-1,3
6	60,2	59,7	-0,5
7	50,2	48,1	-2,1
8	64,7	63,8	-0,9
9	55,9	55,8	-0,1
10	51,2	53,3	2,1
11	43,2	47,3	4,1

The results indicate that the present ambient noise level during the day is high in proximity to the N1 and R21 highway (MP 1, 5, 6 AND 8) to low in the centre of Area 1 (MP 2, 3, 10 and 11) where the topography of the area provides significant screening against noise emissions.

In comparing the measured and calculated noise levels, it should be remembered that the calculations have to be based on a number of assumptions concerning the flow traffic and the physical layout of sources and receivers. Especially over larger distances will chaotic atmospheric processes tend to increase the prediction error.

SABS 0210[2] states that the calculation procedure is accurate to within 2,7 Dba at distances up to 300m with a confidence level of 95%.

The consultant is of the professional opinion that the designed model produced acceptable results, considering the relatively large distances to which it was applied and the assumptions that had to be made. The slight tendency to over predict the noise levels at MP 1, 2, 3, 11should result in a more conservative planning strategy as far as ambient noise issues are concerned.

TRAFFIC NOISE LEVELS

The calculated traffic noise levels are resented as contours of constant noise levels in the proposed development areas for the Day, Night, Lr,dn and Laeq,I (24 h). These contours are given in Figures 4.2.1 to 4. 2. 4. Annexure Z of DFA Document.

Implications for Development

- The noise contours of a noise study that was compiled for Tshwane was indicated on the sensitivity maps that were used as form giving element fort he proposed layout. In areas where the noise levels were higher than 55dBA, non-residential land-uses that are more compatible with the higher noise levels were placed;
- The noise levels of the future roads that cut across the study area must also be taken into consideration. It is however important that the preliminary design for the roads (especially Olievenhoutbosch Road) commence as soon as possible, because the vertical alignment (whether the proposed roads are in cut, on natural ground level or raised) of the proposed roads will determine the noise levels that will be caused by the roads; and
- An acoustical engineer should be appointed to supply the developer as well and the road planners with design guidelines to mitigate the anticipated future noise levels.

7.4 Services

In order to investigate how the proposed Land Development Area shall be incorporated into the spatial context from a physical infrastructure and engineering service supply perspective the applicant appointed, VELA VKE Consulting Engineers to investigate the supply of Roads and Stormwater infrastructure, LV and Partners to investigate the supply of Water and Sanitation infrastructure and Geopower Consulting Electrical Engineers to investigate the supply of electricity

Bulk Engineering Services

7.4.1 Stormwater

The proposed township has five main catchment areas draining in various directions. These catchment areas discharge stormwater run-off into existing stormwater drainage systems with sufficient capacity to accommodate the additional run-off from the Land Development Area.

The stormwater run-off from areas outside the proposed Land Development Area will also be accommodated by the proposed stormwater system.

The details of the stormwater system are provided in the Service Scheme Report: Roads and Stormwater attached as **Annexure Q of DFA Application**.

7.4.2 Water

Reference is made to the following master plan report done by GLS Consulting; "Waste Master Plan": Development of Proposed Township – Irene X89 to 91 and Five o'clock", date 1 February 2010, of which a copy is enclosed in Annexure T of the DFA Application.

Water Reticulation

The proposed water reticulation will consist of a combined domestic and fire system which will be installed inside the street reserve with a water connection point for each individual erf. The water reticulation pipelines will be installed 2.2m from erf boundaries on the high side of the street reserve. The individual water meters at each erf will be installed by Local Authority at a later stage, as and when applied for. The new infrastructure will be taken over by the Local Authorities at a later stage.

Irene Ext 92 is underlain by dolomite and all designs, specifications and installation of services shall comply with the Department of Public Works Manual PW 344 and related specifications.

All designs and installation of pipes, valves, communication pipes and fire hydrates will be done to the latest standards of the Local Authorities and fire Department. The water reticulation will be designed by computer assisted "Civil Designer" programs. See appendix BB, Annexure T of DFA Application for the Proposed Water Reticulation Layout.

Every new development, with its unique water demand patterns, exerts a certain amount of pressure on the Municipal bulk water supply scheme. It is therefore expected of each development to contribute to the upgrading of external bulk water supply infrastructure in relation to the volume of water consumed. The bulk contribution is calculated by the Local Authorities.
It is proposed that funds invested in external infrastructure be subtracted from bilk contribution payable.

7.4.3 Sewer

The following standards will be used in the design of the sewer reticulation

- Sewage outflow per day

• Special for Business buildings, Shops, Place of Refreshment	:	0.8kl/100m²
• Special for Wholesale trade, Showrooms, Motor dealership, Conference centum	:	0.4kl/100m²
• Special for Light industrial	:	0.3kl/100m²
• Hotel	:	0.9kl/100m²
• Residential (medium) - cluster Housing up to 40 units per ha (Assumed)	:	0.6kl/unit
• Residential (low/ medium) – cluster housing up to 20 units per ha (assumed)	:	0.7kl/unit
• Special for Education	:	0.6kl/100m²
• Special for Access control	:	0.6kl/unit
• Peak factor	:	2.5
• Sewage capacity	:	Pipes shall be designed to run at 70% full, measured in terms of flow depth
• Provision for stormwater infiltration	:	The remaining 30%
• Flow formula	:	Manning with n = 0.013
• Minimum velocity in sewers	:	0.75 m/s at full flow with absolute minimum 0.6 m/s
• Fall through manholes	:	80mm (for sewers ≤315mm Ø)
• Minimum pipe size for reticulation pipes	:	145mm Internal diameter
• Sewer erf connections	:	160mm diameter at the lowest point of each erf in the case of larger Business erven and a distance of 500mm inside the erf

boundary and not less than 1m from the side boundary

- Minimum gradient

Nominal Ø (mm)	Minimum grade with depth of flow = 1/5 D and V = 0.6 m/s	Minimum grade with depth of flow = ½ D and V = 0.82 m/s
160	1/80 (for fewer than 24 dwelling units connected)	1/100
200	1/120	1/200
250	1/160	1/240
315	1/200	1/300

- Depth of sewer
  - In mid-block : 1.2m depth to invert
  - In street reserve : 1.5m depth to invert
- Sewer system in mid-blocks or street reserves : Mid-block system acceptable if sewers are not installed deeper than 2 m and the main sewer not deeper than 3 m, otherwise a double system may be considered depending on costs.
- Maximum manhole spacing : 80m
- Placement of sewers inside 13m, or 16m to 25 road reserve : 2.85 m from erf boundary on high side of road for 16 m to 25 m road reserve, or 2.45 m in the case of 13 m road reserve also on the high side
- Place of sewer inside mid-block : 1.2m from erf boundry

- Pipe material (dolomitic area) for sewers : HDPE PE100 to SANS ISO 4427 (solid wall pipes)
  - Minimum pipe class : PN 8, SDR 21
  - Supply lengths : 6m maximum (for butt-welding)
  - Joints : Butt-welded to SANS 10268 – Part 1.)Only 160 mm dia sewers and smaller to be reamed on inside after butt-welding)
  - Sewer manholes (Dolomitic area) : Pre-cast concrete rings with "Pro Structure 687" sealant at joints
    : Fall through manholes 80 mm for sewers ≤ 300mm NB
    : Fall through manholes using standard energy equation for sewers larger than 300 mm NB

7.4.4 Electricity

Note: The figures incorporated into this section of the report form part of the Electrical Report included as ***Annexure S*** of the DFA Application.

7.4.4.1 Primary voltage level.

The city of Tshwane is supplied with electricity in the Centurion region, from the Eskom/CoT Rietvlei 275/132kV in-feed station. The CoT 132 KV distribution system in Centurion is linked to the 132kV Pretoria system at the Lyttleton 132 kV switching station. The Pretoria and

Centurion 132 kV system are supplied from the Eskom Apollo Main Transmission Substation (MTS) via the Eskom/CoT Njala and Rietvlei 275/132kV in-feed stations.

7.4.4.2 Primary infrastructure in vicinity of the proposed land developments.

The Rietvlei in-feed station is situated due south of the proposed land development areas as is indicated in black on Plan 1.

- A 132 kV double circuit, power-line extends from the Rietvlei in-feed substation, in a northerly direction along the Western Reserve of the R21 freeway. This power-lines links the Waterkloof 132/11kV substation to the Rietvlei 132kV in-feed station. This line is currently dedicated to supply the Waterkloof substation. The route of this power-line and the relative position of the two substation is shown plan 2. **(Refer to Annexure S of the DFA Application).**

7.4.4.3 Capacity of Existing Primary Infrastructure.

7.4.4.3.1 Rietvlei 275kV/132kV substation

a) The firm supply capacity is 125 MVA, obtained through two 125MWA, 275/132kV power transformers. Each transformer is supplied via a dedicated 275kV power-line and operates independently of each other as no 132kV bus-section was provided.

b) Both Eskom and the COT have plans to upgrade this substation from a 275/132kV to a 400/132kV substation. The commissioning of this substation is expected in 2014/15. The designated firm capacity of the new 400/132kV substation is 500MVA. The design will enable future upgrading of the supply capacity if required.

c) The highest recorded demand of this substation was apparently slightly above 200MVA although the highest recorded demand in 2009 was 163 MVA. The 2009 maximum demand exceeded the firm 125MVA supply by 38MVA. Based on the 2009 MD reading there is approximately 35 MVA spare unfirm supply capacity available at Rietvlei in-feed station. This capacity has most probably been allocated. The fact that both the summer and winter Centurion demand has exceeded the firm Eskom supply capacity, places the entire Centurion region at a high risk in terms of security of supply. This situation has been perpetuated for several years and the concern is that the existing Rietvlei in-feed substation will not be able to sustain the demand growth of the entire Centurion region, which is one of the most active regions of development in Tshwane, until the new substation is commissioned in 2014.

d) The only short-term option available to increase the capacity or at least to enhance the security of supply at the Rietvlei substation will be to introduce a third transformer. There are two constraints in this regard. Firstly the available spare capacity on the Eskom 275kV system is limited. Secondary there is no 275kV bus and the two incoming lines are connected to the two 275/132kV transformers which makes the provision of an additional transformer

complicated but not impossible. It will however be necessary to isolate one of the two circuits and its associated transformers, which is almost at full load.

e) The provision of a third transformer at Rietvlei in-feed station will ensure that the supply is firm but will not necessary assist with the provision of additional supply capacity on Eskom's 275kV system in this region.

7.4.4.3.2 Waterkloof Substation 132kv Power-Line

a) The capacity of the 132kV Waterkloof power-line is 150MVA firm and comprises of two circuits with ACSR codename "BEAR" conductors.

b) The capacity of the Waterkloof line is adequate to supply the existing Waterkloof substation's designed 60MWA firm capacity.

c) The waterkloof line has sufficient spare capacity to accommodate an additional 80MWA firm substation.

d) The servitude right of way of the Waterkloof power-line is double servitude and there is therefore space available for the erection of an additional line parallel to the existing line if required to accommodate any increased line requirements of the future.

7.4.4.3.3 Waterkloof Substation

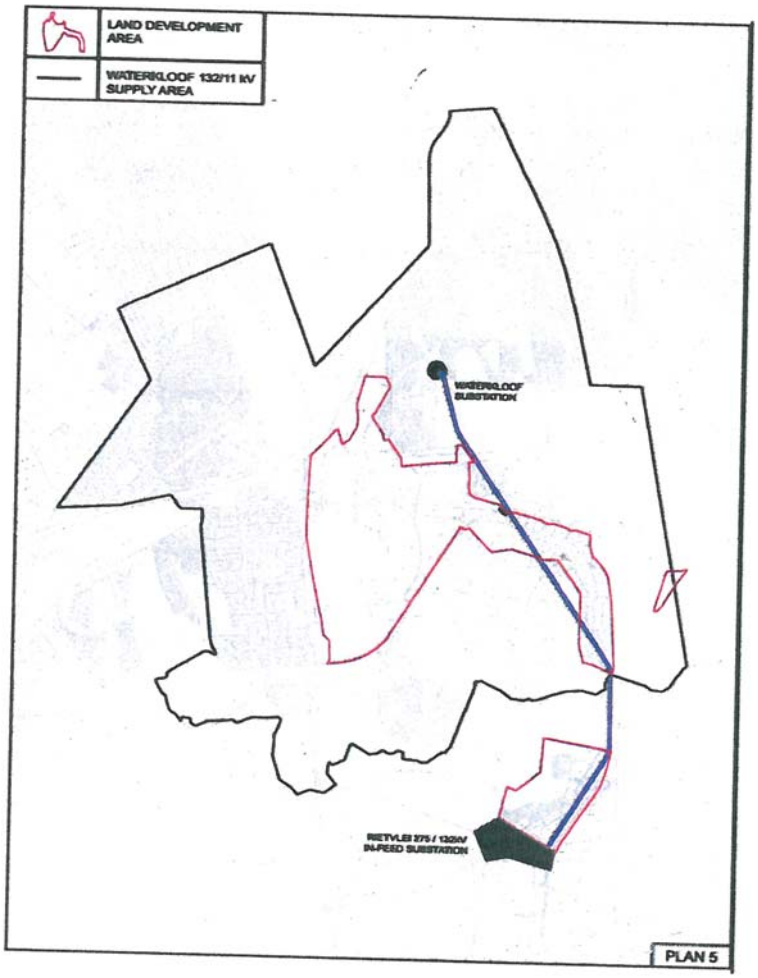
a) The firm supply capacity of the Waterkloof substation is currently 20MWA and comprises of two 20-MWA transformers. CoT is in the process of adding a third 20MWA transformer to this substation for back-up. The vector group of the third transformer however does not match that of the operational transformers which makes parallel operation of the third transformer with either of the existing transformer impossible. The implication of this constraint is that the third transformer will not provide the classic firm ARB system, and a system back-up.

b) The installed capacity of the substation is 40MVA, without the third transformer, and in the past winter months the demand has exceeded 40MVA.

c) It is likely that this substation will be upgraded by CoT to a firm 60MVA substation (4 x 20MVA)

d) It is unlikely that the Waterkloof substation will be upgraded beyond 60MVA due to the fact that development is taking place mainly within the southern regions of this relatively large electricity supply area. The substation was furthermore positioned close to the northern perimeter of its supply area which makes the supply of electricity to the southern region of its supply area ineffective. The supply area of the Waterkloof substation is shown on Plan 5.

e) Plan 5 clearly indicates that proposed four Irene township developments are included in the current electricity supply area of the Waterkloof substation.



7.4.4.4 Estimated Demand of M&T's Irene Land Developments

Irene extension 92

The sum of the ADMD's(After Diversity Maximum Demands) for the proposed Irene Extension 92, based on the desired land use is 67,8MVA.

Combined sum of ADMD's of Irene extensions 89, 90,91and 92

The combined sum of the Irene extensions is 92,5m MVA.

Anticipated ultimate demand

The anticipated ultimate demand of Irene extensions 89,90,91 and 92 collectively is expected to be in the order of 78,6 MVA. This relatively large demand and will require two stages (two 40MVA transformer stages plus back-up stage) of typical CoT three stage 120MVA, primary substation.

7.4.4.5 Proposed Solution For The Bulk Electricity Supply.

Interim versus Long-Term Solution:

Long-term solution

a)The fact that the 132 kV supply capacity at the Rietvlei in-feed station is limited and that which is spare has apparently been allocated by CoT, necessitates the implementation of an interim solution to supply the proposed Irene land developments until such time as what 132kV capacity is available at the Rietvlei in-feed station.

b) The Rietvlei in-feed station supplies the Centurion region with electricity at a voltage level of 132kV. The CoT have stated that it may be possible for them to provide some capacity for these developments from the Rietvlei station, but that they cannot make a firm commitment in this regard. This possibility is therefore to be retained as an option. It is not expected that the Rietvlei station will be upgraded before 2014 and therefore M&T are

willing to implement the interim solution for the provision of bulk electricity supply capacity to their Irene land developments.

c) The interim solution is in line with the CoT's long-term master plan and the infrastructure provided can in future be integrated into the system.

Interim solution

Phase 1:

a) Phase 1 of the interim solution comprises the construction of an 88kV power-line (designated for 132kV), between the Hippo Quarries substation and the Portion 107 Doornkloof, which is situated just north of the Rietvlei in-feed station. The extension of this line to the site for the Cornwall Hill substation will be considered in the detail planning of the solution. The approximate length of this line is 9.6 km.
b) The above-mentioned line will be operated at 11kV utilizing some of the 23MVA supply capacity which M&T have been allocated at the Hippo Quarries substation. The construction of the 11 kV feeder bay at the Hippo Quarries substation is currently in progress.
c) The capacity that can be transferred via this arrangement is in the order of 8MVA .

Phase 2:

a) Phase 2 of the interim solution is the first place of the permanent solution, ie. The construction of the first phase of the Cornwall Hill substation. If accepted by the CoT, the first phase of the Cornwall Hill substation can comprise of a mobile type substation constructed on a skid base. The equipment which is utilized for the mobile substation can later be re-used in the outdoor yard of the Cornwall Hill substation.
b) A mobile type substation can be constructed within six months and is the preferred interim solution from both a cost and time consideration.

c) A high-voltage 88kV or 132kV supply will be required for the first phase of the Cornwall Hill substation, irrespective of the construction form, ie. Mobile versus outdoor.
d) As mentioned above the most effective and permanent solution will be a direct 132kv connection from the two circuits of the existing CoT 132kV power-line that passes the site for the Cornwall Hill substation.
e) Should the CoT not be able to provide the capacity for a 132kV connection to their system, the power-line constructed for the interim supply 5.2.1 above will need to be extended to the Junction substation. The junction substation will be constructed in 2010 and will provide 20MVA at a voltage level of 88kV.
f) The route of the power-line between the proposed Junction and Cornwall Hill substation is indicated on the following plan. The servitudes exists for the entire length of the line and an environmental authorization application has been lodged with GDARD.

7.4.4.5 Authorisations

a) Kungwini LMM has agreed to the proposed cross border solution and the CoT's representatives have indicated that they will consider it.
b) The cross border solution will need to be sanctioned by NERSA, who will require formal written approvals by both the CoT as well as Kungwini LMM.

7.4.5 Solid Waste

7.4.5.1 General

The study area is situated within the urban edge and Tshwane Metropolitan Municipality is responsible for the solid waste collection during the operational phase of the project. The construction waste will be removed by a private waste contractors and the construction waste will be disposed-off at a legal and registered landfill site. Proof of such waste

disposal at a legal landfill site will form part of the required on-site record keeping during the construction phase.

7.4.5.2 Waste Storage and Processing Systems

A solid waste compacter is envisaged. The waste generated will be temporary stored in different operational waste containers or bins. Waste will be dumped into the static compacter to be provided. The waste will be collected from the waste generating sites and taken directly to the compacter. The compacter waste slugs will be stacked in a container for proposed weekly removal or if required daily per arrangement in smaller quantities.

The following design parameters are applicable:

WASTE GENERATION GUIDELINES	
Residential (Medium developments)	0,8 kg/cap/d
Residential (Upper developments)	01,2 kg/cap/d
Commercial(Finical)	0,01 kg/cap/d
Commercial(Mixed)	0,05kg/cap/d

7.4.5.3 Waste Generation Estimates

The daily waste generation figures for the various areas in this development are indicated in the table below.

The development will generate approximately 560 m³ of solid waste per week that will be removed by the local authority.

