



# LEAP

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## Klerksoord Development

GAUT 002/07-08/N0897

**Draft**

## Environmental Impact Assessment

May 2012

Submitted on behalf of:  
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# Executive Summary

## **Introduction**

LEAP Landscape Architect and Environmental Planner CC was appointed by Platinum High Tech Development (Pty) Ltd as Independent Environmental Consultant to undertake the appropriate environmental process for the proposed Klerksoord Extension 25 on Portion 147, Part of Portions 146, the Remaining Extent of Portion 160 and the Remaining Extent of Portion 164 of the Farm Witfontein 301-JR and Klerksoord Extension 26 on Portion RE/145 and Parts of Portions 146, RE/160 and RE/164 of the Farm Witfontein 301-JR. The process was registered for an EIA with the Gauteng Department of Agriculture and Rural Development (GDARD) under Regulation 543 to 547 of the National Environmental Management Act (Act No 107 of 1998) and was assigned the reference number **GAUT 002/07-08/N0897**

## **GENERAL SITE DESCRIPTION**

The proposed Klerksoord Extension 25 site has an extent of approximately 36.22 hectares and the proposed Klerksoord Extension 26 site has an extent of approximately 41.6 hectares. The R566 runs through the centre of the proposed site, dividing it into two parts: the northern section containing Klerksoord Extension 25 and the southern section containing Klerksoord Extension 26. The northern section is located directly adjacent to the Onderstepoort Nature Reserve (Pyramid Koppies) and the City of Tshwane Municipality TOK Building. Most of the other surrounding properties are used for light industrial activities or are vacant at this stage. The subject property falls within the jurisdiction of the City of Tshwane. The site is currently vacant.

## **RECEIVING ENVIRONMENT**

### **Topography and Hydrology**

The general slope of the proposed site is approximately 1% towards the south-east of the site and minor concentrations of runoff will concentrate in shallow localised gullies will occur on the site. The flow of surface water will be towards the canalised gully situated on the southern portion of the property and forms the primary drainage feature. Other than the R566 road which affects the drainage of the site no other significant drainage features were identified. A small wetland is located on the southern section of the proposed site. Here, a channel runs from the adjacent industrial site to the wetland.

No ground water seepage was recorded in any of the test pits, however it must be borne in mind that the investigation was completed following a period of below average rainfall and it must be anticipated that seasonal fluctuations of the level of the perched water table may occur.

### **General Geology**

The site is underlain by norite and gabbro of the Main Zone of the Rustenburg Layered Suite, Bushveld igneous Complex. Typically these rocks decompose in-situ, forming a surface horizon of black, highly expansive clay known as "black turf", while this residual material may often be covered in a horizon of transported fine colluvial sand.

The geological investigation revealed that the entire site is underlain uniformly by gabbro, and no structural feature identified that will affect the geology.

## **KLERKSOORD DEVELOPMENT DRAFT EIA**

As a result of deep and extensive chemical weathering, the rockmass has been reduced to residual silty sand and gravels at depth and active clayey soils close to the surface. The depth of this material varies considerably and is usually underlain by residual gabbro, at depths that vary from approximately 1.0m to greater than 5m.

### **Agriculture**

According to the Gauteng Agricultural Potential Atlas (GAPA Version 3), the site of the proposed development is not situated within a region delineated as an Agricultural Hub.

According to the Gauteng Department of Agriculture, Conservation and Environment's C-Plan 2, the proposed site has patches of high and low agricultural potential. While the southern section of the site is deemed to have a high agricultural value, the northern sections have a combination of high and low agriculture potential. The land is currently vacant and no land is under permanent irrigation.

### **Ecology**

The area in which the proposed site is situated can be classified as Marikana Thornveld, situated in the Grassland Biome. The vegetation in the area ranges from pristine in some areas to disturbed in various degrees across the site. The proposed site will take many years to return to its original state if left to natural ecological forces. The habitat of the site is suitable for some red- and orange –listed plant species in the grid studied, but no red listed Plant species were found, because the natural vegetation has been destroyed. There is one Orange Listed plant species on the entire study site. Only three plants of *Eucomis autumnalis* subsp *clavata* were found. It is also recommended that some of the interesting plants found on site be incorporated in the landscaping of the site.

Faunal assessment diversity was assessed initially as a desktop study and then a field assessment through visual observations and various standard trapping methods. No RDL faunal species were observed during the field survey of the proposed development area. The proposed site will contain large numbers of small and medium mammals because of the Onderstepoort Nature reserve bordering the proposed site to the north and the undisturbed nature of the vegetation on the site. Four red data mammal species may on occasion move through the site from the nature reserve. These species will probably move back to the nature reserve as soon as disturbance in the form of development starts on site.

It was found that the proposed development will not result in the loss of ecologically sensitive and important habitat units, ecosystem function, loss of faunal habitat nor the loss or displacement of threatened or protected fauna, avifauna, reptiles or amphibians. The near threatened Giant Bullfrog (*Pixycephalus adspersus*) is present in the general area but is not confirmed to be present on the site. There were areas within the proposed development site that offer good habitat type and quality that would support a wide diversity of species, many of which are RDL.

The RDL species that may be potentially dependent on the area to be affected by the proposed development activities are well-represented within protected areas within the region. It is therefore perceived that the proposed development activities will not have a significant impact on the overall conservation of RDL fauna within the region.

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Two wetlands have been identified on the proposed site. The wetlands occupy approximately 5% of the total area. These wetlands have been identified as seepage wetlands, are situated on a footslope and feed into a formalised canal. According to Taka Echo and Land Rehab CC, both wetlands show signs of being permanently wet wetlands. Their soil sample shows low mottling content with anaerobic characteristics and predominantly fine textures poorly drained gleyed soil. Both wetlands have similar hydrological characteristics with their hydrology being dependent on the sub-surface flow that is generated by the immediate catchment.