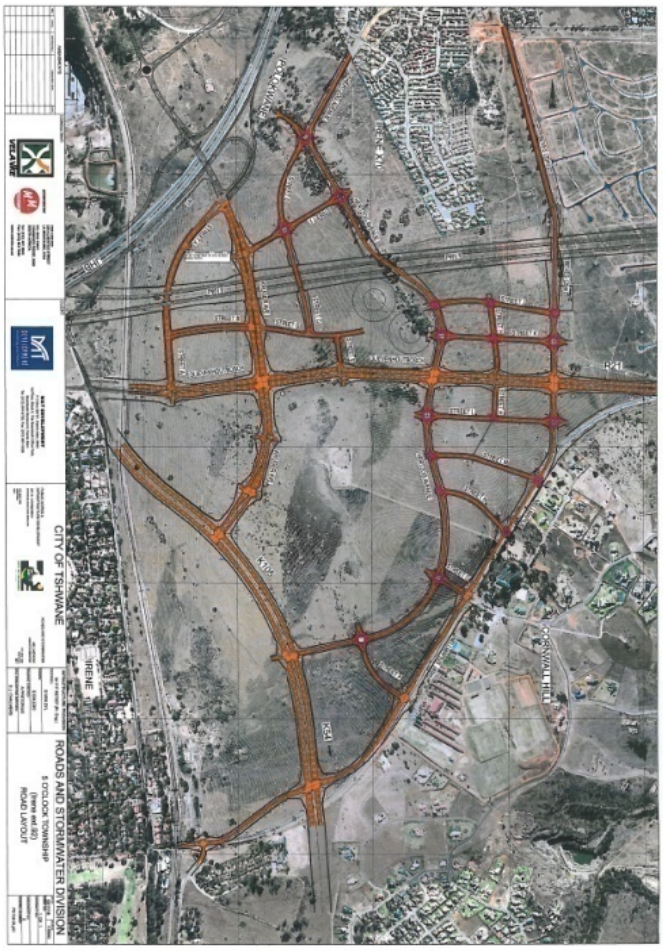
Erf No	Rate Kg / m2 / day	Erf Size m²	FSR	Gross Floor Area m²	Weight / day Kg
1	0.05	25324	1.0	25324	1 266
2	0.05	2144	1.0	2144	107
3	0.05	14966	1.0	14966	748
4	0.05	4948	1.0	4948	247
5	0.05	11111	1.0	11111	556
6	0.05	4821	1.0	4821	241
7	0.05	18964	1.0	18964	948
8	0.05	2208	1.0	2208	110
9	0.05	297	1.0	297	15
10	0.05	10949	1.0	10949	548
11	0.05	15074	1.0	15074	754
13	0.05	40862	1.0	40862	2 043
14	0.05	671	1.0	671	34
15	0.05	21700	1.0	21700	1 085
16	0.05	1076	1.0	1076	54
17	0.05	27398	0.6	16439	822
18	0.05	17397	0.6	10438	522
19	0.05	28531	0.5	14266	713
21	0.05	36510	0.5	18255	913
24	0.05	32014	1.2	38417	1 921
25	0.05	46782	1.3	60817	3 041
26	0.05	3092	1.3	4020	201
27	0.05	20083	1.3	26108	1 305
28	0.05	1601	1.3	2081	104
29	0.05	30182	1.3	39237	1962
30	0.05	2431	1.3	3160	158
31	0.05	18278	1.3	23761	1 188
32	0.05	586	1.3	762	38
33	0.05	25095	1.3	32624	1 631
34	0.05	18259	1.3	23737	1 187
35	0.05	157186	0.8	125749	6 287
36	0.05	2521	0.8	2017	101
38	0.05	58281	0.6	34969	1 748
39	0.05	18666	0.8	14933	747
40	0.05	19822	0.8	15858	793
41	0.05	21432	0.8	17146	857
42	0.05	21512	0.8	17210	861
43	0.05	35615	0.5	17808	890
45	0.05	8770	0.8	7016	351
46	0.05	10609	0.8	8487	424
47	0.05	22245	0.8	17796	890
48	0.05	19105	0.8	15284	764
50	0.05	40756	0.6	24454	1 223
51	0.05	12883	0.5	6442	322
52	0.05	14450	0.5	7225	361
53	0.05	42612	0.6	25567	1 278
55	0.05	10137	0.4	4055	203

7.4.6 Traffic

Note: The figures incorporated into this section of the report form part of the Traffic Report included as ***Annexure M, Q and R*** of the DFA Application.

A Traffic Impact Assessment was conducted by Vela VKE ***(refer to Annexure P of DFA Application).***

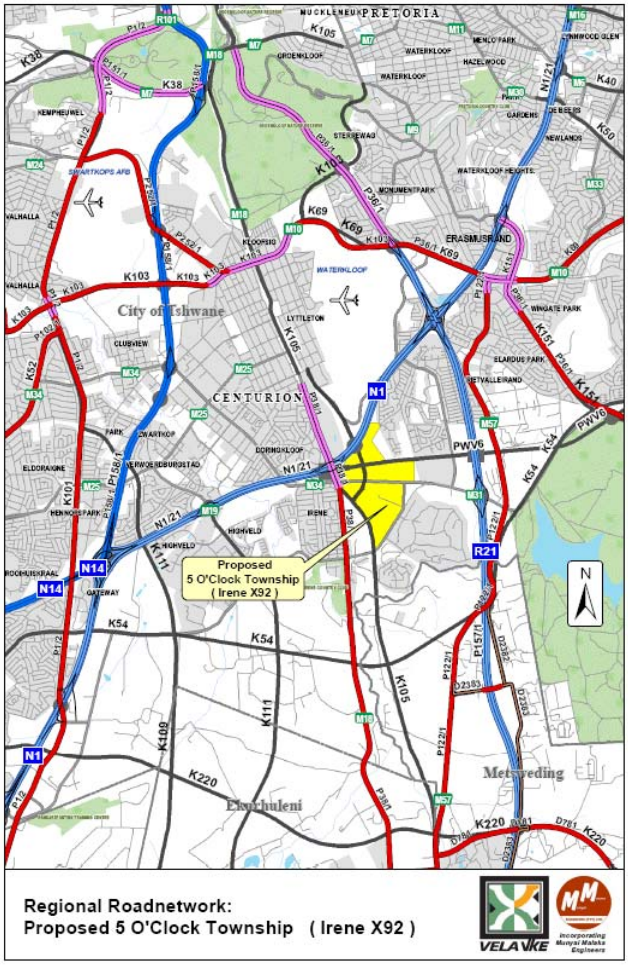
Existing Road Infrastructure



From an existing road infrastructure perspective it is noticeable that the site of application is bordered by Nellmapius Road on the south-eastern boundary of the site. The National Road N1 borders the Land Development Area to the north. On the western boundary of the site the existing railway line separates the site of application from the existing Botha Avenue, which in turn, intersects with the National Road N1 via the Botha Avenue interchange. The site does currently not have any direct access onto the National Road N1 or to Botha Avenue. Hertzog Road, which is extended from the Pierre van Ryneveld townships, and currently provides access to the existing township Irene Extension 70, shall in future be extended in a southern direction. Access to the Land Development Area can currently be obtained from Hertzog Road.

Access to the regional road infrastructure is currently obtained via the connection of Nellmapius Road with the R21 (Albertina Sisulu) freeway as well as via the connection of Nellmapius Road with Botha Avenue and that of the aforementioned with the National Road N1.

The following existing roads impact as follows on the proposed township.



- **Nellmapius Drive**

Nellmapius Drive is a municipal road and forms the south-eastern boundary of township. As olievenhoutbosch Avenue will replace a section of Nellmapius Drive, forming a link between future provincial road K105 (Main Road) and the R21 freeway, Nellmapius Drive has been re-aligned in the North to link up with Olievenhoutbosch Avenue opposite the Beves Avenue Extention from Pierre van Ryeneveld township.

Nellmapius Drive has also been re-aligned in the south to improve the angle of the intersection with the future K105 road alignment. Six access points are provided along Nellmapius Drive to the 5 O'clock Township.

- **Beves Avenue**

Beves Avenue is a municipal road and is extended from Pierre van Ryeneveld township in southerly direction, crosses over the future planned PWV6 to link-up with the future planned Olievenhoutbosch Avenue, opposite the above mentioned re-aligned Nellmapius Drive intersection.

Beves Avenue provides two access points to the 5 O' Clock Township.

- **Hertzog Avenue**

Hertzog Avenue is a municipal road and is also extended from Pierre van Ryeneveld township in a southerly direction, crosses over the future planned PWV6, traversing the 5 O' clock site to link-up with future planned provincial road K105 in the south.

There are nine access points provided along Hertzog Avenue to the 5 O'Clock site.

Proposed Road Infrastructure

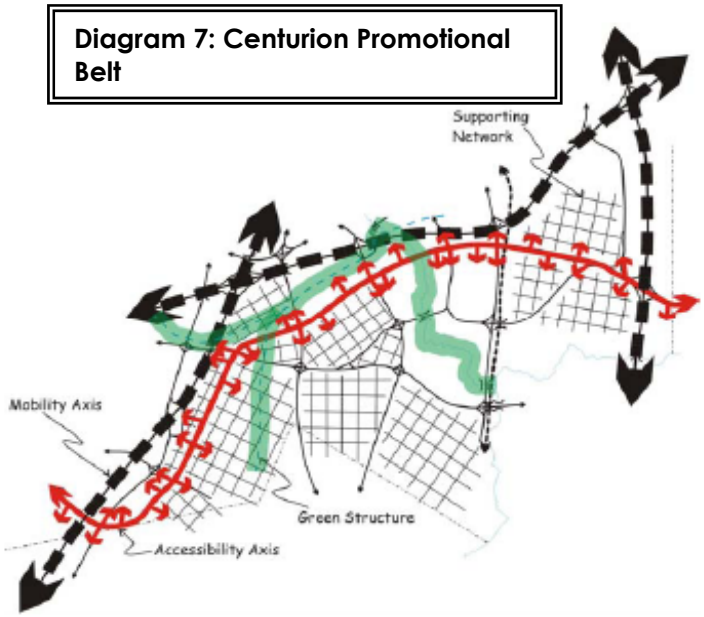
The site plays a key integration role in future road networks in Centurion. The provision of new road infrastructure within the site of application shall strongly support and strengthen the implementation of the local development lattice in light of the strategic positioning of the site and the spatial opportunity of road infrastructure integration.

The following future planned roads impact as follows on the proposed township.

Olievenhoutbosch Road

Olievenhoutbosch Avenue is a City of Tshwane initiative, linking Alexandra Road in the west with the Rietvlei interchange on the R21 freeway in the east. It will link the R21 at the Rietvlei Dam interchange with the N1 at the Samrand interchange over a distance of 15km. It is commonly acknowledged that the construction of the said road shall promote the establishment of a strategic development corridor N1 Development Corridor / Centurion Promotional Belt), parallel to the National Road N1.

Diagram 7: Centurion Promotional Belt



A problem currently experienced in as far as the facilitation and implantation of the corridor is concerned pertains to the extension of the supporting road infrastructure to connect the areas to the east and west of the application site in order to establish a direct link between the R21 freeway and the National Road N1. The construction of Olievenhoutbosch Road shall complete this process of integration by means of linking Alexandra Road to the west of the site of application with Nellmapius Road to the east of the site and in turn with the Rietvlei interchange on the R21 freeway.

In as far as the Land Development Area is concerned the proposal is to provide for the provision of the road from the newly planned interchange between Provincial Road K105 and Alexandra Road, crossing over the Pretoria-Johannesburg Metro Rail railway line, traversing the site of application, and linking up with Nellmapius Road at the intersection of Van Ryneveld Road in the east.

There are six access points provided along Olievenhoutbosch Road to the site of application.

Kruger Avenue Interchange

A new interchange on the N1 freeway shall provide direct access to the Land Development Area and shall forthwith be known as the Kruger Avenue Interchange.
The evaluation of the proposed interchange consisted of two phases, namely

Phase 1: Evaluation of two interchange alternatives ("Lupin link road versus Split diamond interchange), and the results was reviewed with SANRAL.

Phase 2: Evaluation of minor adjustments to the proposed Kruger Avenue split diamond interchange, as requested by SANRAL**. (Refer to Annexure P: Traffic Impact Study).**

The figures showing the layout and traffic of these two alternatives, are attached in the Traffic Impact Study as Appendix C.

The results of the analysis show that that there will be an improvement if the access to the development from the southern terminal of Kruger Road is removed. However it should be noted that the driving force to build the proposed interchange, is the regional accessibility it provides to the proposed developments in the area. The proposed interchange redistributes traffic and as can be seen in the results of the capacity analysis (Refer to Traffic Impact Study), the levels of service at the Botha Avenue interchange improves. The proposed bridge interchange creates additional and also improves the region accessibility of the Pierre van Ryneveld area substantially.

Kruger Avenue shall provide for the integration of the internal road infrastructure with the newly to be constructed interchange by means of its north-south alignment connecting the N1 freeway in the north with the newly proposed alignment of the Provincial Road K105.

Kruger Avenue shall intersect with Olievenhoutbosch Road and in total provide for five access points to the site of application.

Provincial Road K105

Provincial Road K105 is a future planned 6 lane K-route of the Gauteng Provincial Government, linking the Botha Avenue interchange on the N1 freeway with Nellmapius Drive in the south.

The route location report of the K105 road is in the process of being approved by the Gauteng Provincial Government and subsequently be protected in terms of the Gauteng Transport Infrastructure Act. Both SANRAL and the Gauteng Department of Public Transport Roads and Works (GDPTRW) however agreed that Botha Avenue with existing interchange should be retained as the class 2 north-south major arterial in this area and that K105 should be rerouted to the Botha Avenue. Amendments to the proposed alignment of the said road is proposed in order to relocate the northern destination / connection point of the road from its previously proposed interchange position on the N1 freeway to the newly proposed intersection position with Alexandra Road. The road shall therefore remain in its original position in as far as the alignment of the road affects the southern portion of the Land Development Area, then deviate from the existing alignment by turning into a western direction, crossing underneath Olievenhoutbosch Road, crossing over the Pretoria-Johannesburg Metro Rail railway line and linking up with Alexandra Road.

Provincial Road PWV 6

PWV 6 is a future planned freeway of the Gauteng Provincial Government traversing the site of application. The preliminary design has been adhered to as there will be no direct access from the Road to the Land Development Area and all internal roads shall either traverse under of over the PWV 6.

The updating basic planning of the PWV6 between Botha Avenue and the R21 was done in 2002. It was designed as a double carriageway with 3 lanes per direction, although it has been agreed in principle by Gauteng Province that the reserve and the cross section can be reduced. This is however not finalized.

This road will be constructed in phases depending on the Gauteng Provincial Government's priorities.

Beves Avenue

Beves Avenue is a municipal road and shall be extended from Pierre van Ryneveld in a southerly direction, crossing over the proposed Provincial Road PWV 6 to link up with the planned extension of Olievenhoutbosch Road, opposite the new re-aligned access position of Nellmapius Road and Olievenhoutbosch Road.

There area two access positions provided along Beves Avenue to the site of application.

Hertzog Road

Hertzog Road is a municipal road is also extended from Pierre van Ryneveld township in a southerly direction, crosses over the future planned PWV 6, traversing the 5 O'Clock site to link up with future planned provincial road K105 in the south.

Nine Access position are provided along Hertzog Road.

Nellmapius Road

In light of the proposed extension of Olievenhoutbosch Road to provide for a connection between K105 / Alexandra Road and Nellmapius Road, a section of Nellmapius Road shall be realigned in the north to link up with Olievenhoutbosch Road opposite the Beves Avenue Extension from Pierre van Ryneveld townships.

Internal Network

All roads within the Land Development Area will be designed and constructed in the accordance with the applicable standards of the City of Tshwane.

Implications for Development

- It will be possible to supply the study area with the necessary infrastructure.
- The topography on site will allow for cost effective installation of gravitational based storm water management and for the provision of other services.
- Link services to municipal services will have to be implemented at the cost of the developer for the provision of sewerage and water reticulation.
- Some upgrading will be needed to some of the reservoir systems that will be used by the development for the provision of water reticulation.
- To accommodate the proposed development the following upgrades to the external traffic system will have to be done:
    - Construction of Olievenhoutbosch Road
    - Localized intersection upgrades
    - An investigation needs to be done by Gautrans into the possibility of scaling down the K105 to a municipal road to relief Main Road traffic.

7.5 Demography and Feasibility

Demacon Market Studies were commissioned by **M & T Developments** to compile a comprehensive, specialist site-specific market study to establish the capacity of the local market to sustain a mixed use development situated adjacent to the N1, Irene, Centurion. ***Refer to Annexure Y of the DFA Application for a copy of the report.***

7.5.1 Economic Overview

Global national economic trends

According to Demacon the current economic, business and investment environment is extremely challenging due to the severe global and local recession, as well as the high domestic inflation rates. However, the combination of lower interest rates, increased fiscal stimulus, the hosting of the 2010 World Cup, ongoing infrastructural activity and a sound banking system should provide the basis for a solid economic, but ultimately below potential, recovery in South Africa during the next 18 months. Global expectations for 2010 show signs of economic recovery which would have beneficial advantages for South African and major metropolitan regions.

Local Economic Indicators (Centurion)

Demacon stated that the Centurion local economy moved from 6.5% to 5.8% annual growth from 2001 - 2008. The effects of the global recession can be seen from 2007 to 2008 in local growth rates which have subsequently decelerated from 8% to 5.8%. Centurion local economy contributed approximately 16.4% towards City of Tshwane economy.

The four dominant contributors to the Centurion local economy include finance & business, general government services, manufacturing and the trade sector as indicated in Table 10.

Table 10: Key Economic Indicators of the Market Area

Variable	Market Characteristics
City of Tshwane Economic Growth Performance Centurion Economic Growth Performance	✓ 4.1% per annum ✓ 5.8% per annum
Centurion Dominant Economic Contributions	✓ Finance & business sector– ***29.1%*** ✓ General government services – ***21.1%*** ✓ Manufacturing – ***14.0%*** ✓ Trade sector – ***12.7%***

7.5.2 Demographic Market Overview

The market area is informed by SACSC criteria, which is guided by a **10km radius** and further refined by trade area based research. ***Refer to Table 11 for a demographic market summary.***

Table 11: Key Socio-Economic Indicators of the Market Area

Variable	Market Characteristics
Population size	259,438 people 92,644 households
Household Size	2.8 people / household
Age profile	14.7% - between 10 and 19 years 37.5% - between 20 and 40 years 26.5% - between 40 and 60 years 8.8% - 60 years + 74.6% - between 15 – 65 years
Highest level of education	45.9% - Higher 33.3% - Std 10/Grade 12 12.8% - Some secondary 3.9% - Some primary 2.7% No schooling
Variable	**Market Characteristics**
	1.5% - Complete primary
Level of employment	74.9% Economically active of which 4.0% is unemployed and 96.0% is employed
Occupation profile	19.1% - Professionals 18.5% - Elementary occupations 13.7% - Technicians and associate professionals 12.0% - Legislators, senior officials and managers 11.7% - Clerks 6.7% - Undetermined
Dwelling types	63.6% - House or brick structure on a separate stand or yard 21.4% - Town / cluster / semi detached house 6.8% - House / flat / room in back yard 3.5% - Flat in block of flats
Tenure status	47.5% - Owned but not yet paid off 22.3% - Owned and fully paid off 17.5% - Rented 12.7% - Occupied rent-free
Average household income (2009)	R429,129 per annum, R35,768 per month – (All LSM) R491,045 per annum, R40,920 per month – (LSM4 to 10+)
LSM Profile	84.6% LSM 4 to 10+ 46.9% LSM 10 to 10+

Demacon estimated that approximately **259,438** people and **92,644** households reside in the market area with an average household size of **2.8** people per household. The area is

furthermore characterised by an increasing number of younger couples and families as well as mature parents in the market. Of the total labour force, **96.0%** in the market area is formally employed - largely within occupations varying from professionals to service workers, shop and market sales workers.

7.5.3 Residential Market

The residential market, estimating the development potential of a residential development in the market is summarized in ***Table 12.*** In order to reach this objective, Demacon identified and assessed the supply and demand for residential facilities within the market area in light of current trends.

Table 12: Summary of the Residential Composition (Core Target Market)

Income Midpoint 2009	House Price	Distribution (%)	Assumed capacity (2,382)	Classification
R 182,231	R 440,371	28.1%	669	Entry level Economic Freestanding / Group
R 364,461	R 880,740	39.3%	935	Sectional title town houses
R 728,921	R 1,761,478	23.0%	548	Full title cluster units
R 1,457,842	R 3,522,955	5.7%	135	Freestanding full title homes
R 2,915,683	R 7,045,908	2.0%	48	Freestanding full title homes
R 3,921,112	R 9,475,584	2.0%	47	Freestanding full title homes

Demacon's Findings:

- The Irene Ext 92 Development lends itself to a total of **2,382** residential units to be developed, into an integrated housing development which could be increased to 3,250 units.
- In terms of prevalent market conditions, the optimum number of bonded units to be developed within the **first phase** is calculated as **750 – 1,000 units**.
- The average price range of the majority of residential units should be in the region of **R400,000 – R800,000** (i.e. low end bonded to high income), higher price units should be limited in this instance.
- A combination of credit linked and low-end bonded types are recommended.

- It would take an estimated **5 to 7 years** for these units to be absorbed by the market (improving market conditions may accelerate take-up).

7.5.4 Retail Market

Demacon integrated the findings of the retail study into an empirical assessment of retail market potential. Demacon's Retail Demand Modelling results illustrate that the consumer market can sustain a total retail offering based on the following:

Table 13 : Summary of the Retail Market

	5 – 10 year forecast	10 – 15 year forecast
Market size (2009) – annual consumer retail spend	R 11,118,322,014	
Optimum size (m^2 GLA) – including banking & services	**52,142m^2**	**61,251 m^2**
Annual sales potential	R1,004,310,803	R1,179,759,865
Employment opportunities (on site)	1,738	2,042
Capital investment	R283,653,537	R333,206,670
Parking bays required	3,129	3,675
	5 – 10 year forecast	**10 – 15 year forecast**
Parking infrastructure & landscaping cost	R75,422,641	R88,598,673

Given the economic and demographic outlook for the market, the 5 – 10 year forecast by Demacon recommends a total retail offering of **±52,142m² GLA**, and the 10 – 15 year forecast of total retail offering of **±61,251m² GLA**. Retail can be classified as *specialist / entertainment / theme / lifestyle*. An annual sales potential of at least **R1 billion per annum** is expected for the next 5 – 10 years forecast and **R1.2 billion per annum** is expected for the next 10 -15 years forecast**.** The project will create **±1,738** permanent on-site jobs for the 5 – 10 years forecast and **±2,042** permanent on-site jobs for the 10 – 15 year forecast. Demacon recommended that the optimum point of market entry should be in **2013 / 2014.**

7.5.5 Office Market

Demacon's demand modelling indicated office potential of approximately **150,000m2 office GLA** is to be allocated as gross leasable office space over the next 5 years with a total of **400,000m² GLA** on the long term.

Table 14: Synthesis of Space Demand Modelling Results – m² GLA (cumulative)

Cumulative Additional Space Demand	Up to 2014	2019	2024
Finance & Insurance *(sqm GLA)*	35,819	45,980	66,551
Business services *(sqm GLA)*	589,164	1,106,614	1,495,768
TOTAL: Centurion	**624,983**	**1,152,594**	**1,562,319**
Nodal Share - min	**124,997**	**230,519**	**312,464**
Nodal Share - max	**187,495**	**345,778**	**468,696**
Average	**156,246**	**288,148**	**390,580**

Note: the nodal shares and the average figures are cumulative

Demacon's Findings:

The following emerged from preceding paragraphs:

- Dominant sub-sector: **Business services sector**
- Recommended type of office development: **Low rise, medium density, suburban lifestyle offices**
- Optimum size up to 2014: **150,000m2 GLA – 160,000m2**
- The optimum take-up for offices for the following 10 to 15 years would be in the order of **300,000m2 GLA – 400,000m2**
- Optimum point of market entry: **2011**
- Employment opportunities: **4,198**
- Capital investment: **R738 million**
- Provisions should ideally be made to accommodate future expansion.

The above modeling results reflect private sector office demand. Demacon stated that the effect of single large corporate tenants, parastatals and government departments

(tenants who sometimes take up between 40 000m² - 80 000m²+ office GLA) may increase demand and subsequent take-up by an additional 10-15%.

7.5.6 Hotel Analysis

According to Demacon performance of the South African, and in particular the Gauteng tourism market has been countercyclical in recent years – i.e. whereas tourism figures have plummeted globally, attendance and occupancy rates are growing at a healthy pace locally. In Gauteng, the prime benefactor is 3, 4 and 5 star hotels. An important driving force appears to be the fact that 90%+ of tourists are from other African states. Consistent with contemporary nodal development principles, the demand for short-stay accommodation facilities at the Centurion node was modelled. Current tourism growth rates are excessively high, and Demacon adjusted these downwards for purposes of the calculation.

Table 15: Market Demand Estimations – cumulative

Type Of Short-stay Accommodation	Demand (2011)	Demand (2016)	Demand (2021)
Three to Four Star Hotel			
Beds	232 beds	467 beds	940 beds
Conference Facility	424 seats	1,213 seats	2,801 seats
Restaurant Facility	242 seats	693 seats	1,601 seats

Demacon's Demand Modelling indicates a *hotel facility* of approximately **232 beds** (in 2011) along with *conference facility* consisting of **424 seats** and a *restaurant facility* consisting of **242 seats**. The optimum point of market entry is **2012 / 2013.**

7.5.7 Private Schools Market Recommendations

The following table provides the demand market potential for private school.

- **Irene Ext 92 Private School Potential (15%)**

Table 16: Irene Ext 92 Potential

Market Share (15% market share)	2009	2014	2019
Number of people between ages 5 – 9	730	805	889
Number of people between ages 10 – 14	787	869	959
Number of people between ages 15 – 19	827	913	1008
Total (Pupils)	**2,344**	**2,587**	**2,857**

- **Irene Ext 92 Private School Potential (20%)**

Table 17: Irene Ext 92 Potential

Market Share (20% market share)	2009	2014	2019
Number of people between ages 5 – 9	973	1074	1186
Number of people between ages 10 – 14	1049	1158	1279
Number of people between ages 15 – 19	1103	1218	1345
Total (Pupils)	**3,125**	**3,450**	**3,809**

The findings of the private school chapter are integrated into an empirical assessment of private schools market potential. Demacon's Demand Modelling results illustrate that the market can sustain an integrated private school consisting **2,500 – 3,400 pupils** in 2014.

7.5.8 Locational Analysis

The following table provides the site assessment results for the development in terms of its residential, retail, office, hotel and private school potential.

Table 18: Summary of Site Evaluation Results:

Proposed Land Use	Percentage
Residential	78.5%
Retail	80.5%
Office	79.8%
Hotel	77.8%
School	75.9%

* ***Note:*** *80%+ indicates an exceptional site rating; a site rating of 70 – 80% is high and indicates that most important fundamentals for a successful mixed use 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.*

7.5.9 Estimated Timeframe & Land Requirements For the Land Uses

Given tender procurement and land use planning timeframes, it is estimated that the first phases of the project will be able to enter the market in **2011 / 2012**.

Phasing Plan of Land Uses

Table 19: Phasing Plan

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Residential											
Offices											
Hotel											
Retail											
Private School											

A demographic overview of households in the area revealed characteristics of a consumer market that comprise of two main sub markets, the first of which is a well established, affluent, middle aged market (18,8 % of the total market) in Irene proper. The second sub market comprises a growing segment of younger, equally affluent dual income earning families (12,5%) investing in their dream home – predominantly new homes in secure country estates. The high income socio-economic status of the population is reflected in its occupation profile – of the economically active population, 62,1% are professionals – and income profile – the average household in the area earns R186 000 per annum, which is highest of all areas in Centurion.

Essentially, these demographic attributes create favourable demand conditions for most property markets that are compatible with the surrounding environment.

Development Potential

Demacon Market Studies were commissioned to compile a comprehensive, specialist site-specific market study to establish the capacity of the local market to sustain a proposed mixed use development as proposed in this application. The most important findings and recommendations of the market study can be summarized as follow:

Residential Market

- The land development area lends itself to a total of 2382 residential units which can comprise of sectional title town houses, full title cluster units, and freestanding full title homes
- It would take an estimated 5 to 7 years for these units to be absorbed by the market

Retail Market

- The retail should be configured as a combination of street-front and specialized retail formats (including a combination of convenience and destination retailers) interspersed throughout the greater mixed use commercial / office node in clusters – the largest which will not exceed 25 000m²
- The location rated relatively high as a suitable retail location
- It is anticipated that the extension and development of the proposed facility will have a positive impact on the local economy and municipal tax base
- It will address a gap in the market for destination convenience retail and daily necessities, as well as specialty retail thereby addressing the leakage of purchase power from the market

- Given the economic and demographic outlook for the market, the 5-10 year forecast recommends and optimum total retail offering of 52 142m², and the 10-15 year recommends an optimum total retail offering of 61 251m²
- The project will create approximately 1738 permanent on-site jobs for the 5-10 years forecast and approximately 2042 permanent on-site jobs for the 10-15 year forecast.

Office Market

- Approximately 150 000m² office gross lettable area is to be allocated as gross leasable office space over the next 5 years with a total of 400 000m² GLA on the long term
- Optimum point of market entry is 2011
- Approximately 4198 employment opportunities will be created

Short stay Accommodation Market

- A hotel facility of approximately 232 beds (2011) along with conference facility consisting of 424 seats and a restaurant facility consisting of 242 seats should be provided
- The optimum point of market entry is 2013/2014

Private Schools Market

- The market can sustain an integrated private school consisting of 2500-3400 pupils in 2014.
- The optimum point of market entry is 2013/2014

Implications for development

- From an economical and demographical point of view, the proposed development is regarded as suitable for the area. Findings of the demand

modelling, based on prevailing market conditions, indicated that there is scope for development in each market.

7.6 Public Participation

Refer to Annexure U for the Public Participation for the Scoping Report compiled for Irene X 70

Public participation is an important aspect of the EIA process. The principles of the Environment Conservation Act (Act No. 73 of 1989) govern many aspects of environmental impact assessments, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment and ensuring the participation of previously disadvantaged people, women and youth.

Effective public involvement is an essential component of many decision-making structures, and effective community involvement is the only way in which the power given to communities can be used efficiently. The public participation process is designed to provide sufficient and accessible information to interested and affected parties (I&AP's) in an objective manner to assist them to:

- Raise issues of concern and suggestions for enhanced benefits.
- Verify that their issues have been captured.
- Verify that their issues have been considered by the technical investigations.
- Comment on the findings of the EIA.

In terms of the Guideline Document for Environmental Impact Assessment (EIA) Regulations promulgated in terms of the Environment Conservation Act (Act No.73 of 1989), stakeholders (I&AP's) were notified of the Environmental Evaluation Process through:

1) A site notice that was erected (at prominent points on and around the study area) on 24 August 2005 (***Annexure U i)***.

2) On 24 August 2005 public notices/ flyers were distributed to the neighbouring properties and estates/ developments that may be affected by the proposed development ***(Annexure U ii).***

3) Notices regarding the project were further e-mailed and faxed to a list of interested and affected parties and the councillors in the area that registered for other projects in the Irene area ***(Annexure U iii)***.
4) A public meeting was held on 11 October 2005 and a notice that describes the proposed activity was faxed and/or e-mailed to the neighbouring landowners and other interested and affected parties that have registered ***(Annexure U iv)***.
5) An advertisement was placed in 'Die Beeld' newspaper on 16 August 2005 ***(Annexure U v).***

The public meeting on 11 October 2005 was held at the Irene Primary school ***(Refer to Annexure U vi)*** for the Minutes of the Meeting, the Issues register, agenda, and invitations to the Meeting). The strategic environmental sensitivity analysis that was compiled by Bokamoso was presented at the meeting for discussion. The town planner, developer, services engineer and the traffic engineers were represented at the meeting and had opportunities to present their studies/ inputs that were completed up to date and to answer questions regarding their fields of expertise.

The Interested and Affected Parties raised some issues and concerns that must be taken into consideration during the planning stages of the project but also during the reviewing of the application.

To follow is a list of the main issues of concern that were raised:

- The project was launched before approval of the project and the sales agent does not inform the buyers of 1) possible layout changes and 2) the status of the EIA process.

Response:

According the developer no stands were sold the buyers. The buyers signed offers to purchase. Many developers launch projects on their own risk before RoD's are issued. Developers must however obtain permission from the involved local authority to commence with the launch of such a project. Banks prefer it if developers test the market at the beginning of a project. They require that a certain number of stands/ units be sold/ reserved before they approve the necessary financing a project.

- Traffic congestion is a major problem especially in Nellmapius Road where the proposed main entrance for the development is planned (the proposed development will consist of approximately 1800 group housing units, 660 full title stands and a further 300 units in the north western section of the site) for medium to high-income households that will add a significant amount of traffic to the local roads.

Response:

It is true that traffic congestion is a major problem in the area, even if the proposed development does not take place. The developer did however indicate that they are planning to contribute to the construction of Olievenhoutbosch Road – they are even willing to construct the section of the road that cuts across the study area. The main reason why the road is not approved by GDARD yet can be contributed to the ecological sensitivity of the western section of the study area. The preliminary design of the road must take the sensitive issues into consideration and the proposed vertical and horizontal alignments for the road should be discussed with GDARD prior to the submission of the Scoping Report for the road.

- The traffic study should include all the surrounding roads.

Response:

The wider area will most definitely be taken into consideration.

- The layout does not reflect the environmental analyses- high-density housing is planned for the green area at the foot of the ridge.

Response:

At present the proposed development for the foot of the ridge is regarded as a possible future land-use and the layout for the proposed development must still be finalised. The general feeling of Tshwane and the fauna and flora specialists is that the area should remain as open space – it should not be developed at all. The developer is still considering the various options for tat section of the study area and the final layout (if any development is planned for that area) will be work shopped with Tshwane and GDARD prior to its submission.

- Noise impacts from the proposed roads should also be projected as the current layout has residential units planned directly adjacent to the proposed roads which implies that the roads will not be allowed to be built in future due to the social impact. The PWV 6 will be a major provincial road causing major noise pollution

Response:

We take note of this statement. The corridors for the proposed roads are very wide and the town planners were notified of possible noise impacts adjacent to the roads.

It will however only be possible to determine the specific noise impact of the roads on the layout once the vertical and horizontal alignments for the proposed roads are finalised.

We did however consult with Dr. Ben van Zyl (an acoustical engineer) and requested that he supply is with some basic guidelines and buffer zones for developments adjacent to major roads. The guidelines will be supplied to the public and the authorities as soon as available and if necessary amendments will be made to the layout to accommodate the anticipated noise levels.

- Approximately 30% of the site will be open space, what will the zoning be and whom will be responsible for maintaining this area?

The HOA's of the developments that utilize the open spaces/ a combination of the involved local authority & HOA's (if sections of the study area will be used for environmental education purposes). According to Tshwane they do not have the capacity or necessary funds to monitor, manage or maintain the open spaces of the study area.

- Is provision made for state school/church/ other institutional uses?

Response:

Some negotiations are currently taking place between Tshwane and the developer – due to the site's high bio-diversity and other valuable environmental features, they are thinking of a facility for environmental education.

- The line of rocky outcrops on the study area is broken/divided into sections by the development and the road reserves.

Response:

Will not be broken up – design will allow for links.

- Will the development cater for the squatters on the study area?

Response:

No, the squatter are regarded as a major problem, because they are currently damaging the sensitive vegetation of the study area. They will be removed from the study area.

- 18 u/ha is a low density - Will this be accepted by GDARD?

Response:

Although GDARD supports high-density developments, it is not always possible to achieve such high densities in dolomitic areas. The geological conditions of the study area do not allow for higher density developments.

- This site has a variety of sensitive components and the International Convention of Biodiversity prescribed a mandate on how these areas should be managed, conserved & developed. The study area, the area just south of the Smuts Koppie and the Smuts Koppie are classified as irreplaceable sites by the GDARD C-Plan, and this has not been addressed in the development analyses.

This issue has been addressed in the fauna and flora survey as well as in the EMP that was compiled for the development. The proposed linkages with the larger open space system were also discussed with the Land and

Environmental Planning Division of Tshwane and they indicated the areas where links were required. The sizes and shapes of the remaining open spaces on the site were also determined to accommodate the existing bio-diversity and to promote an increase in the bio-diversity of the site. The initial development layouts only allowed for narrow linear open spaces in between structures and the revised layout as discussed in this document (the layout was done after the sensitivity analysis) is a "clutter and space" layout that includes larger continuous open spaces.

- The issue of Olievenhoutbosch road and Nellmapius should be addressed. The community wants a signed commitment from the developer that a contribution will be made towards the Olievenhoutbosch road.

Response:

The developer is more than willing to sign a commitment to construct the road. It is however not that easy, because the current environmental issues will have to be addressed to the satisfaction of GDARD. According to GDARD they do not currently support the proposed alignment for Olievenhoutbosch Road.

- The Red Data species on site should be conserved.

Response:

The waypoints of all the red data species were supplied to GDARD. The species as well as the required buffer zones were taken into consideration.

- The site is in the urban context and roads crisscross the site with more and more squatters on the site destroying everything on site. The community

should support the development and use it as a way to get the Olievenhoutbosch road constructed.

These issues were also addressed at the meeting and were considered during compilation of this Scoping Report.

8. Institutional Environment

Application is made for the establishment of LDAs in terms of the development Facilitation Act, 1995 (Act 67 of 1995) and the Development Facilitation Act Regulations, 2000 to be known as Irene X 92. The capital costs for the development will essentially be borne by the developer. Relative to this, however there lays an obligation on the local authority to support proposals in its interest (expansion of its tax base) as well as those in the interest of the community (investment and ensuring sustainable of development over time) and the environment.

This section contains a documented motivation of the sustainability of the proposed development in terms of the relevant design rationale, proposed zoning and development controls and guidelines of several policy documents.

According to the developer and the market research team, the proposed development will be a significant addition to the economic environment of the City of Tshwane.

8.1 On an International Level

Relevant International Conventions to which South Africa is party:

- **Convention relative to the Preservation of Fauna and Flora** in their natural state, 8 November 1993 (London);
- **Convention on Biological Diversity**, 1995

(provided, and added stimulus for a re-examining and harmonization of its activities relating to biodiversity conservation. This convention also allows for the in-situ and ex-situ propagation of gene material);

- **Agenda 21** adopted at the United Nations Conference on Environment and Development (UNCED) in 1992.
  (An action plan and blueprint for sustainable development)

8.2 On a National Level

The Development Facilitation Act, 1995 (Act No 67 of 1995)

Information supplied by M & T Development Town Planners

It is important to motivate the proposal in terms of the General Principles of the **Development facilitation Act, 1995** and to illustrate how the proposed development further complies with these principles. It should further be recognized that these principles cannot be considered mechanically and can not be considered a fixed set of rules/norms. Not all principles will apply to the proposed Land Development Area and therefore only relevant principles will be discussed from a holistic view in the remainder of this motivation.

Principle 3(1)(a) : "Policy, administrative practice and laws should provide for urban and rural land development and should facilitate the development of formal and informal, existing and new settlements." – The proposed Land Development Area to be known as Irene x 92 represents a new development which is formal in nature. The locality of the property adjacent to the N1 freeway an north of Nellmapius Road, within an existing growing node of the City of Tshwane (CoT) determines its context as formal development within an urban setting.

Principle 3(1)(c) : "Policy, administrative practice and laws should promote efficient and integrated land development in that they –

(i) Promote the integration of the social, economic, institutional and physical aspects of land development – The proposed Land Development Area is holistic due to the fact that broad consultation and input from several stakeholders are required to prepare development plans which must further be supported by the CoT and which must be in line with the CoT's overall planning and development strategies. The developer further preferred to make use of the Development Facilitation Act, 1995 to secure land development rights and to ensure that social, economic, institutional and physical aspects of developing land are integrated. Due to the nature and extent of the development, the developer has seen this process as the most suitable legislative route to ensure that the economic, social, physical and institutional aspects of land development are integrated.

(iii) Promote the availability of residential and employment opportunities in close proximity to or integrated with each other – The proposed Land Development Area comprises of mixed land use precincts where work opportunities, economic amenities and residential accommodation are established. It further contributes towards the holistic spectrum of mixed land uses in the broader context and immediate surrounding areas.

(iv) Optimize the use of existing resources including such resources relating to agricultural, land, minerals, bulk infrastructure, roads, transportation and social facilities – Due to the fact that the Land Development Area can be regarded as infill development, it will ensure that the use of existing resources are optimised through its development. The proposed development is located in close proximity to bulk sewer, bulk water, electrical infrastructure as well as existing road infrastructure. The additional bulk service contributions payable to the

CoT will further contribute to the optimum utilisation and upgrading of existing bulk infrastructure and roads (i.e the construction of Olievenhoutbosch Road in a east-west direction through the site, the proposed re-alignment of K105 as well the construction of an additional off ramp and access from the N1 national Freeway).

(v) Promote a diverse combination of land uses, also at the level of individual erven or subdivision of land – The addition of the proposed Land Development Area in Centurion is seen as a high intensity mixed use development, comprising of erven with a variety of rights such as business buildings, offices, shops, places of refreshment, residential buildings, educational facilities etc. It is therefore the view of the applicant that this development fully supports the creation of a diverse combination of land uses, in conjunction with the existing diversity of land use of the greater Centurion/Irene and surrounding areas. In addition to the above, the proposed Land Development Area is seen as an ideal place to establish a mixed land use node due to its strategic location next to the N1 National Freeway and due its superior access from the proposed Olievenhoutbosch Road.

(vi) Discourage the phenomenon of urban sprawl in urban areas and contribute to the development of more compact towns and cities.

(vii) Contribute to the correction of historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs – The proposed Land Development Area proposes high intensity development within the Centurion/Irene region which already offers high intensity mixed use development at various locations and can further be classified as infill development on vacant land within the urban environment. The proposed Land Development Area will therefore contribute to the re-

engineering of the existing urban form, the establishment of a more compact city and also contribute to the optimisation of the use of existing infrastructure such as bulk water and sewer lines and roads.

Principle 3(1)(d) : "Members of communities affected by land development should actively participate in the process of land development" – Public participation is a key process whereby the public have the opportunity to participate and influence the planning decisions specific to a Land Development Area. As part of Council's attempt to provide the public the opportunity to influence planning decisions in the area, the Integrated Development Plans and Regional Spatial Development Frameworks actively engaged with communities in order to accommodate their concerns prior to the finalisation of these planning policies. In preparation of development proposals for Irene x 92, several public meetings were held which formed part of the Environmental processes. Several community representatives and adjacent land owners attended these meetings in order to give them opportunity to contribute and raise concerns prior to this application for township establishment. The township establishment process provides further opportunity to members of communities to raise their concerns by means of an allotted objection period in which any concerns/objections will be noted by the Designated Officer which can be discussed prior to the pre-hearing or during the scheduled hearing dates. It is also anticipated that the surrounding community (i.e. Irene Vigilance Association, Ward Councilor, Cornwall Hill Home Owners Association etc) will continue to contribute valuable inputs/concerns to the successful implementation of the development.

Principle 3(1)(h) : "Policy, administrative practice and laws should promote sustainable land development at the required scale in that they should-

(ii) Promote the establishment of viable communities - The proposed Land Development Area is a high-intensity mixed land-use development and is not intended as a low-density development which will contribute to urban sprawl. It will therefore contribute to the sustainability and viability of the City as a whole.

(v) Ensure the safe utilization of land by taking into consideration factors such as geological formations and hazardous undermined areas – a preliminary soil investigation was conducted by VGI Consultants (Report numbers/reference VGI 3119, VGI 3119FW, VGI 3171 and VGI 3172). The preliminary findings indicate that the majority of the site is conducive for development. These findings/recommendations together with the recommendations from the Council for Geoscience, will further be valuable inputs for the proposed development concept.

Principle 3(1)(i) :"Policy, administrative practice and laws should promote speedily land development" - The developer preferred to make use of the Development Facilitation Act, 1995 to secure land development rights and to ensure that social, economic, environmental, institutional and physical aspects of developing land are integrated in the best possible approach.

Principle 3(1)(j) : " Each proposed Land Development Area should be judged on its own merits and no particular use of land, such as residential, commercial, conservational, industrial, community facility, mining, agricultural or public use, should in advance or in general be regarded as being less important or desirable than any other use of land." – Due to the fact that the proposed Land Development Area comprises of a mixed use development, the applicant acknowledges that no single land use is more important than any other land use.

Principle 3(1)(k) : "Land development should result in security of tenure, provide or the widest possible range of tenure alternatives, including individual and communal tenure, and in cases where land development takes the form of upgrading an existing settlement, not deprive beneficial occupiers of homes or land or, where it is necessary for land or homes occupied by them to be utilised for other purposes, their interests in such land or homes should be reasonably accommodated in some other manner." – Due to the fact

that the proposed land development is predominantly commercial in nature, the development requires security of tenure. Without such security, it would be virtually impossible to negotiate and enter into any lease agreements or obtain development funding to portions of the land. A range of rental office/commercial/residential use will be accommodated.

Principle 3(1)(m) : "Policy, administrative practice and laws relating to land development should stimulate the effective functioning of a land development market based on open competition between suppliers of goods and services." – The proposed Land Development Area will contribute to the economic growth of the broader Centurion/Irene area and it will also be in competition with other nodes in the region in terms of all land use classifications applied for. The application is a private sector initiative planned and applied for in the context of open market competition.

Principles Contained in NEMA and the DFA

Principles of NEMA and the DFA, which give effect to sustainable development, were followed:

- development must be socially, environmentally and economically sustainable; and
- promotion, of integrated land development in rural and urban areas in support of each other.

Implications for Development

The proposed development is in line with the principles of NEMA and the DFA and will be economically and environmentally sustainable.

National Environmental Management Act, 1998 (Act No 107 of 1998) and the Environmental Impact Assessment Regulations

The Environmental Impact Assessment (EIA) process followed is in compliance with the National Environmental Management Act: NEMA, 1998 (Act No. 107) of 1998), as amended and the Environmental Impact Assessment Regulations of 2006 (Government Notice No's R385, 386 & 387 of 2006). The proposed development involves 'listed activities', as defined by the NEMA, 1998. Listed activities are activities, which may potentially have detrimental impacts on the environment and therefore require environmental authorisation form the relevant authority, before such activities are implemented.

NEMA provide for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith.
This Act formulates a set of general principles to serve as guidelines for land development and it is desirable that:

- The law develops a framework for integrating good environmental management into all development activities;
- The law should promote certainty with regard to decision-making by organs of state on matters affecting the environment;
- The law should establish principles guiding the exercise of functions affecting the environment;
- The law should ensure that organs of state maintain the principles guiding the exercise of functions affecting the environment;
- The law should establish procedures and institutions to facilitate and promote co-operative government and inter-governmental relations;
- The law should establish procedures and institutions to facilitate and promote public participation in environmental governance; and

- The law should be enforced by the State and that the law should facilitate the enforcement of environmental laws by civil society.

Implications for Development

Authorization for the proposed development had already been obtained from GDARD.

Integrated Environmental Management

Integrated Environmental Management (IEM) is a philosophy, which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy aims to achieve a desirable balance between conservation and development (Department of Environmental Affairs, 1992). The IEM guidelines intend endearing a pro-active approach to sourcing, collating and presenting information at a level that can be interpreted at all levels.

8.2.3 The National Water Act, 1998 (Act No 36 of 1998)

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account, amongst other factors, the following:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Reducing and preventing pollution and degradation of water resources;
- Facilitating social and economic development; and
- Providing for the growing demand for water use.

In terms of the Section 21 of the National Water Act, the developer must obtain water use licenses if the following activities are taking place:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in a stream flow reduction activity contemplated in section 36;
e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing in any manner of water which contains waste from or which has been heated in any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a water course;
j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

The National water Act also required that (where applicable) the 1:50 and 1:100 year flood line be indicated on all the development drawings (even the drawings for the external services) that are being submitted for approval.

Implications for Development

Section 21 Water Use Licenses must be obtained for any listed activities in terms of the National Water Act.

8.2.4 National Environmental Management: Air Quality Act (Act No. 39 of 2004)

This act replaced the Atmospheric Pollution Prevention Act (Act No. 45 of 1965), however Part 2 of this act is still applicable. Part 2 of the act deals with the control of noxious of offensive gases. The proposed development will not release any of the listed gases into the atmosphere and this act is therefore not applicable to the proposed development.

The purpose of the Act is "To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto."

Implications for Development

During the construction phase dust pollution can become a significant factor, especially to the surrounding developments and landowners as well as on the N1 Freeway. Dust control would be adequately minimised during this phase by way of water spraying and possible dust-nets, when required.

8.2.5 The National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA)

The NHRA requires heritage resources impact assessments for various categories of development stipulated in section 38 of the Act. It also provides for the grading of heritage resources and the implementation of a three-tier level of responsibilities and functions for heritage resources to be undertaken by the State, Provincial authorities, depending on the grade of the heritage resource. The Act defines cultural significance, archaeological and palaeontological sites and materials (section 35), historical sites and structures (section 34), and graves and burial sites (section 36) that fall under its jurisdiction. Archaeological sites and material are generally those resources older than a hundred

years, including gravestones and grave dressing. Procedures for managing graves and burial grounds are set out in section 36 of the NHRA. Graves older than 100 years are legislated as archaeological sites and must be dealt with accordingly.

Section 38 of the NHRA makes provision for application by developers for permits before any heritage resource may be damaged or destroyed.

Implications for Development

If any historical / archaeological resources of significance is found during excavations and construction, an archaeologist and/or the South African Heritage Resource Agency (SAHRA) and/or a museum has to be informed or contacted immediately so that an investigation and evaluation of the finds can be made.

Even though no sites directly relating to the war were found during the general survey, the study area can be described as a Cultural Landscape, and therefore has cultural historical significance. It is also rumoured that the grave yard for black people that died in the Irene Concentration camp is in the vicinity of the site and may even be situated somewhere on the site! It is preferable that the site remains undeveloped but be conserved as a valuable cultural historical terrain. However, should development proceed, the developer must keep these facts in mind during the construction phases and should treat the study area as a sensitive cultural historical terrain.

8.3 On a Provincial Level

Gauteng Spatial Development Framework (GSDF) (Phase 3: 2000 and beyond)

The Gauteng Integrated Development Framework (Phase 3)

This document provides a development framework for Gauteng Province and focuses on growth and development on a broader level. Several spatial development components

as so-called interventions were identified, of which the following are relevant to the proposed development:

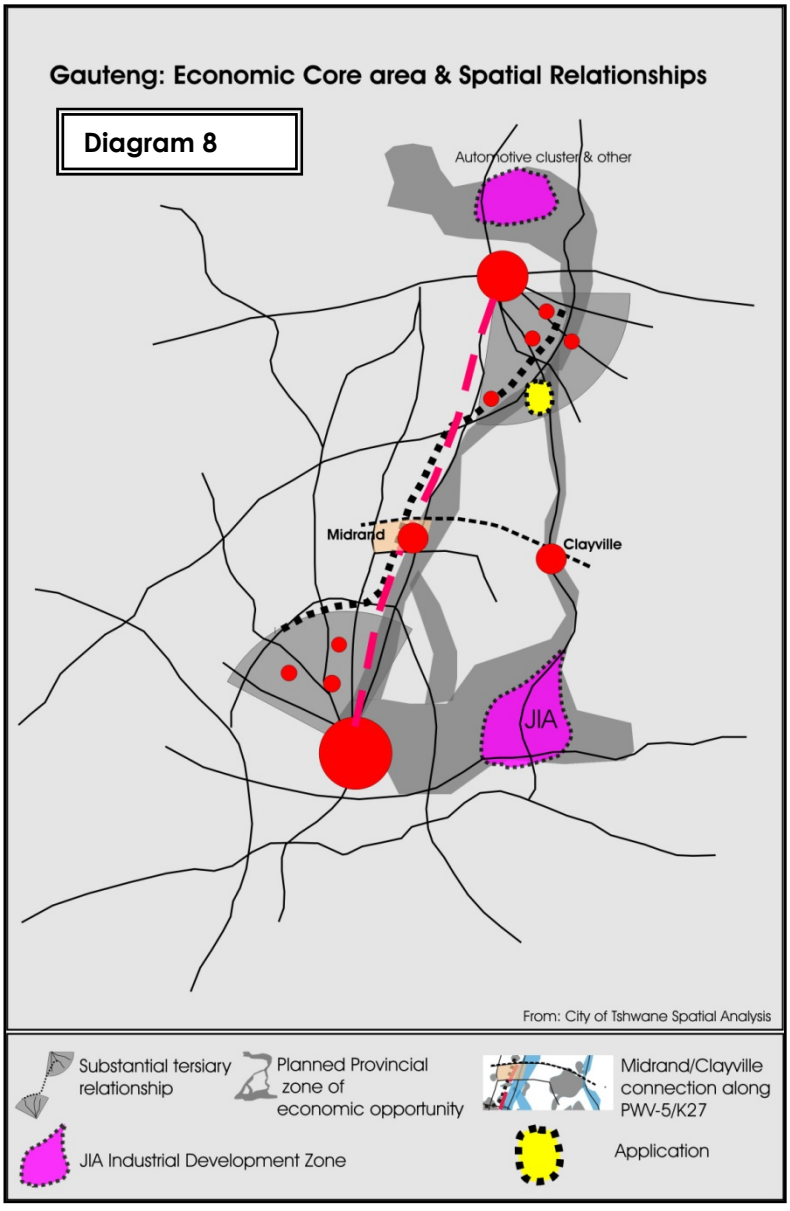
- Centurion is identified as a Growth Area,
- The application site is situated within the provincial Urban Edge where growth should be stimulated and encouraged.
- Containing and Compacting the City: The infill of vacant land contributes towards the optimization of municipal infrastructure.
- Economic Growth: The proposed mixed land use development should be encouraged.

Diagram 8 is an illustration of the Economic components of the IDF:

-The projections are based on various blue IQ projects like the Gautrain, JIA, Automotive Cluster, etc. functioning together within a regional context and plugging into the global economic thrust.

-The illustration indicates the strong relationships that exist between the Tshwane east job opportunities and that of the Sandton / Randburg areas.

Areas situated along the N1-R21 within Centurion and the eastern Tshwane areas are residential focusing on tertiary related job opportunities developing over a wide front in the south.



-The policy also containing the 2 corridors linking the southern and northern urban agglomerations (Johannesburg / Ekurhuleni/ Tshwane). The 2 corridors merge in the vicinity of the study area, which adds to its desirability. The proposed development will link into and contribute to the potential urban energy with good quality housing (that is a main ingredient of the policy to bring job opportunities and housing closer together to increase diversity and mixed land use).

-The Midrand (on the N1 corridor) and Clayville (on the R21 corridor) nodes already strengthen the corridor concepts and create more job opportunities south of the application.

-The proposed development is situated centrally within development thrusts in the surrounding region. The strengthening of economic aspects is a strategy that is systematically implemented by the Gauteng Province through various projects and investments.

The Gauteng Provincial Urban Edge

As already mentioned the proposed development falls within the Provincial Urban Edge.

The Gauteng Draft Red Data Policy

The main purpose of the draft Red Data Policy is to protect red data plant species in Gauteng Province. This policy required that red data species remain in situ and it gives priority ratings (based on where they occur) to the different red data species. The red data species that were identified on the study area have A1 and priority grouping B ratings and it requires a 200m buffer zone around all the species in an urban environment. However a **100m** buffer zone around the red listed fern species *Cheilanthes deltoida* was approved by GDARD.

The Gauteng Draft Ridges Policy

The draft ridges policy is also applicable, because a ridge covers a portion of the study area. According to the draft ridges policy a Class 3A ridge affects the study area. If the ridges policy is rigidly applied (with the 200m buffer zone) no/ very limited development will be possible on the study area. The impact of the ridges policy in the develop ability of the study area was discussed with GDARD and Tshwane prior to the layout design. During the preliminary discussions that were held with the authorities, GDARD indicated that the Ridges Policy was only a Draft Policy that are used as guideline document when evaluating applications affected by ridges. The GDARD officials confirmed that they would be willing to consider a development in the ridge area. They requested that the developer supply them with a sustainable development proposal for the study area.

The development proposal as described in this document is a product of an integrated and holistic planning process that regarded the environmental aspects of the study area and its surroundings as the form giving elements for the layout.

Draft GDARD Requirements for Biodiversity Assessments Version 2 (March 2008)

According to the GIDS, 2007, the study area is located on irreplaceable sites and specialist ecological assessment studies were conducted for the study area.

Protection of Agricultural Land in Gauteng Revised Policy (June 2006)

The purpose of this policy is to protect land that has been identified as high agricultural potential from development, for the exclusive use of agricultural production to:

- feed the nation;
- provide upcoming farmers with access to productive land; and
- meet national targets set in this regard.

Land with high agricultural potential is a scarce non-renewable resource and the need to protect it is a high priority for GDARD. The Department applies a risk averse and cautious approach when development of such land for purposes other than agricultural production is proposed. This risk averse and cautious approach should be the basis of decision-making on the transformation of high potential agricultural land and land deemed as irreplaceable in terms of meeting Agri-BBBEE and national food security targets and thus legally protected from transformation.

The Department is not in support of development on high potential agricultural land that resides outside the urban edge. Seven agricultural hubs have been identified in the Gauteng province. All the hubs are located outside the urban edge (2002). These hubs are regarded as areas with a large amount of high agricultural potential land that should be preserved for agricultural use and will accordingly be planned and managed as a holistic agricultural unit. Each of the hubs will be developed to align with its agricultural potential and preferred land use and will be supported by current economic indicators.

The study area is located within the urban edge and is located on **very low to none** agricultural potential soils. The study area also does not fall in one of the seven identified agricultural hubs.

Gauteng Transport Infrastructure Act, 2001

To consolidate the laws relating to roads and other transport infrastructure in Gauteng; and to provide for the planning, design, development, construction, financing, management, control, maintenance, protection and rehabilitation of provincial roads, railway lines and other transport infrastructure in Gauteng.

The Gauteng Transport Infrastructure Amended Act, 2003

The purpose of this act is: *"To amend the Gauteng Transport Infrastructure Act, 2001, so as to amend and insert certain definitions; to provide for the necessary land use rights with respect to stations and for the necessary powers of the MEC to enter into contracts for road and rail projects; to amend the procedure in relation to route determination; to make a second environmental investigation at the stage of preliminary design of a road or railway line unnecessary where the competent environmental authority decides that the environmental investigation at the stage of route determination is adequate; and to provide for incidental matters."*

8.4 On a Local Level

8.4.1 Motivation in Terms of Municipal Policy Guidelines

Information supplied by M & T Development Townplanners

This section contains a documented motivation of the need and desirability of the proposed development in terms of the proposed zoning and development controls, marketing dynamics, guidelines of the different applicable development frameworks, municipal and provincial strategies and development guidelines.

This project falls within the area of jurisdiction of the Gauteng Provincial Government and the Tshwane Metropolitan Municipality. Tshwane Metropolitan Municipality will provide water, electricity, and sewerage disposal for the development.

City of Tshwane Integrated Development Plan 2009/2010 (2006-2011)

According to the MSA (Municipal Systems Act) the IDP adopted by the Council of a municipality is the principle strategic planning instrument which guides and informs all planning and development and all decisions with regard to planning, management and development in the municipality. As far as possible the intention of the TIDP is to link,

integrate and co-ordinate development plans for the municipality. IDP's and RSDF's (Regional Spatial Development Frameworks) are therefore not structure plans but rather broad strategies to increase municipal performance in terms of a pre-determined vision. In order to implement/realize the broad strategies of the IDP, individual projects need to be identified and classified in terms of the IDP.

Numerous challenges face the City of Tshwane (CoT) and other municipalities today and there are no obvious solutions. Challenges include, for example, the provision of basic services, sustainable housing delivery, and the management of urbanization, transportation and economic development, to name but a few. In order to adhere to the above-mentioned challenges, the CoT's service delivery model has proposed a regional approach, where participation from regional sub-structures can be stronger, where local government can be closer to the people. The aim is to make municipal services more accessible to all residents of Tshwane, and generally, aligned to regional development needs. The CoT is further made up of 76 community wards, which are divided into five administrative regions, namely:

- Southern Region (Centurion,Olievenhoutbosch) – The Land Development Area (Irene x 92) forms part of this region
- North West Region (Akasia, Soshanguve area)
- Eastern Region (Garsfontein, Mamelodi area)
- North East Region (Hammanskraal area)
- Central Region Inner-City, Atteridgeville area)

Some of the roles of the region, to which the Land Development Area can contribute to, include the following:

- Ensure decentralized delivery of services
- Support and drive a broader focus on urban management and development

- Ensure effective and efficient delivery of services through maintaining a focus on regional delivery, and promoting service integration across functional lines
- Accelerate prioritized targeted development (within each region)
- Bring local government closer to the people, thereby providing customers with greater accessibility

With the approval of the Land Development Area and with the roll-out of the necessary infrastructure which will meet existing and future demand, the CoT (together with the engagement of several stakeholders in private and public sector) will progress in fulfilling its mandate and obligations as per the Constitution of South Africa, namely:

- Provide quality basic services and infrastructure;
- Promote social and economic development;
- Promote a safe and healthy environment;
- Give priority to the basic needs of communities; and
- Encourage the involvement of communities in the matters of local government

The City of Tshwane Integrated Development Plan is further aimed to respond to the development challenges and opportunities faced by the locality/ward and should further strive to achieve the five above-mentioned strategic objectives.

In light of the above, it is important to reflect on some of the opportunities and challenges of Ward 65, of which the Land Development Area forms part of, as identified through the CoT's public participation process which served as input for the respective needs analysis per ward which took place during the months of September and October 2008. Some of the most important needs identified in Ward 65 pertain to the following broad categories:

- Pavements, sidewalks and pedestrian bridges
- Roads Planning, provisioning and upgrading

- Speed humps – traffic calming and mini-circles
- Traffic Matters, Traffic Flow, Traffic lights
- Stormwater Drains & Canals
- Parks, Street scaping, fencing
- Illegal Land Use, squatting
- Electricity

Integrated Development Plans and Spatial Development Policies of Council are actively proposing intensification and diversification of land uses along important economic development spines such as the National Road N1. The proposed Land Development Area, which is situated directly south of the National Road N1, will further contain and compact the city, contributing to the sustainable maintenance of infrastructure and will address several of the above-mentioned priorities in Ward 65, which is further in line with the economic priorities of the City of Tshwane. .

City of Tshwane Spatial Development Strategy 2010 and Beyond (April 2007)

The purpose of the City of Tshwane Spatial Development Strategy (CTSDS) is to provide a holistic spatial strategy that will give direction to the City of Tshwane's 5-Year programme, formally referred to as the Integrated Development Plan. The strategy is not a spatial development framework, but a strategic tool that addresses specific development needs in the city. Whereas the Tshwane Integrated Development Plan spells out what the municipality needs to invest in order to achieve its objectives as summarized under 3.7.3 above, the CTSDS strives to indicate which are the optimal locations for investment by local government in the Tshwane area in order to address the highly inefficient, inequitable and unsustainable spatial form of the City of Tshwane.

From a regional perspective, the most important elements affecting Tshwane's growth and development, and which specifically impacts on the proposed Land Development Area due to its strategic location, are:

- The direct N1 road link between Tshwane and Johannesburg;
- High-tech and information technology related development along the National Road N1 highway;
- The provincial economic core which encompasses large parts of southern, south-eastern and central Tshwane.

It further forms part of functional area 5 of the CTSDS and will contribute towards the following interventions as identified for the area:

- Residential development and sustainable neighbourhoods – the Land Development Area provides many opportunities for residential densification in close proximity to employment opportunities;
- Engineering services and infrastructure – the Land Development Area will emanate a substantial amount of infrastructure investment (important road links such as Olievenhoutbosch Road will be constructed and will further be linked up with a new off-ramp from the N1 freeway etc) and the bulk service contributions will be utilized to create the necessary water, sanitation, electricity, roads, stormwater and communication infrastructure capacity.
- Economic development and employment creation – the Land Development Area will contribute towards the development of the Centurion Activity Node as identified in the CTSDS;
- Accessibility and Mobility – the Land Development Area will further address the above by contributing towards the inclusion and development of the Bus Rapid transit System along the proposed construction of Olievenhoutbosch Road.

It is also important to reflect on the objectives of the Tshwane Spatial Development Strategy. The proposed Land Development Area can contribute towards the City of Tshwane to become an efficient, equitable, liveable and sustainable urban environment by adhering to the following objectives:

- Integrate residential settlements with areas of economic and social opportunity;
- Integrate the poor with the main-stream day-to-day functioning of the city;
- Densify strategic areas in the city;
- Identify areas of economic development in the city;
- Identify movement networks that connect all the strategic areas in Tshwane;
- Direct infrastructure investment in the city to strategic focus areas;
- Ensure the creation of sustainable human settlements that foster the creation of healthy communities;
- Ensure a sustainable metropolitan area from an environmental, social and economic point of view.

Cognisance must be taken of the fact that the above-mentioned principles are the main underlying principles of the proposed Land Development Area, Irene Extension 92 in order to enhance the sustainability of the broader Centurion/Irene area by providing and upgrading basic and existing infrastructure and social and community facilities that will ensure that people can live productive and healthy lives.

City of Tshwane Compaction and Densification Strategy (May 2005)

The City of Tshwane Compaction and Densification Strategy is specifically focused on addressing development within the urban area and is therefore specifically relevant in as far as Irene Extension 92 is concerned.

The following aspects are considered to be key directives for the City of Tshwane Compaction and Densification Strategy:

- Minimise unmanaged or unfocussed urban growth;
- Create opportunities for the densification of existing low density areas;

- Promote higher density and integrated environments with typical urban characteristics to counteract suburban developments;
- Ensure that residents have access to a range of choices with regard to housing typologies as well as locations;
- Integrate residential development, movement systems, social facilities and employment opportunities;
- Focus residential densification around areas of opportunity (economic opportunity, transport opportunities etc).

The City of Tshwane Compaction and Densification Strategy is further aimed at addressing the need for densification and compaction within the City of Tshwane Metropolitan Area. It is aimed at addressing the structural composition of the metropolitan area as a whole from a densification point of view, rather than making any detailed proposals for densification in specific areas.

The strategy only provides guidelines and norms for densification from a strategic point of view, which must inform and guide more specific densification proposals within the regional spatial development frameworks.

Some of the more important strategies which can be applied to the Land Development Area include the following:

- Densify settlements and ensure filling in and mixing of land uses in all land development and redevelopment actions/interventions;
- Improve the quality of housing and public infrastructure;
- Ensure responsive, effective, efficient and collaborative governance of settlements;
- Develop and strengthen public transport-oriented activity corridors; and
- Increase economic efficiency and productivity of urban form and functions.

In essence, the proposed township, Irene Extension 92, strives to establish an urban form that promotes sustainability and efficiency which in turn adhere to all the above-mentioned principles. The proposed Land Development Area will further strive to create opportunities for the densification of existing low density areas, promote higher density and integrated environments with typical urban characteristics to counteract suburban developments, ensure that residents have access to a range of choices with regard to housing typologies and integrated mixed-use facilities; integrate residential development, movement systems, social facilities and employment opportunities; and focus residential densification around areas of opportunity (economic opportunity, transport opportunities etc). The proposed land uses of the Land Development Area will further promote more compact development of urban areas and will limit urban sprawl and will further promote the use and development of land that optimises the use of existing resources such as engineering services. The Land Development Area further falls within the suburban densification zones in term of the Compaction and Densification Strategy. The maximum density achievable will however be related to the underlying geological conditions.

Tshwane Regional Spatial Development Framework (CTSDF) – Southern Region

This document includes valuable concepts regarding the movement system and the development lattice. According to the CTSDF the movement system in an urban environment is literally the arteries of the city and without these linkages there can be no economy and no inter-relatedness. Movement systems can be used to create access, structure settlements, and promote integration, diversity and mixed land use.

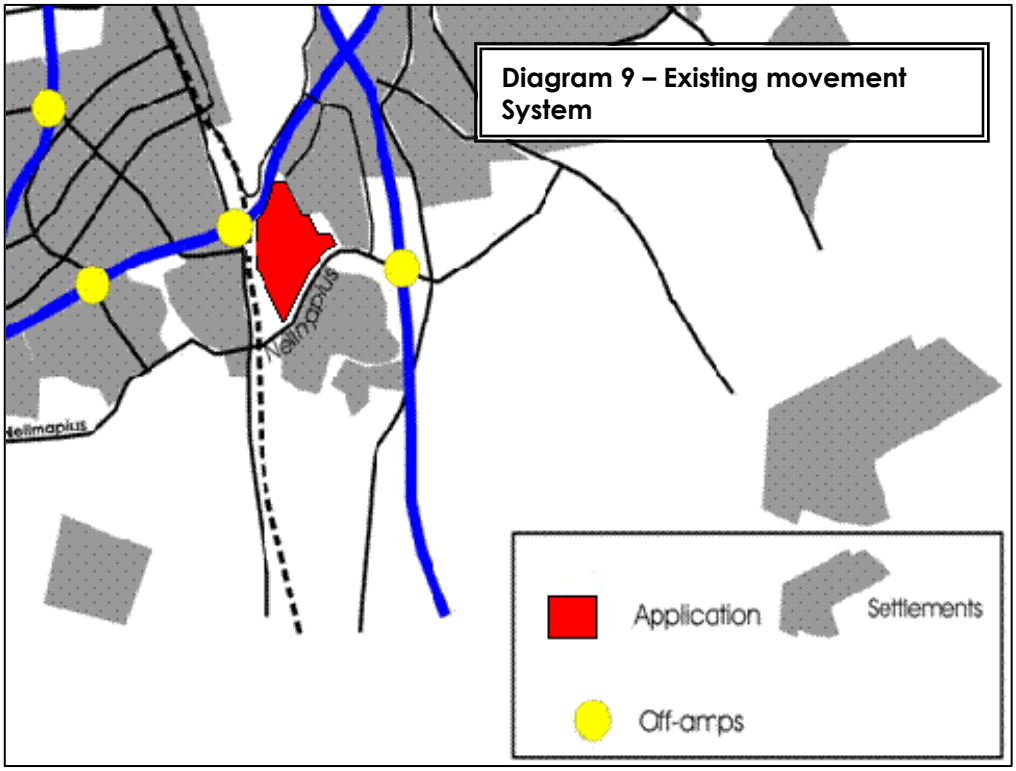
Movement (flows of people, finance, goods) defines the energy networks of settlements. Accordingly, more continuous lines of movement represent planes of greater accessibility and, therefore, become the more desirable planes of connection for intensive use.

By creating a complex and diverse pattern of accessibility, all activities, both large and small, can naturally find a place within the structural system, depending on their need for

accessibility and their ability to pay for it. (market mechanism ensure intensive use of land where important)

According to the CTSDF movement systems provide a powerful planning mechanism to bring about mixed, but broadly predictable, patterns of activity, provided activities are allowed to respond to them.

The following graphic indicates the present state of the movement system surrounding the application.



The area is severely influenced by the existence of large interstitial areas (represented by white colour between areas of settlement) and interstitial elements like freeways. This affects certain areas by actually lowering their levels of accessibility by preventing connections on the lower planes of hierarchy. Although such areas are situated centrally within a large area their lower levels of accessibility prevent them from harbouring extensive economic opportunities. These are the areas suitable for development purposes.

They must have enough scale and space available to develop as neighbourhoods – providing in a critical volume and range of social and local economic services. The application is an extension of an already established pattern of infill development – also providing critical economy of scale as well as a range of job opportunities and services to a community that tends to be isolated.

The graphic also indicates Nellmapius Road. The significance of this road is that they inter-connect the higher order radial road system spreading from the Tshwane CBD area. This inter connectedness provide the local movement systems for the decentralised economic opportunities situated within the so called "suburbs." It is only with these roads that the urbanisation of the suburbs can occur. Nellmapius therefore plays a very important role – connecting origins and destinations of various local nodes and precincts of different types of land uses. Although capacity for movement on this road has been exceeded, the application proposes a slight re-alignment of Nellmapius which extends into the proposed Olievenhoutbosch Road. This should be encouraged as it will stimulate local economic development and will further relief the current over capacitated Nellmapius Road from additional traffic. These traffic movements have no relation to the broad goal of limiting private vehicle use but will increase the ability of land uses to perform better. Cognizance must be taken of the fact that Olievenhoutbosch Road and the proposed K105 is not indicated on the illustration above. The proposed re-alignment of K105 route forms the western boundary of the application site whereas the proposed Olievenhoutbosch Road forms part of the proposed Land Development Area. These two roads will also play a significant role in that they will inter-connect the higher order radial road system spreading from the Tshwane CBD area. The Land Development Area will further provide a road system that will be able to connect with the huge and extensive planned future road system for the immediate area.

According to the CTSDF the lattice development concept consists of an interconnected system of corridors, activity spines and strategically placed nodes, serving as pull factors in the network of activity spines. A set of development corridors and spines form the framework of the urban development lattice and relays urban energy from 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 activity spines.

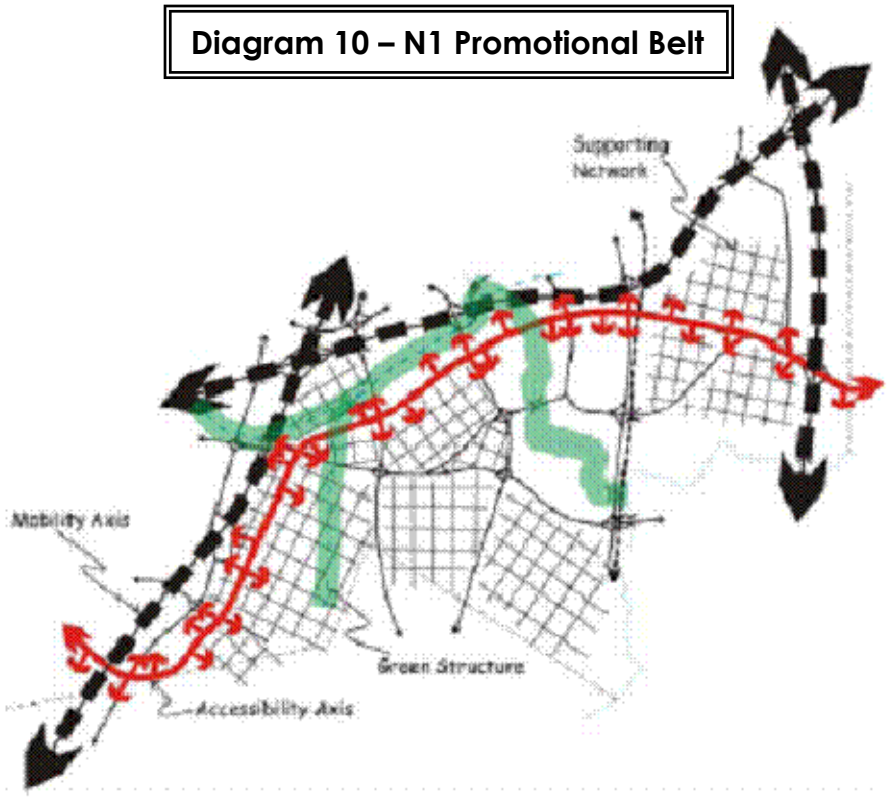
According to the CTSDF the Urban Lattice is based on the following four elements:

- A Latticed configuration – maximising access, movement and development choices
- A Nodal Structure – guiding intense development to specific locations and linked to increased accessibility
- A Precinct Strategy – creating a diverse character along the spines
- Integrated and phased-in public transport – creating opportunities for multiple connections.

The N1 Development Corridor links established nodes and is an existing development corridor.

The Centurion Promotional belt has been developed to provide the N1 Development Corridor with an activity spine. This plan had been developed to capture a zone of potential

Diagram 10 – N1 Promotional Belt

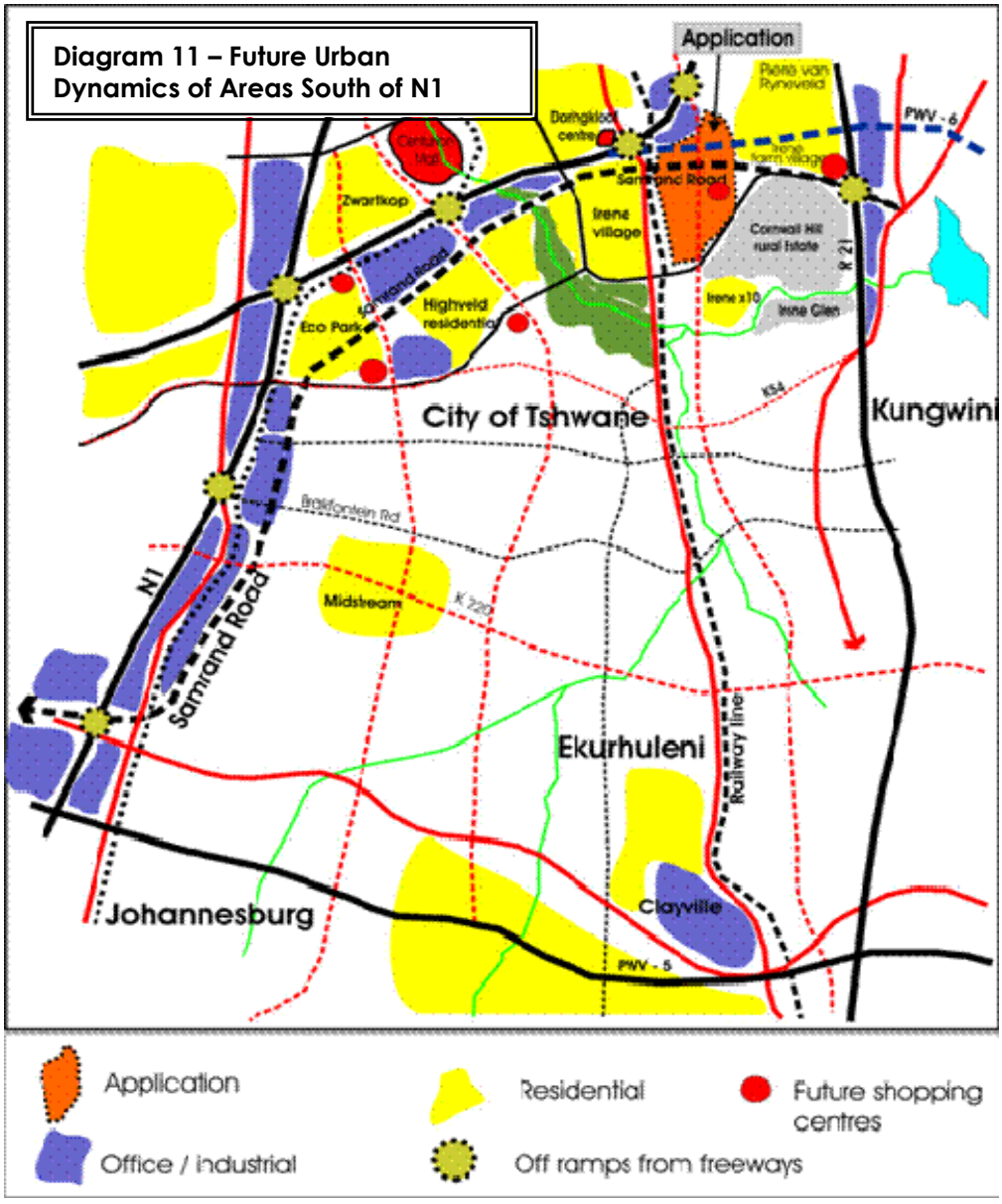


high access along the N1-21 route. Up to 6 off ramps can eventually be directly linked to this road. Numerous connections can be established with existing and future roads.

The application geographically forms part of this activity spine. It would add neighbourhood functions to the extensive existing developed area. As indicated earlier not all land boxed in by high order roads that forms interstitial elements have sufficient levels of access or interconnectedness to accommodate high order economic activities.

The application constitutes infill development – providing economy of scale to an existing developing area. In the process jobs and housing are brought closer together. The following graphic illustrates the urban dynamics of the area south of the N1-21 route. This is the area between the N1 and R21 development corridors. Many planned and existing PWV and K-routes connects the N1 and R21 together. A vast network of higher order routes will be established.

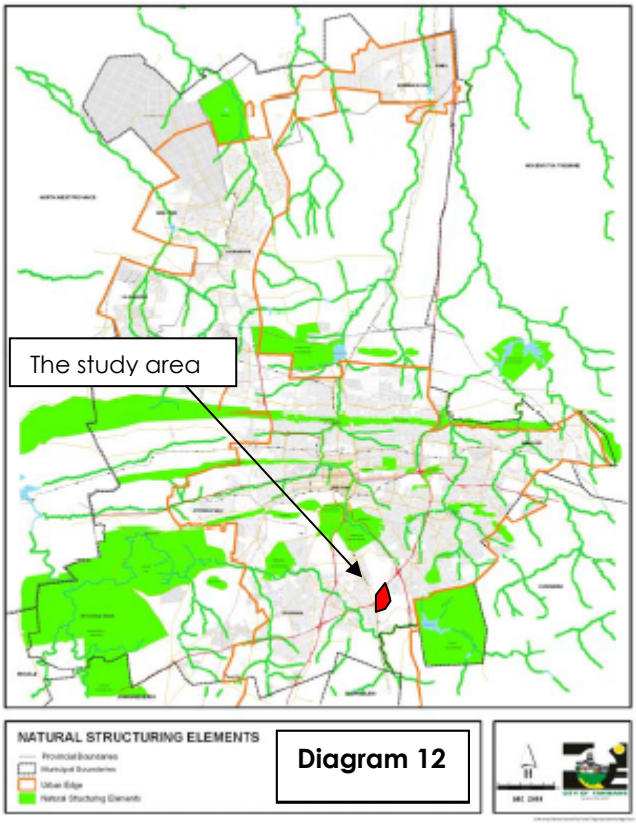
Diagram 11 – Future Urban Dynamics of Areas South of N1



Notable is the K111 and John Vorster Drive's extensions to the south. Many new activity nodes of different hierarchy and levels of access can be accommodated in the future.

Many elements of the N1 Promotional belt have already been put into place. Over many years a steady stream of mixed land use development took place south of the N1. Applications for huge nodes of job opportunities are in the process of being approved. To the west intensive residential functions are being developed.

One problem regarding the N1 Promotional Belt is the area east of the railway line. To integrate this part of the activity spine a bridge has to be built over the railway line as well as Main Street. Cognizance should be taken of the fact that the above concerns are currently considered as it will enhance the accessibility of the Land Development Area to a great extent. Gauteng Province indicated that they support this activity spine as an element of the N1-21 route. This will connect the western part of the promotional belt with the R21 and the off ramp off it presently part of Nellmapius Road. Such a connection will tremendously empower the present road network of the southern area. The proposed road K54 that is planned further south is also on a priority list of Gauteng Province. The K54 road also connects the radial roads and therefore can enormously boost the movement system and therefore the performance of related land uses.



The K54 road will let sub regional traffic bypass to the south of the Irene extensions. This will "localise" the present use of collector roads.

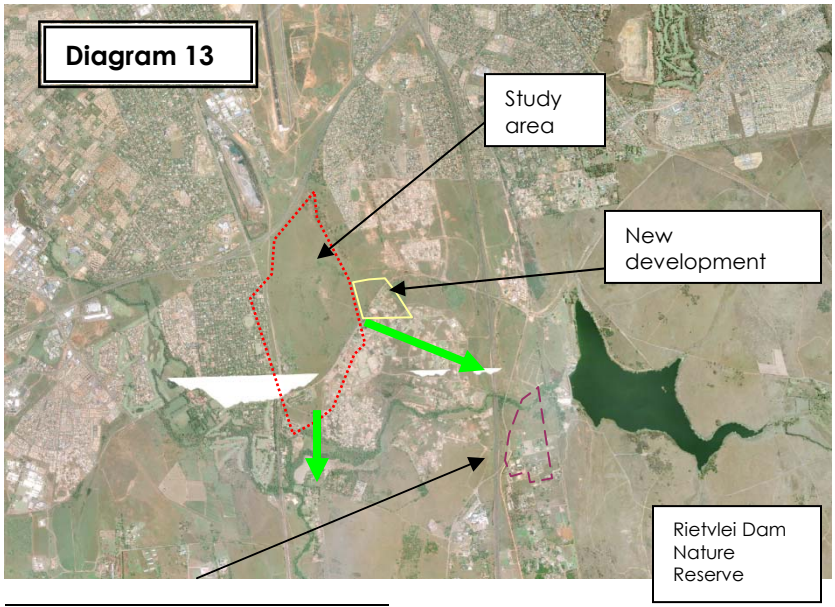
The green open space system (Tshwane Spatial Development Framework)

The Tshwane development framework has identified 'green structuring elements' that consist of large nature reserves and conservancies, ridges or mountain ranges, rivers and streams and other open space that belong to the state. Diagram ?? below highlights all the "Green Structuring Elements" within the Tshwane municipal boundary.

Diagram 13

In this illustration it is clear that the study area does not fall on any of the green structuring elements that were identified[6]. It seems as if the important links between the conservancies and nature reserve are mainly through the drainage/ river system.

From an ecological point of view however the study area may be seen as an important site as it is in close proximity of the Rietvlei Nature Reserve, and as indicated previously the study area is currently a large open space with various habitats and some Red Data plants. The ridge area and the grassveld on especially the western sections of the site (also where Red Data species where found) are important in the ecological balance of the area.



[6] It is however important to note that the new draft open space plan for Tshwane, incorporates the study area as part of the larger continuous open space system and the Land and Environmental Planning Division of Tshwane indicated the required positions for open space links with the larger system. The EMF for the N1/R21 quadrant also identifies the study area as an area to be conserved.

From the aerial photograph it is easy to see that this large open space can be important for species movement from the nature reserve to the surrounding environment.

It is however further clear that to the west and the north there are no other corridors/ linkages – the railway line and the freeway causes fragmentation in these areas. One link towards the south (is a sufficient culvert is provided underneath Nellmaphius Drive) is however possible. This link will allow for the connection of the open spaces of the study area with the open spaces along the Sesmyl Spruit. The open spaces along the Sesmyl Spruit eventually link up with the open spaces of the Rietvlei Dam Nature Reserve.

The developer has however agreed to conserve sections of the ridge and the western sections of the study area along the railway line as one continuous open space/ conservation area with links and species movement corridors thought the development towards Rietvlei Nature Reserve (underlying chert layer with outcrops and the power line servitude allow for the provision of linear open space links throughout the development).

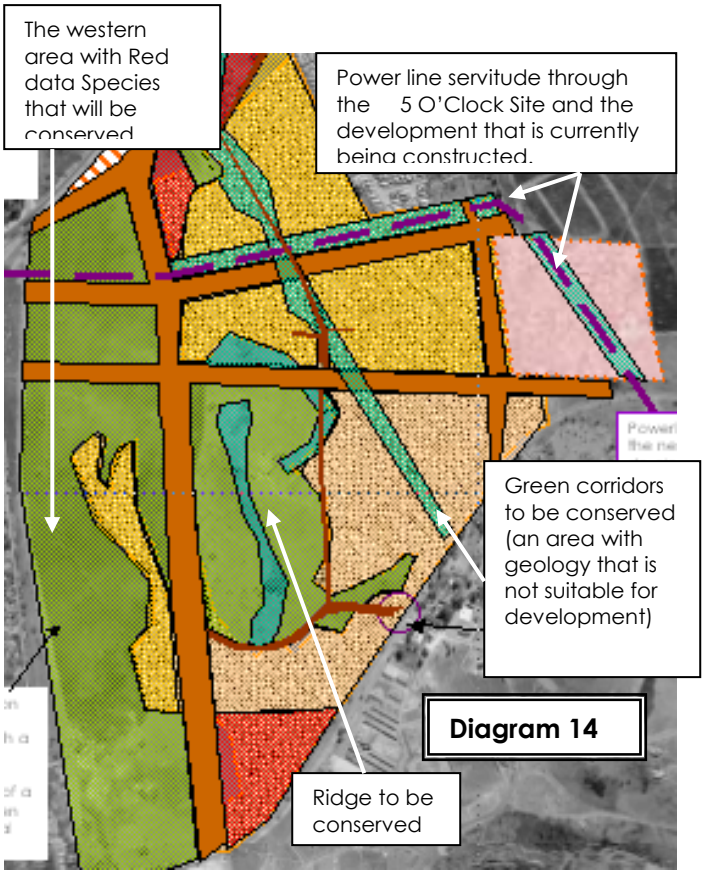
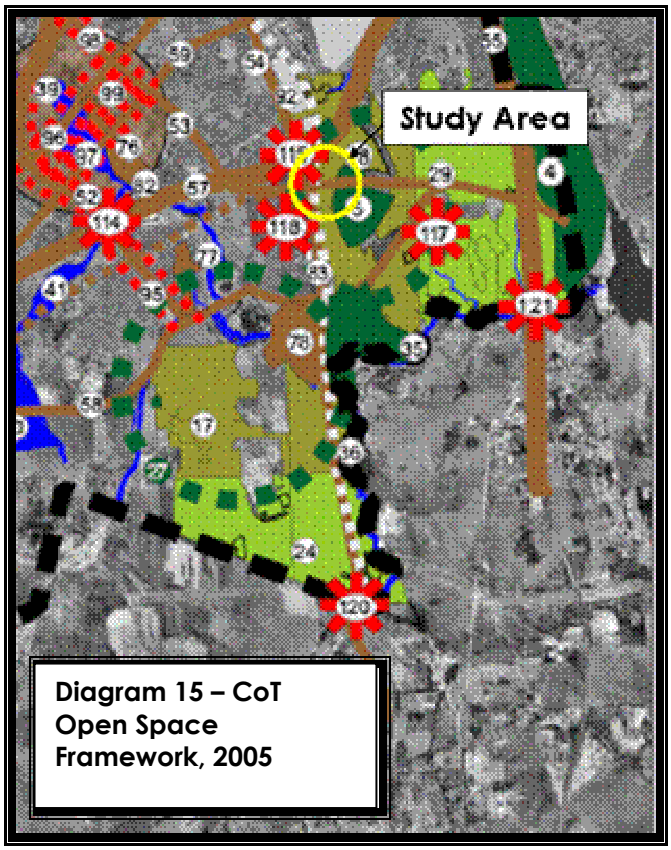


Diagram 14

The development will thus not isolate the habitats on site, the open spaces will be linked to form one continuous open space system.



City of Tshwane Open Space Framework, 2005

The study area falls within a Green Node (high ecological sensitivity, Irreplaceable sites GDARD) according to the City of Tshwane Open Space Framework. ***Refer to Diagram 15.***

The EMF for the N1/ R21 Quadrant

The EMF for the N1/R21 quadrant earmarked the study area as an area that should be conserved. This option was considered as one of the alternatives identified, but according to the Land and Environmental Planning Division of Tshwane and Galago Ventures, the authorities do not have the funding or the capacity to manage, monitor, or maintain the study area as a conservation area. Funding from private investors and holistic and integrated planning to achieve a sustainable private development are needed the ensure the protection of valuable assets of the study area.

Market research did not regard an eco-tourism facility as economically viable. The study area is strategically located within the urban environment and therefore the market value of the study area in terms of its development potential is very high. The developer paid a significant amount of money for the property and therefore the proposed land-use (mainly in terms of the size of the development) must take the profits to be generated by the development into consideration. Developers are not welfare organisations, their main goal is to make money and developments without sufficient profits are not regarded as viable.

The study area is regarded as very sensitive from an environmental point of view and the developer took cognizance of this matter from the start. The developer indicated that they want to take the hands of the provincial and local government (private-public planning partnership) and they offered to involve government in the planning process from the start. GDARD and Tshwane were friendly enough to attend preliminary layout planning meetings and Tshwane even supplied the developer with preliminary comments regarding the proposed conceptual layouts that were presented during the planning meetings. The developer even distributed sensitivity maps and preliminary layouts to the involved Ward Councillors at a Ward Committee meeting that was held at the Council Chambers of Centurion.

We are of the opinion that the developer approached the development with a spirit of co-operation. The developer's willingness to accommodate the environmental assets of the study area was clearly reflected in the preliminary planning meetings that were held and in the preliminary sensitivity analysis' that were submitted to the authorities for comments. We (Bokamoso) regard this approach of the developer as a positive step in the right direction – developers are starting to follow pro-active, holistic, and integrated planning processes with the purpose to achieve developments that are sustainable. We are therefore requesting that the report be evaluated in the same spirit. The developer and the project team is more than willing to meet with the authorities to discuss issues that are unclear during the evaluation process.

Implications for Development:

When looking at the institutional environment, it is important that legislation relevant to all environments (economical, ecological and social) be taken into consideration. This is one of the projects where the ecological, social and economical issues were all regarded as equally important:

- From an ecological point of view the red data species, the high bio-diversity, pristine grassland and the ridge must be taken into consideration and legislation and policies that protects the involved resources must also be taken into consideration;
- From a social and economical point of view the study area is ideally situated for urban development in line with the land-uses of the surrounding environment. Allot of legislation documents, development frameworks, the IDP and policies promote development on and around the study area. The surrounding residents also indicated that they would support the proposed development if the current traffic congestion problems are addressed to their satisfaction and if the aesthetical qualities, cultural and historical features and the ecological systems of the study area are preserved/ incorporated as part of the development.

  According to the developer the property was purchased for development purposes and before they purchased the property a series of consultations was held with the involved provincial and local authorities to determine the development possibilities of the site in terms of the applicable legislation and policy documents.

The proposed development considered all aspects contributing to the uniqueness of the site and the surrounding area to find a compromise that balances the elements and the development considerations. The result is a sustainable development that is in line with most of the national, provincial, and local planning frameworks, policies and legislation.

9. ENVIRONMENTAL SCOPING

9.1 Environmental Issues and Impact Identification

The overall aim of ecologically sound urban development is to minimize the negative impact of development on the environment, thus limiting the ecological footprint of development while moving towards greater sustainability over the longer term.

The anticipated impacts are identified, described and assessed in this section of the report. An assessment of the significance of environmental impacts was done according to the methodology described in section 9.3. (Significance Description Methodology).

9.2 Anticipated Environmental Impacts

The impacts/ aspects (beneficial and adverse) of the proposed development on the receiving environment were identified. The above impacts, as well as the affected environmental characteristics, are indicated in ***Table 20*** below.

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
CONSTRUCTION PHASE									
Construction works could cause disturbance and eradication of the sensitive ecosystems, habitats, cultural historical elements and Red data species	■		■	■	■	■		■	☻

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
on site.									
Erosion and gully formation may take place on site in some of the geology zones if storm water is not managed sufficiently during the construction phase.	■	■	■	■		■			☻
If the construction phase disturbs the	■	■	■	■		■			☻

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
ridge area, erosion may be caused due to the steep slope.									
If not planned and managed correctly, topsoil will be lost due to construction activities.	■			■					☻
Surface water flows will be altered during the	■		■						☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
construction phase.									
Construction during the dry and windy season could cause some impacts and dust pollution.	■					■	■	■	☺
Traffic congestion caused by heavy slow construction vehicles on the					■	■		■	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
local roads.									
Localized vibration							■		☺
Construction during the rainy season can cause unnecessary delays and damage to the environment.	■	■	■	■				■	☺
The clearing of the site and the	■		■	■		■		■	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
construction of the proposed structures and infrastructure can result in the eradication of the existing vegetation (with and without conservation value) in and around the study area									

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
During the construction phase some safety and security problems (especially for the surrounding residents) are likely to occur.								■	☺
Removal of the illegal squatters on site.					◆	◆		◆■	
Creation of Job								◆	☼

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
opportunities									
Soil might be lost from the site due to heavy vehicles tracking the soils from the site onto adjacent areas and roads.	■	■	■	■					☻
Site office and camp, and associated waste.	■		■	■	■	■	■	■	☻
Vehicle	■		■	■		■			☻

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
maintenance may cause pollution.									
Disposal of building waste & liquids.	■		■	■		■		■	☻
The construction vehicles and facilities will have a negative impact on the study area and						■		■	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
surrounding views.									
No temporary erosion protection at release points of water (especially during the rainy season)	■	■	■	■				■	☻
Uncontrolled activities & access to natural areas	■		■	■	■	■		■	☻
Dumping of	■		■	■	■	■		■	☻

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
rubble in sensitive areas and on the surrounding properties.									
Construction activities could disturb neighbours in terms of noise, visual and dust pollution					■	■	■	■	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
Uncontrolled veld fires may cause damage to infrastructure, cause loss of vegetation and fauna				■	■	■	■	■	☻
Eradication of invasive and exotic species from the site.			◆	◆		◆			☺
Causing damage				■		■			☻

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
to fauna habitats									
Temporary disruption of services due to relocation and installation of services					■			■	☺
Possible slope failure if steep cut faces are considered	■	■						■	☻
The use of Kikuyu				■	■	■			☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
lawns and other exotic species can cause the spread of the invaders into the natural areas of the study area.									
Conservation of the sensitive habitats, cultural historical elements, red data species and				◆	◆	◆		◆	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
the ridge area.									
The visual impact of the construction works on the surrounding communities and from the N1 freeway.						■			
Impact of the construction works on the sense of place of						■			

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
the area.									
All the road reserves and other proposed roads that traverse the site are left undeveloped.					◆			◆	
OPERATIONAL PHASE									
If irrigation and fertilizers wash into			■	■	■				☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
the conservation area the natural systems may be eradicated or disturbed.									
Protection of the conservation area from informal settlements and incorrect management practises.					◆	◆		◆	☼
Eradication of	◆		◆	◆	◆	◆			☼

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
invasive species									
Conservation of the existing graves and of the cultural historical elements on site.					◆			◆	☼
Impact on visual character and sense of place of Irene and the surrounding communities.				◆	◆■	◆■	■	◆■	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
Increased surface water runoff to storm water management system from hard surfaces may impact on surface and ground water.			■	■					☺
Compatibility with surrounding land uses				◆	◆	◆		◆	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
Provision of primary commercial and retail land adjacent to the N1.					◆	◆		◆	☼
Provision of residential units/erven in close proximity to job and business opportunities.					◆	◆		◆	
Provision of high quality secure						◆		◆	

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
living environment to a variety of income levels.									
Provision of housing and business opportunities in close proximity to major highways to Johannesburg, Pretoria, Centurion, Randburg, Johannesburg					◆			◆	

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
airport and Midrand.									
The proposed roads will have a noise impact on the new proposed residential developments.						■	■	■	
Increased security in the area and on the study area.				◆	◆	◆		◆	☼
Provision of land					◆	◆		◆	

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
possible institutional land use and the for local shops in close proximity of the new estates.									
The conservation area will provide the community with a large open space for activities and possible				◆	◆	◆	◆	◆	

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
environmental education programs.									
The view from the ridge will be open to the public to enjoy and the new coffeehouse ect proposed for this area (is currently privately owned).					◆	◆		◆	

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
Contribution to the construction of the Olievenhoutbosch Road that will bring great relief to the current traffic problems in the area.					◆	◆		◆	
Creation of species movement corridors, linking				◆	◆				☼

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
the large open space on site with other natural areas and the Rietvlei Nature Reserve in the area.									
Creation of lots of temporary and permanent jobs					◆			◆	☺
Creating a major contribution to taxes to the local								◆	☻

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
municipality.									
Creating a major spin off for local shops and businesses.					◆			◆	☼
Visibility and accessibility of study area						◆		◆	☼
Impact of additional vehicle traffic on already busy roads due to						■	■	■	☺

Environmental Aspects	Soil and Soil Stability	Topography	Water Quality	Flora &Fauna	Existing Land-use of Study area and its surroundings	Visual Quality & Sense of Place	Qualitative Environment (Air Quality & Acoustical Environment)	Socio-Economic (I.e.. Services, Economical Impacts, Cultural & Historical)	Mitigation Possibilities High ☻ Medium ☺ Low ○ Positive Impact not necessary to mitigate ☼
traffic associated with development									
Light pollution during the night						■	■		☺

■ Adverse Impact ◆ Beneficial Impact

9.3 Environmental Impact description

This section of the report contains a description of each of the impacts indicated in ***Table 20.*** This section also indicates whether it will be possible to mitigate the identified impacts or not. Utilising the Impact Description information, a significance assessment of each impact was performed according to the methodology described in section 9.4. The results of the significance assessment are given in ***Table 21.*** Both adverse and beneficial impacts anticipated for each development alternative are described.

The anticipated environmental impacts associated with the proposed development are discussed below with possible mitigation measures that should be implemented if the project is to be authorized.

9.3.1 Construction Related Impacts

9.3.1.1 Beneficial Impacts

- ***Eradication of invasive species***

Eradication of invasive species during the construction phase would benefit the biophysical environment.

- ***Removal of illegal squatters on site***

The number of illegal squatters is currently growing on site. This poses a major threat to the security of the surrounding landowners and people in the area, but also to the cultural historical elements, the sense of place, fauna and the red data flora species on site.

The squatters will have to be removed at the expense of the landowner.

- ***Creation of Job opportunities***

The proposed development would create a tremendous spin off in terms of job opportunities during the construction phase. Should the local community not benefit from these opportunities, it could lead to an influx of people from other areas. Only employing people from the local community could mitigate the potential adverse impact.

- ***Conservation of the sense of place***

The development will conserve the large open space from the ridge down to the railway line to incorporate the cultural historical elements, red data species and a large part of the grassland habitat. This part of the site is the most visible and will help to retain the sense of place of the area.

The rest of the development should be planned in the Irene style with natural materials, ample vegetation and a neutral

colour pallet. Due to the topography on site the areas where development is proposed is not highly visible from the Irene area. Construction activities will thus be hidden to a great extend from this sensitive area which will conserve the sense of place also during the construction phase (as long as the requirements of the Environmental Management Plan is implemented).

- ***All road reserves and other proposed roads are left undeveloped***

The proposed development is planned to incorporate the planned roads that traverse the site:

- K105
- Olievenhoutbosch Road
- PWV 6

The developer will further contribute to the construction of Olievenhoutbosch Road, and if these alignments and reserves are conserved later disputes and hold-ups are ruled out to a great extend. This further means the development is in line with the Gautrans and Tshwane planned road network.

Property buyers are informed regarding the roads that may be built in future. These roads will enhance the accessibility of the site.

- ***Conservation of the sensitive habitats, cultural historical assets, Red data species and the highly visual ridge area***.

The proposed development is planned to incorporate these sensitive areas and elements into the large open space system on site. This area will form a large continuous conservation area with species movement corridors linking this area with green areas of adjacent sites.

This sensitive areas should be fenced before other construction activities take place on site to ensure all the sensitive elements and habitats are conserved and protected against construction activities and other negative impacts like the illegal squatting that is currently taking place on site.

9.3.1.2 Adverse impacts

- ***Construction works could cause disturbance and eradication of the sensitive ecosystems, habitats, cultural historical elements, and Red Data species on site.***

If not planned and managed correctly, the construction activities of the proposed development could damage or even the eradication of the special elements on site that need to be conserved.

Mitigation Possibility: **High**

Mitigation:

The sensitivity analyses that analysed all elements on site and identified the areas that need to be conserved with the appropriate buffer zones. This analysis identified a large area that incorporates these elements into one conservation area.

In order to successfully conserve this area:

- A conservation fence should be erected as indicated on the sensitivity map, BEFORE CONSTRUCTION STARTS.
- No person, site worker, vehicle, dumping, construction material, waste products or liquids will be allowed in this area. It should strictly be conserved as a 'No-go' zone and access will only be allowed after written consent from the ECO (environmental control officer).

- ***Erosion***

If not planned and managed correctly, the construction activities could cause the erosion of soils. Mitigation measures should be taken in all phases of the project to prevent erosion, which could in turn impact on the water quality of the water bodies lower down in the catchment area.

Mitigation Possibility:**Medium**

Mitigation:

In order to prevent erosion, siltation and water pollution the following must be done:

- The involved engineer should compile a storm water management plan.
- Mitigation measures to prevent erosion, siltation and water pollution at the storm water discharge points should be provided by the involved storm water engineer during the detail design stage of the road. Measures such as stilling basins, bio-swales, stone pitching, gabions etc. are acceptable. Details shall be submitted to the relevant engineering sections as well as the Environmental Planning Section of the local authority.

Suggestions for applicable methods:

- Use porous paving materials where possible
- Apply planted islands in roundabouts
- Infiltrate road and paving lot runoff in "BIOSWALES"
- Beyond (or instead of) the curb, install grasses or vegetated areas called bio swales – linear, planted drainage channels. A typical bio swale moves storm water runoff as slowly as possible along a gentle incline, keeping the rain on the site as long as possible and allowing it to soak into the ground. At the lowest point of the swale there is usually a raised drain inlet that empties any

overflow (during particularly heavy storms) into the nearest waterway. Along with the infiltrating function, bio swales cleanse runoff via their plants and soil microbes.

Bio swales function particularly well in parking lots, which generate runoff laden with pollutants that drip from cars and collect on the parking-lot surface. In addition to their decontamination functions, these bio swales create a place for lush plantings, amid the parked cars.

- ***Surface water flows will be altered during the construction phase.***

Due to the excavations that will take place (there will be trenches, topsoil and subsoil mounds on the study area), the topography of the study area will temporarily be altered. This will however only be a short-term impact and if the levels are restored to normal (the surface drainage patterns from the new levels should not differ too much from the surface water drainage of the original levels) once the construction phase is completed.

Some high-risk geological zones are present on site and if any construction will take place in such areas, the involved engineer should prescribe mitigation measures for the construction and operational phases.

Mitigation Possibility:**Medium**

Mitigation:

- Construction activities should preferable take place during the winter months;
- If it is not possible for construction activities to take place during the winter months, construction activities should take place in phases in order to prevent large exposed areas that will cause in increase in the speed of surface water;
- When storm water planning is done, every attempt possible should be made to keep the post construction similar to pre-construction flow.

- ***Construction during the dry and windy season***

Construction during the dry and windy season could cause dust pollution.

Mitigation Possibility:**Medium**

Mitigation:

Dust pollution could occur during the construction works, especially during the dry months. Regular and effective damping down of working areas (especially during the dry and windy periods) must be carried out to avoid dust pollution that will have a negative impact on the surrounding environment. When necessary, these working

areas should be damped down twice daily (in the mornings and afternoons).

- ***Disturbance to the ridge area may cause erosion***

If the ridge area is disturbed (vegetation cleared and soils exposed) in any way erosion control measures should be implemented to prevent erosion in this steep area, which may take place quickly.

Mitigation Possibility: **High**

Mitigation:

Construction is not allowed to take place in this conservation area, which should be fenced before any construction takes place. If soil is exposed or vegetation removed at any stage, it should be rehabilitated immediately. The rehabilitation measures should stabilize the soil, re-vegetate the area and maintain it until 75% coverage has been established.

- ***Loss of topsoil due to construction activities***

Topsoil is a valuable resource and should be conserved as far as possible. Construction activities can damage topsoil through compaction, pollution, erosion, heavy vehicles tracking soils from the site, incorrect stock piling methods,

incorrect waste management/ storage or if it is used for construction purposes.

By implementing some basic mitigation measures the loss of topsoil can easily be prevented.

Mitigation Possibility:**High**

Mitigation:

- A shake down area at the exit of the construction site should be established where the excessive soil on the tires of construction vehicles can be brushed off and kept aside for later use during rehabilitation works.
- The construction site should be planned before any construction activities take place on site. The areas where soil will be compacted by construction activities, heavy vehicle movement (on site construction routes), site camp, material storage areas and stockpiling areas, should be marked out and the topsoil should be removed.
- The areas where topsoil will not be removed and that will be conserved during the construction phase should be marked with barrier tape to ensure vehicles do not move across these areas and construction activities do not damage the insitu topsoil.
- The removed topsoil should be stored separately from all stockpiled materials and subsoil, according to the stockpiling methods as described below. The stockpiled

topsoil should be used for rehabilitation and landscaping purposes after construction has been completed.

- The installation of services could leave soils exposed and susceptible to erosion. Soils should be stored adjacent to the excavated trenches that are excavated to install services, and these should be filled up with the insitu material as the services are installed. All stones and rocks bigger than 80mm should be removed from the top layer of soil and these disturbed areas should be re-vegetated immediately after works in a specific area has been completed.
- Rehabilitation works must be done immediately after the involved works in an area is completed to prevent erosion.

- ***Stockpile areas for construction materials***

Designated areas for stockpiling of construction materials must be specified by the Environmental Control Officer. Stockpiling in the wrong areas will be detrimental to fauna and flora and will deplete the soil quality.

Rainwater falling onto stockpiles may become polluted with dust originating from aggregate and other construction material, such as bitumen from pre-mix stockpiles.

The footprint of stockpile areas will be contaminated with the stored material, and will require cleaning before rehabilitation.

Mitigation Possibility: **High**

Mitigation:

- Stockpiles should not interfere with the natural drainage paths or species movement corridors of the environment.
- In order to minimize erosion and siltation and disturbance to existing vegetation, it is recommended that stockpiling be done/ equipment be stored in already disturbed/exposed areas.
- Cover stockpiles and surround downhill sides with a sediment fence to stop materials washing away.
- Soils in areas where construction materials where stockpiled should be tested and the correct soil pH etc should be established. Soils should be ripped and topsoil from stockpiles should be imported, fertilized and re-vegetated.

- ***Stockpile areas for topsoil***

Topsoil should be stockpiled in a manner that will conserve the quality and quantity of soil removed in other areas on

site. Stockpiling in the wrong areas will be detrimental to fauna and flora and will deplete the soil quality.

Stockpiled topsoil should only be used for rehabilitation and landscaping purposes on the site.

Mitigation Possibility: **High**

Mitigation:

- Topsoil should be stockpiled to ensure that the soil quality will not be depleted and that the grass seed remain in the soil for later rehabilitation of the disturbed areas.
- Stockpiling should only be done in designated places where it will not interfere with the natural drainage paths of the environment.
- Topsoil should be stockpiled separately from subsoil.
- The topsoil stockpiles should be located in areas where construction activities and machinery will not pollute or compact the soil.
- Topsoil stockpiles should be no higher than two meters.

- ***Traffic congestion and safety risks due to higher quantities of heavy vehicle traffic on local roads***

The development will add traffic especially heavy vehicles to the surrounding road network, this can cause delays, and traffic jams and increases the possibility of accents on these roads.

Mitigation Possibility:**High**

Mitigation:

- To minimize this impacts or risks, heavy construction vehicles should avoid using the local road network during peak traffic times.
- These vehicles should use only specific roads and strictly keep within the speed limits and abide to all traffic laws. No speeding or reckless driving should be allowed. Access to the site for construction vehicles should be planned to minimize the impact on the surrounding network.
- Warning signs should be erected on the roads that these vehicles will use, at big crossings/access roads and on the site if needed.

- ***Localized vibration***

Localized vibration could have a significant impact during the construction phase.

Mitigation Possibility:**Medium**

Mitigation:

Although it will not be possible to prevent localized vibration during the construction phase, it will be possible to limit the activities that cause localized vibration to working hours only.

- ***Construction during the wet season***

Construction during the wet season could cause damage to existing dirt roads on site and natural vegetation.

Should the construction phase be scheduled for the summer months, frequent rain could cause very wet conditions, which makes it extremely difficult to do excavations and to do the necessary rehabilitation works of disturbed areas.

Wet conditions often cause delays to construction projects.

Mitigation Possibility:**Medium**

Mitigation:

The best mitigation measure for this impact will be to schedule the construction activities that may be delayed by wet condition to the dry winter season. In order to prevent unnecessary damage to the environment during the wet season the following mitigation measures are proposed:

- If possible schedule construction activities in close proximity of sensitive areas and dirt roads for the winter months and schedule the construction activities in less sensitive areas for the wetter periods;
- If construction activities in close proximity of sensitive areas and dirt roads must take place during the wet season, it is recommended that heavy construction vehicles and machinery avoid the sensitive areas and dirt roads during rainy days (until the water has been absorbed or drained away);
- No construction vehicles or equipment should be allowed to enter sensitive areas. In cases where it will be necessary to enter sensitive areas, circulation routes must be clearly indicated and vehicles and equipment should be restricted to the allocated areas only (the ECO should give written permission);
- Establish an all-weather site access and wheel wash or shake down to prevent soil and materials being tracked onto local roads.
- Schedule excavation works to the dry periods.

- ***Construction works will cause the eradication of existing vegetation.***

Construction works will cause the eradication of existing vegetation with and without conservation status. It is important to plan the construction activities to eradicate

only the needed vegetation and to conserve all valuable habitats and species.

Mitigation Possibility: **Medium**

Mitigation:

The removal of vegetation should be restricted to designated areas only, and a conservation fence should be constructed to prevent access to areas that must be protected.

Before the removal of vegetation takes places, the area to be cleared must be clearly marked out and a suitable qualified vegetation specialist shall inspect the site to identify valuable medicinal plants and other plants that can be relocated / removed.

- ***Snaring and hunting of fauna species during the construction phase and the destruction of habitats can have a detrimental effect on some species.***

The construction phase could have a detrimental impact on habitats and fauna of the study area.
Mitigation Possibility:**Medium**

Mitigation:

- Strict measures to prevent the hunting/ snaring/ scaring of fauna species should be implemented.
- The conservation area should be fenced before other construction activities take place on site.
- This fence should however allow for species movement.
- No wood sourcing should be allowed on site or on any adjacent properties.
- Any person that is caught hunting, snaring or damaging existing vegetation (earmarked to be retained) should be fined. The responsible contractor will also be fined and will have to replace the fauna or flora specie as specified by the ECO at the time.
- The involved authorities should be informed of the activity, the fine and the replacement specifications.

- ***During the construction phase some safety and security problems (especially for the surrounding residents) are likely to occur:***

- Reckless operators of construction vehicles can cause dangerous conditions on the nearby roads as well as on the study area.
- Ground works especially deep excavations without warning signs.
- Possible crime initiated by construction workers or friends/ contacts of construction workers (especially casual workers) proposed activities).

Mitigation Possibility:**Medium**

Mitigation:

- Although regarded as a normal practice, it is important to erect proper signs indicating the operations of heavy vehicles in the vicinity of dangerous crossings and access roads or even on the development site if necessary;
- It is also important to indicate all areas where excavations took place/ are taking place and warning signs that clearly indicate areas with excavations must be placed immediately adjacent to excavations.
- A barrier should be established around dangerous excavation areas.
- With the exception of the appointed security personnel, no other workers, friend or relatives will be allowed to sleep on the construction site (weekends included), in the public open space or on adjacent properties.
- No workers should be allowed to enter adjacent private properties without written consent of the legal owners to the contractor.

- ***Nuisance to surrounding properties in terms of noise generation. The noise that will be generated by the construction vehicles and associated activities could have an impact on the surrounding properties.***

This will however be short term, being generated only during the day.

Mitigation Possibility:**Medium**

Mitigation:

Construction will only be permitted during working hours (between 8h00 and 17h30) and construction should be restricted to weekdays only. If construction works are to take place on a Saturday, the local authority as well as the surrounding landowners and tenants must be notified at least one week in advance.

- ***Site office, camp and associated waste (visual, air and soil pollution)***

The construction phase of a development requires the establishment of basic infrastructure such as Site Offices, Material stockyards, Workshops and Staff Accommodation. The site where the above facilities are to be erected must be cleared before erection of the buildings can commence.

These facilities can cause visual, air and soil pollution and should be managed to avoid any such impacts on the surrounding environment.

Absence of proper sanitation facilities and good housekeeping could impact on groundwater and water bodies lower down in the catchment area.

The construction works, machinery, equipment, material and the waste products generated by the construction works could also have a significant negative impact on the visual qualities of the area if not taken into consideration during the planning stages of the project.

Mitigation Possibility: **High**

Mitigation:

- Temporary waste storage points on site shall be determined. These storage points shall be accessible by waste removal trucks.
- These points should not be located in areas highly visible from the properties of the surrounding land-owners/tenants/in areas where the wind direction will carry bad odours across the properties of adjacent tenants or landowners.
- The site camp and the rest of the study area should appear neat at all times.
- Waste materials should be removed from the site on a regular basis, to a registered dumping site.

- The site camp should not be located in a highly visual area on the study area, or a screen or barrier should be erected as not have a negative impact on the sense of place.

- ***Vehicle maintenance***

Temporary maintenance workshops may be required for construction vehicles. Soil and water pollution by oil, lubricants and fuel may occur at these facilities.

Mitigation Possibility: **High**

Mitigation:

- No leaking vehicle shall be allowed on site. Before entering the study area, all vehicles and equipment shall be inspected for leaks by a qualified mechanic/other suitably qualified person and the environmental officer The mechanic/ the mechanic of the appointed contractor must supply the environmental officer with a letter of confirmation that the vehicles and equipment are leak proof.
- If maintenance on site in absolutely necessary, it should be conducted on a concrete surface in the site camp. Spilled oil should be cleaned up and disposed off appropriately (not dumped on site). This area may not be washed with soaps and dissolvent and allowed to enter the drainage system.

- ***Disposal of building waste & liquids***

During the construction period waste would be generated on site. The waste may consist of the following waste streams, namely:

- Liquid waste from vehicles
- Solid domestic waste
- Solid construction waste

Disposal of some of the above waste streams may lead to soil, water and aesthetic pollution of the site. The soil and water pollution should be localised with little impact on the surrounding environment. Waste disposal on site may stimulate the surrounding population to also dispose domestic waste on the site. This may lead to an uncontrolled situation that would be aesthetically unacceptable to future occupants and costly to rehabilitate.

The disposal of construction waste at landfill sites in the area would place a burden on these sites to accommodate the additional volumes. Although this waste is inert in most cases, it may be of significant proportions and will contribute to the saturation of the formal landfill sites in the area.

Mitigation Possibility: **Medium**

Mitigation:

- Prevent unhygienic usage on the site and pollution of the

natural assets. Develop a central waste temporary holding site to be used during construction. (Near the access entrance) This site should comply with the following:

- Skips for the containment and disposal of a waste that Could cause soil and water pollution, i.e. paint, lubricants, etc.
- Small lightweight waste items should be contained in skips with lids to prevent wind littering.
- Bunded areas for containment and holding of dry building waste.

  THESE AREAS SHALL BE PREDETERMINED AND LOCATED IN AREAS THAT IS ALREADY DISTURBED. THESE AREAS SHALL NOT BE WITHIN 100 M FROM THE CONSERVATION AREA.

- Workers will only be allowed to use temporary chemical toilets on the site. CHEMICAL TOILETS SHALL NOT BE WITHIN 100 M OF THE CONSERVATION AREA.
- No french drain systems may be installed on site at any time.
- No bins containing organic solvents such as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site.
- All waste must be removed to a recognized waste disposal site on a weekly basis. No waste materials may be disposed of on or adjacent to the site. The storage of solid waste on site, until such time that it

may be disposed of, must be in the manner acceptable to the Local Authority.

- Keep records of waste reuse, recycling and disposal for future reference. Provide information to ECO

- ***The use of insufficient drainage systems during the construction phase***

Due to the fact that the site is currently adequately covered in vegetation, the current speed of the storm water is not very high. The construction phase will cause a disturbance in the existing vegetation coverage and as a result the speed of the storm water will increase.

The dumping of excavated materials in drainage line could prevent natural surface drainage and as a result ponding and saturated soil conditions can be caused behind the excavated materials.

Mitigation Possibility:**High**

Mitigation:

- In order to prevent large exposed areas, it is recommended that the construction be done in phases. Each phase should be rehabilitated immediately after the construction in that area is completed. The appointed contractor should

maintain the rehabilitated areas until a vegetative coverage of at least 75% has been established.

- Implement temporary storm water management measures that will help to reduce the speed of the water. These measures must also assist with the prevention of water pollution, erosion and siltation.
- No excavated materials or rubble should be dumped in **drainage lines.**

- ***Uncontrolled veld fires***

Uncontrolled veld fires may cause damage to infrastructure and cause loss of vegetation and fauna.

Mitigation Possibility:**High**

Mitigation:

- If fires are required for cooking and heating purposes, these fires will only be permitted in a specially allocated area in the site camp. The fire area should be an exposed area (no natural veld grass should be in close proximity of the fire area).
- Construction workers should only be allowed to smoke in the fire area.
- Fires should preferably be prevented while strong winds are blowing.

- ***Installation and relocation of services (i.e. storm water, electrical. TELKOM etc.)***

The installation of services could have a negative impact on the ecological (fauna, flora and hydrology), economical (costs of relocation of services) and social (inconvenience of temporary power failures, disconnection of water and sewage, disconnection of telephones experienced by surrounding land owners) environment.

Mitigation Possibility:**Medium**

Mitigation:

- Determine areas where services will be upgraded and relocated well in advance.
- Determine the impacts of the service upgrading well in advance.
- Discuss possible disruptions with affected parties to determine most convenient times for service disruptions and warn affected parties well in advance of dates that service disruptions will take place.
- Rehabilitate areas disturbed by the installation and relocation of services immediately after works have been completed

- ***Damage to existing graves during the construction phase***

Reckless construction workers could damage the existing graves and other cultural historical features during the construction phase.

Mitigation Possibility: **High**

Mitigation:

- Protect the graves during the construction phase. The best way to protect the graves is to erect a temporary/ permanent fence around the graves prior to the construction phase.
- The aspects concerning the conservation of cultural resources are mainly dealt with in two acts namely:
    - The South Africa Heritage Resources act (Act 25 of 1999); and
    - The Environmental Conservation Act (Act 73 of 1989);
- It is important to note that in terms of the National Monuments Act, (Act No 28 of 1969), all historical sites and materials older than 60 years are protected;
- It is an offence to destroy, damage, alter or remove such objects from the original site, or excavate any such site(s) or material without a permit from the National Monuments Council;
- Gravesites are subject to the requirements of Act 28 of 1969; and

- During construction activities, archaeological sites might be exposed. It is therefore recommended that if anything was noticed, it should immediately be reported to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made.

- ***Kikuyu lawns and other exotic vegetation that is introduced to the site may spread into the natural conservation area.***

Mitigation Possibility: **High**

Mitigation:

No Kikuyu or other exotic plants may be used for landscaping or rehabilitation works on this site.

9.3.2. Operation Related Impacts

9.3.2.1 Beneficial Impacts

- ***The conservation area will be maintained and protected against future informal settlements.***

The open space/ conservation area will be maintained by the HOA of the development. The conservation area will be accessible to the public but through access control. This will ensure that access to this area is controlled and that

informal settlements are prevented. Informal settlers are currently living on site causing damage to the fauna and flora on site and causing unhealthy sanitary conditions on site.

The maintenance plan of the conservation area should include a constant fight against invasive and exotic species, erosion and pollution.

- ***Eradication of invasive species***

The weeds and exotic invaders on the study area will be removed and after construction, the disturbed areas will be rehabilitated and re-vegetated. It is recommended that only indigenous/endemic species be used on site. Weeds and exotic invaders should be removed from the conservation are on an ongoing basis also in the operational phase of the project.

- ***Conservation and maintenance of the existing graves and other cultural historical elements on site.***

All the identified elements of cultural historical value are located in the conservation area and will be conserved during the construction phase against possible construction related damage that may occur. The entire area will be

fenced and conserved and after construction this area will be maintained and so protected against vandalism.

The site with the graves should be accessible to family and visitors and should be kept neat and maintained.

- ***The conservation area will provide the community and public with a large open natural area***

The public will be able to use this area for recreational and educational purposes for instance for walking and excursions, these elements will be accessible to the public and become a tourist attraction. The possibility to start educational programs on this site is high due to the diverse ecological value and cultural historical elements on site.

- ***Establishment of coffee shops and small retail facilities within the residential community and on the ridge area***

The opportunity to develop coffee shops and small shops will provide the community with facilities in their immediate area. The area for the coffee shop is close to the ridge area between the residential complexes and the conservation area; this will provide people that visit the area and coffee shop the opportunity to enjoy the views to west and the natural surroundings on site.

- ***The development can contribute to the visual character and sense of place of the Irene area.***

If designed and managed correctly the development can contribute to the strong Irene character and sense of place. The development should be designed in the same style and to blend into the Irene area by using characteristic elements and materials such as stonewalls. The landscaping will also be important and especially trees should be used to make the new development blend into the existing tree rich established residential suburbs. Colors and textures used in the development should be earthy and neutral.

The views off the development should be taken into account when designing the structures and the skyline should be respected even if height restrictions should be imposed on some of the erven.

- ***Contribution towards the construction of this section of the Olievenhoutbosch Road***

The roads in the area are congested during peak traffic times and the construction of this section of the Olievenhoutbosch Road will bring some relief to Nellmapius, Main road and other local roads around the site.

The construction of this road will be very important for the success of this development and therefore the developer is committed to contributing towards the construction of this road and is currently involved in construction of the section of Olievenhoutbosch road close to Centurion. This will probably speed up the priority of the road.

The developer is however aware of the environmental sensitivies that have to be taken into consideration and the developer is planning to involve the local authority and GDARD in the planning process of the road.

- ***Creation of permanent jobs and the provision of job opportunities, commercial and retail opportunities in close proximity of residential components.***

During the operational phase numerous permanent jobs will be created on various levels (house work, maintenance workers, commercial opportunities and retail opportunities). This development due to its location and the different land uses will create job opportunities close to and within the residential areas. This is sustainable and will minimize road trips and energy consumption for some.

- ***Provision of high quality secure living environment for various income groups***

The development will consist of security residential complexes designed and constructed to a high standard. This area experience high pressure for residential development as the location is exceptionally favourable due to its accessibility to three major highways connecting Johannesburg, Pretoria, Midrand, Johannesburg Airport, Randburg and Germiston.

The development will provide residential erven, residential 2 duplex living units and residential three simplex units. The variety of units and erven that will be available will provide people and families from different income groups with the opportunity to live in this well located development.

- ***Provision of commercial properties adjacent the N1 highway***

This is in line with other development along the N1 to the south towards Midrand that has sought after land with great visibility and advertisement opportunities for larger businesses.

- ***Possible provision of institutional land use on site***

The possibility to develop institutional uses on site close to Nellmapius Road is still discussed with authorities. This can include land for schools, medical and or religious facilities.

- ***Increased security on the study area and for the surrounding communities***

It is possible that the proposed development will cause an increase in security in the area. Currently some informal settlers live on site and the development will develop large parts of the currently open space and place better access control on the rest of the site/ conservation area. This will possible help to control crime in the larger area criminals can not simply disappear to hideaways in the open space.

- ***Rates and taxes payable to the Local Municipality***

In order for the local authority to upgrade the existing municipal services of the area, they need to increase their rates and taxes or new developments that will generate rates and taxes must be done. The proposed new development will generate large amounts of rates and taxes on a monthly basis and as a result the social and economical environments will benefit from the proposed development.

- ***Compatibility with surrounding land uses***

The proposed development will be in line with the surrounding land-uses.

The commercial components will be located along the N1 and this will form a natural link with similar trades and facilities along the highway towards Midrand.

The residential components are located mainly on the eastern and central sections of the site amidst Irene, Cornwall Hill and Pierre van Ryneveld residential areas. A similar security complex is currently being developed along the eastern boundary of the site.

The retail component will be located between the residential component and the conservation area and will provide basic shops and coffee shops in close proximity of the residential community and this is in line with all normal suburbs.

- ***Establishment and conservation of species movement corridors***

Movement corridors to the surrounding open space system and towards the Rietvlei Nature Reserve will be established with the open space/ conservation area on site. This open

space will be large and consists of different habitats and vegetation types that can play an important role in the sustainable co-existence of fauna and flora with human settlements especially in an urban environment such as is the case for this development. Is regarded as important to establish and conserve such species movement corridors and these spaces should form and integral part of this development.

- ***Creating a spin off for local shops and businesses***

The study area is situated in between existing suburbs with shops and local small businesses. This development will attract new residents and workers to this area that will cause more business opportunities for local restaurants, shops, curio shops and other businesses.

9.3.2.2 Adverse impacts

- ***Irrigation water and fertilizers will have a negative impact on the natural vegetation and systems on site.***

If irrigation water and fertilizers are allowed to wash into the natural vegetation and conservation area, the natural ecosystems can be changed, which can result in weeds and other exotic species establishing and infiltrating these

areas. This may detrimentally impact some of the endemic species and even habitats on site.

The storm water plan should be ensure that storm water is managed on site in a way that will slow storm water down and assist the infiltration of water into the soil.

Run off from the build environment should not be allowed to enter the natural vegetation area before filtrating through siltation and filtration ponds or bio-swale systems to clean the water from added nutrients and fertilizers.

- ***An increase in surface water runoff to storm water management systems (because of an increase of hard surfaces such as roofs and paved areas), may have an impact on surface and groundwater quality and quantities.***

If contaminated storm water runoff from roads, were not managed, it could lead to surface water and ground water pollution. Storm water throughout the site should be managed to accommodate the higher quantities of run off. Sheet flow should be encouraged as far as possible, and channels should be designed sufficiently address the problem of erosion.

Bio-swale system could implemented to filter water from paved areas and especially from roads and parking areas

to sufficiently clean water of heavy metals and other hazardous materials in storm water on a natural manner. This will further provide an opportunity for water to infiltrate the soil, break the energy of storm water and keep the water on site for longer.

- ***The possible spreading of kikuyu lawns and other exotic vegetation into the natural conservation area.***

If stand owners plant invaders or other exotic species in gardens it could easily spread into the natural habitats that could have a detrimental impact on these habitats and some fauna species.

It is thus important to motivate individual owners of the stands to mainly use indigenous species and avoid invading species. A barrier or transition zone could be established between such areas and the natural area and exotic species should be eradicated from the natural area on an ongoing basis.

- ***Loss of open space and the impact on the sense of place***

Some open space will be lost on site but the large conservation area is located in the higher visual areas on site and should help to mitigate the impact of the

development on especially the visual aspects of the area that contribute to the areas special sense of place.

This open space will be monitored, maintained and will now be accessible to the public for the first time.

- ***Noise impact of the proposed roads when constructed on the residential component of the development***

If the planned roads (Olievenhoutbosch road, K109 and the PWV6) are constructed the traffic on these roads will have a definite noise impact on the residential complexes next to the roads. Most of these roads are still in preliminary planning stage and the construction of these will depend on lost of factors and be subject to EIA processes and authorization by different departments. The future of most of these roads is still uncertain.

If and when these roads are implemented specialists should determine the noise impact and mitigation measures would have to be implemented.

- ***Light pollution***

Unsympathetic lighting design can cause lighting pollution during the evenings. Lights that direct light beams

downwards with low glaring qualities should be used for landscaping and streetlights.

- ***Impact of additional vehicle traffic on already busy roads due to traffic associated with development***

The proposed development will lead to a traffic increase on the surrounding roads, which could have a negative effect on the already congested roads as well as on traffic volumes. An increase in traffic volumes can cause the number of accidents to rise.

The construction of some of the planned roads (especially one of the east-west roads) is already needed and the developer is committed to contributing towards the construction of the Olievenhoutbosch road. This will solve traffic problems that are currently experienced and that are added to the local roads by the development.

9.4 Significance Description Methodology

The significance of Environmental Impacts was assessed in accordance with the following method:

Significance is the product of probability and severity. Probability describes the likelihood of the impact actually occurring, and is rated as follows:

- Improbable - Low possibility of impact to occur either because of design or historic experience.
  Rating = 2

- Probable - Distinct possibility that impact will occur.
  Rating = 3

- Highly probable - Most likely that impact will occur.
  Rating = 4

- Definite - Impact will occur, in the case of adverse impacts regardless of any prevention measures.
  Rating = 5

The ***severity factor*** is calculated from the factors given to "intensity" and "duration". Intensity and duration factors are awarded to each impact, as described below.

The ***Intensity factor*** is awarded to each impact according to the following method:

- Low intensity - natural and man made functions not affected – Factor 1

- Medium intensity - environment affected but natural and man made functions and processes continue - Factor 2

- ❑ High intensity - environment affected to the extent that natural or man made functions are altered to the extent that it will temporarily or permanently cease or become disfunctional - Factor 4

Duration is assessed and a factor awarded in accordance with the following:

- ❑ Short term - <1 to 5 years - Factor 2
- ❑ Medium term - 5 to 15 years - Factor 3
- ❑ Long term - impact will only cease after the operational life of the activity, either because of natural process or by human intervention - factor 4.
- ❑ Permanent - mitigation, either by natural process or by human intervention, will not occur in such a way or in such a time span that the impact can be

considered transient - Factor 4.

The ***severity rating*** is obtained from calculating a severity factor, and comparing the severity factor to the rating in the table below. For example:

The Severity factor = Intensity factor X Duration factor
= 2 x 3
= 6

A ***Severity factor*** of six (6) equals a Severity Rating of Medium severity (Rating 3) as per table below:

TABLE 22: SEVERITY RATINGS

RATING	FACTOR
Low Severity (Rating 2)	Calculated values 2 to 4
Medium Severity (Rating 3)	Calculated values 5 to 8
High Severity (Rating 4)	Calculated values 9 to 12
Very High severity (Rating 5)	Calculated values 13 to 16
Severity factors below 3 indicate no impact	

A Significance Rating is calculated by multiplying the Severity Rating with the Probability Rating.

The ***significance rating*** should influence the development project as described below:

- Low significance (calculated Significance Rating 4 to 6)
  - Positive impact and negative impacts of low significance should have no influence on the proposed development

project.

- Medium significance (calculated Significance Rating >6 to 15)
  - Positive impact:
    Should weigh towards a decision to continue
  - Negative impact:
    Should be mitigated to a level where the impact would be of medium significance before project can be approved.

- High significance (calculated Significance Rating 16 and more)
  - Positive impact:
    Should weigh towards a decision to continue, should be enhanced in final design.
  - Negative impact:
    Should weigh towards a decision to terminate proposal, or mitigation should be performed to reduce significance to at least medium significance rating.

9.5 Significance Assessment of Anticipated Impacts

Impacts indicated in ***Table 20*** were each assessed according to the above methodology. ***Table 23*** contains the results of the significance assessment.

TABLE 23: RESULT OF SIGNIFICANCE ASSESSMENT OF IMPACTS IDENTIFIED TO BE ASSOCIATED WITH THE PROPOSED DEVELOPMENT

Impact	Probability Rating	Severity Rating		Severity Factor	Severity Rating	Significance Rating
		Intensity	Duration			
CONSTRUCTION PHASE						
Beneficial Impacts						
Eradication of invasive species	5	4	3	12	4	**20 High**
Creation of Job opportunities	5	4	1	4	2	10 Medium
Removal of illegal squatters	5	4	4	16	5	**25 High**
Conservation of the sense of place	3	2	4	8	3	9 Medium
Conservation of the sensitive elements and habitats on site during the construction phase	3	4	4	16	5	15 Medium
Adverse Impacts						
Construction works could cause disturbance and eradication of sensitive habitats, cultural historical elements and Red Data species on site	4	4	4	16	5	**20 High**
Erosion may be caused by the construction activities on site	3	2	2	4	2	6 Low
Topoil might be lost from the site due to construction activities.	4	2	4	8	3	12 Medium
Construction activities and excavations will alter surface water flows.	5	2	2	4	2	10 Medium
Construction during the dry and windy season may cause dust pollution	4	2	2	4	2	8 Medium
Stockpile areas for construction	3	4	2	8	3	9 Medium

materials may cause soil and visual pollution						
Incorrect topsoil stockpiling may cause a loss of topsoil or pollution	3	4	4	16	5	15 Medium
Traffic congestion and road safety risks cause by heavy construction vehicles on local roads	5	4	2	8	3	15 Medium
Localized vibration	3	2	2	4	2	6 Low
Construction during the wet season may cause erosion and delays to the construction phase.	4	2	2	4	2	8 Medium
Construction works will caused eradication of some existing vegetation	5	2	4	8	3	15 Medium
The use of insufficient drainage systems (i.e. sub-surface drainage systems & no mechanisms to break the speed of the surface water) could cause siltation and pollution of drainage system down stream	2	2	4	8	3	6 Low
Installation of services may cause interruption in services.	4	4	2	8	3	12 Medium
Dumping of builders' rubble, waste and liquids in sensitive areas.	4	4	4	16	5	**20 High**
Snaring and hunting of fauna species by construction workers	4	4	4	16	5	**20 High**
Safety and security risks to neighboring landowners	4	2	2	4	2	8 Medium
Noise impact caused by construction activities and vehicles.	5	2	2	4	2	10 Medium

Site office and camp and associated waste.	4	4	2	8	3	12 Medium
Vehicle maintenance	4	4	2	8	3	12 Medium
Disposal of building waste and liquids could cause pollution	3	4	3	12	4	12 Medium
Veld fires may cause damage to infrastructure, cause loss of vegetation and fauna and may spread to adjacent open areas.	2	4	2	8	3	6 Low
Cultural historical elements on site may be damaged during the construction phase (graves and anglo boer war site)	4	4	4	16	5	**20 High**
Kikuyu and other invading exotic species may spread into the natural areas.	4	4	4	16	5	**20 High**
OPERATION PHASE						
Beneficial Impacts						
Conservation area will be maintained and protected against illegal squatting	4	4	4	16	5	**20 High**
Conservation of the existing graves	5	4	4	16	5	**20 High**
Ongoing eradication of invasive species	4	4	4	16	5	**20 High**
Conservation of existing habitats as part of the conservation area	4	4	4	16	5	**20 High**
Conservation of areas with pristine grassland and areas with high bio-diversity	4	4	4	16	5	**20 High**
Large and safe natural open space - accessible to the public	4	4	4	16	5	**20 High**
Establishments of small shops and coffee shops in close proximity of the new residential units	5	2	4	8	3	15 Medium

The development can contribute to the visual character and sense of place of the area	3	1	4	4	2	6 Low
Contribution to the construction of the Olievenhoutbosch Road	4	4	4	16	5	**20 High**
Creation of permanent job opportunities	5	4	4	16	5	**25 High**
Creation of job opportunities in close proximity of residential areas	4	2	4	8	3	12 Medium
Increased security	4	4	4	16	5	**20 High**
Provision of high quality living environment to various income groups	5	4	4	16	5	**25 High**
Provision of commercial and retail opportunities along the N1	5	2	4	8	3	15 Medium
Possible establishment of institutional development opportunities on site	3	2	4	8	3	9 Medium
Compatibility with the surrounding land uses	4	2	4	8	3	12 Medium
Establishment and protection of species movement corridors	4	4	4	16	5	**20 High**
Creating a spin off for local shops, restaurants and businesses	5	2	4	8	3	15 Medium
Increase in rates and taxes payable to the local authority after the development took place.	5	4	4	16	5	**25 High**
Adverse Impacts						
Irrigation water and fertilizers wash into natural areas	3	4	3	12	4	12 Medium

Loss of areas with pristine grassland	4	4	4	16	5	**20 High**
Loss of areas with high bio-diversity	4	4	4	16	5	**20 High**
Increased surface water run-off to storm water management system from hard surfaces such as roofs and paved areas may impact on surface and ground water.	4	2	4	8	3	12 Medium
Possible spread of kikuyu and other exotic invaders from gardens into the natural areas	4	2	4	8	3	12 Medium
Impact of additional vehicle traffic on already congested roads due to traffic associated with development.	5	2	4	8	3	12 Medium
Loss of some open space and the impact on the sense of place	5	2	4	8	3	15 Medium
Loss of sections of the untransformed ridge that occur on the study area	5	3	4	12	4	**20 High**
Noise impact of proposed road traversing the site on the new residential communities	5	2	4	8	3	15 Medium
Light pollution	4	1	4	4	2	8 Medium

9.6 Discussion of Significance Assessment

Twenty-four beneficial impacts associated with the proposed development are anticipated; of which fourteen have a high significance rating. The Environmental Management Plan ***(Refer to Annexure V)*** and the mitigation measures supplied in this report, contains measures to achieve maximum gain from the above beneficial impacts. Eighteen of the anticipated beneficial

impacts are Socio-economic related, and six relates to the bio-physical environment. This indicates that the proposed development should contribute to an improvement in the quality of life of the people residing in the broader area and the new residents of this development.

Of the thirty three anticipated adverse impacts associated with the construction and occupation phases of the proposed development eight had a high significance rating, twenty one impacts have a medium significance rating and four impacts a low significance rating.

Nineteen of the expected negative impacts are associated with the bio-physical environment while eleven are associated with the socio-economical environment.

Measures, which are recommended in the Environmental Management Plan, would mitigate the medium adverse impacts to acceptable levels. No "fatal flaw" adverse impacts, or adverse impacts that cannot be adequately mitigated, are anticipated to be associated with the proposed project.

10. CONCLUSION

If the quantity and significance of the environmental impacts that were identified for the proposed development were rigidly interpreted, one may come to the conclusion that there are some "Fatal Flaws" that could prevent the proposed development from happening.

The most significant environmental impacts that were identified are:

1) The impact on the ridge area (the ridges policy cannot be applied);
2) The loss of some of the pristine grassland;
3) The loss of some of the areas with a high bio-diversity;
4) The possible impact of the proposed development on the red data species and the habitat of the red data species and
5) The possible impact of the proposed development on the valuable cultural and historical features of the site.

Refer to Figure 11, Sensitivity Map.

The developer appointed specialists to conduct specialist studies of the study area prior to the submission of the development application. The specialist studies formed the basis of a sensitivity analysis and feasibility study that was done for the study area. The results of the sensitivity analysis was then discussed with the involved authorities (prior to the submission of the application) and all the environmental issues as listed above were reflected in the sensitivity analysis that was submitted to the authorities for their valuable inputs.

The main purpose of the preliminary consultations with the authorities was to determine whether the authorities would consider any development applications on the study area. If the ridges policy and the red data species policy are rigidly applied, there will be almost no areas available for development. Other environmental issues that also contribute to the loss of developable land are the geological conditions, the impact on the visual qualities of the site, the noise impacts associated with the surrounding freeways and major roads, the railway line and the Waterkloof Airforce Base and the existing power line, water and road servitudes.

The possibility of compromising some of the ridge area and some of the grasslands in the northeastern and southeastern sections of the study area were discussed with GDARD and Tshwane and the possibility of relaxing the buffer zones and principles of the ridges policy was also discussed with the authorities.

In their reaction to the above-mentioned items that were discussed, GDARD stated that the Red Data Species Policy and the Ridges Policy were only draft policies that are used as guidelines when evaluating applications that are affected by red data species and ridges (the departmental policy documents are not legal documents). GDARD stated that they would consider development applications for the study area and they suggested that the developer commence with the layout design and submit the EIA application as soon as possible.

During the meetings with Tshwane and GDARD the developer offered to sell the study area/ the most sensitive sections of the study area to the authorities for conservation purposes. Tshwane confirmed that they do not have the capacity or funds to manage, monitor, or maintain the study area as a conservation area. They were of the opinion that the only way of protecting the most sensitive environmental aspects would be to allow some development on the site, with the condition that the most sensitive sections of the study area be conserved and linked to the larger continuous regional open space system. They recommended that a "clutter and space" development layout rather than a traditional layout that are distributed all over the site with fragmented and narrow linear open spaces be considered for this very valuable property.

The developer adhered to the proposals that were made by the authorities and amended the original layouts that were done prior to the sensitivity analysis to incorporate larger continuous open space systems and at present the proposed

layout incorporates open spaces that cover a large portion of the study area. According to the developer the development will not be viable if very large areas are to be conserved as open space, because the existing geotechnical conditions do not allow for increased densities in the developable areas. The only areas suitable for higher densities are the ecologically sensitive areas that are regarded as "No-Go" areas for development. This proposed future development area identified to the west of the study area (the area where Tshwane wants a wider link with the ridge area) falls within the area suitable for higher density development and falls outside the red data species buffer. The developer consider development in this section of the study area as an opportunity to increase the density of the proposed development to make it more economical viable and to supply more affordable units to buyers.

From an ecological point of view, large portions of the study area were regarded as irreplaceable and the bio-physical environment was regarded as the form giving element for the final layout. As already mentioned in this report GDARD already issued a positive Record of Decision for the proposed development. An appeal was lodged against certain conditions (relating to the ecological environment) of the Record of Decision and the MEC informed the applicant that the Department decided to uphold the appeal.

The mixed-use development proposal as described in this DFA Scoping report is in line with the final land-use and layout proposals as presented to and negotiated with GDARD during the EIA, appeal and land-exchange processes.

The open space concept for the proposed layout was to create a network of large continuous open spaces that incorporates all the various vegetation types (vegetation on the shallow dolomite, mixed grassland, moist grassland etc.) of the study area to promote a higher species and habitat diversity.

This is a typical example of a development where compromises between the ecological and economical environments are required to achieve a development that will be sustainable in the long term. The developer already proofed their willingness to compromise approximately a large portion of the study area for conservation purposes and the area that is compromised is ironically enough the area that is the most suitable for development from a geotechnical point of view. The developer therefore requested that the involved authorities take their hand in their goal of achieving maximum benefits for all the environments.

We (Bokamoso) are of the opinion that the developer went through an enormous amount of trouble to take the environmental issues of the study area into consideration from the start. A thorough pro-active, integrated, and holistic planning process was followed to determine the most suitable and viable layout for the development and the involved authorities were already drawn into this planning process at the beginning of the project.

The damage that was done to the vegetation of the study area during the installation of the pipeline as well as the damage done by the illegal squatters and dumping activities proof that this valuable study area requires more controlled environmental monitoring and management than the involved authorities can offer at this stage. If planned and managed correctly (with the assistance of the involved authorities) the proposed development will create the opportunity to fulfil this management function.

The issues and concerns raised by the interested and affected parties are regarded as issues that can be addressed/ mitigated to acceptable levels. The public's major issue of concern is the impact on the traffic in the area (especially

the impact on Nellmaphius Drive and Botha Avenue) that will have to be resolved even if the proposed development does not proceed.

11. RECOMMENDATIONS

It is recommended that the proposed development as described in this Scoping Report and in the Town Planning memorandum be approved and that following recommendations or conditions be included as part of Conditions of Establishment:

- The guidelines in this report and the EMP should be followed during all the development phases of the project;
- The proposed open space system as identified on the sensitivity maps should be protected in a manner that is acceptable to the appointed ECO. No activities or persons should be allowed to enter sensitive areas during the construction phase of the project;
- The maintenance of the conservation area in the operational phase will be very important to ensure the sustainable future of the ecosystems, and therefore we recommend that a suitable Environmental Consultant compile a maintenance plan and that the levies of residents and the commercial components on site include financial provisions for the maintenance needed.