Plants such as *Typha capensis*, *Imperata cylindrica* and the alien species *Arundo donax*, occur within the wetland boundaries, with is indicative of a permanent or semi-permanent wetland. At the time of the assessment by SAS in September 2011, no permanent water, apart from that within the canalised stream, was present within the delineated wetland area. This may be due to the delayed rainy season and is considered to be natural seasonal variation.

The overall wetland feature has a low to moderate level of ecological function and service provision. Due to the large number of disturbances related to the site, it is unlikely to harbour populations of RDL faunal and floral species. The wetland does however, provides good habitat for certain faunal species with special mention of avifauna, and as such does deserve some level of conservation. Historical infrastructure development, such as the concrete channel construction and related changes in surface topography, rubble dumping, alien vegetative invasion and bush encroachment also contribute to the transformed nature of the wetland feature. A 30m buffer zone and an ecological corridor to link the two areas of moderate sensitivity in order to protect this management unit should be maintained.

### **Cultural Heritage**

No archaeological artefacts features or structures were recorded on the proposed site. The foundations of several brick and mortar structures were observed but none older than 60 years.

An informal cemetery with approximately 20 graves was recorded on the northern periphery of the site. If the cemetery cannot be fenced off than the graves will have to be exhumed and relocated and buried in a formal cemetery. Informal graves fall under the protection Section 36 (and possibly Section 35) of the National Heritage Resources Act (Act 25 of 1999).

Should archaeological artefacts or skeletal material be revealed in the area during construction activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place.

### **Noise Impact**

The proposed development will be in line with SANS 10103 of 2008 – The measurement and rating of environmental noise with respect to annoyance and to speech communication and the Gauteng Noise Control Regulations, provided that the acoustic screening measures are in place before occupation of the units may take place.

## **GENERAL PROJECT DESCRIPTION**

The development proposal entails the mix use development of Klerksoord Ext 25 to be zoned as follows:

- Industrial 1 (excluding a public garage)
- Industrial 1 (including place of amusement, restaurant, shop, office and institution)

## **KLERKSOORD DEVELOPMENT DRAFT EIA**

- Private open space
- Special for access

The development proposal of Klerksoord Ext 26 entails the mix use development of the site, to be zoned as follows:

- Residential 1
- Residential 3
- Business
- Public open space

The Growth Management Strategy of the City of Tshwane prescribes that future growth, in terms of population and economic growth, of the City is accompanied by complimentary services and infrastructure whilst also meeting spatial and socio-economic objectives.

The concept is to create an attractive modern, vibrant and safe environment in which to work, live, shop and play with the highest standards of design and construction. The various uses will have a symbiotic relationship and many precincts will have mixed land uses.

### **RISKS AND KEY ISSUES**

**Potential risks and impacts include, but are not limited to, the following:**

- Biophysical impacts including alteration of fauna and flora habitats, as well as the potential loss of land with limited agricultural potential
- Socio-economic impacts including visual, safety and security, increased traffic and the provision of adequate services and the lack of services in the area

**Key issues assessed include:**

- Provision of services
- Loss of areas of ecological significance
- Responsiveness to the City of Tshwane's requirements

### **IMPACTS AND MITIGATION MEASURES**

Relevant issues were evaluated in terms of the most important parameters applicable to the environmental management. Several mitigation measures have been identified that could manage the impacts, or mitigate them successfully.

### **CONCLUSION**

The development proposal accommodates and avoids the sensitive areas and in the areas that have been identified as development land, has no fatal flaws in terms of the institutional, bio-physical or socio-economic environments.

## **KLERKSOORD DEVELOPMENT DRAFT EIA**

### **RECOMMENDATION**

It is recommended that the **Klerksoord Mix use Development (preferred alternative)** option is utilised. Furthermore, it is recommended that this application be approved, subject to all specifications of:

- The Environmental Impact Assessment Report
- The Environmental Management Plan (EMP)
- All specialist studies
- All requirements of the City of Tshwane
- The requirements of the Record of Decision by GDARD

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- Annexure I - Public Participation Report
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- Annexure K - Draft Environmental Management Plan (EMP)

## **1.0 NEMA REQUIREMENTS**

In accordance with the Regulations in terms of Chapter 5 of the NEMA, 1998, Section 31 Environmental Impact Assessment Reports require the following:

### **Environmental impact assessment reports**

31.

- (1) *If a competent authority accepts a scoping report and advises the EAP in terms of regulation 30(1)(a) to proceed with the tasks contemplated in the plan of study for environmental impact assessment, the EAP must proceed with those tasks, including the public participation process for environmental impact assessment referred to in regulation 28(h)(i)-(iv) and prepare an environmental impact assessment report in respect of the proposed activity.*
- (2) *An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include—*
  - (a) *details of—*
    - (i) *the EAP who compiled the report; and*
    - (ii) *the expertise of the EAP to carry out an environmental impact assessment;*
  - (b) *a detailed description of the proposed activity;*
  - (c) *a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is—*
    - (i) *a linear activity, a description of the route of the activity; or*
    - (ii) *an ocean-based activity, the coordinates where the activity is to be undertaken;*
  - (d) *a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;*
  - (e) *details of the public participation process conducted in terms of subregulation (1), including—*
    - (i) *steps undertaken in accordance with the plan of study;*
    - (ii) *a list of persons, organisations and organs of state that were registered as interested and affected parties;*
    - (iii) *a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and*
    - (iv) *copies of any representations and comments received from registered interested and affected parties;*
  - (f) *a description of the need and desirability of the proposed activity;*
  - (g) *a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;*
  - (h) *an indication of the methodology used in determining the significance of potential environmental impacts;*
    - (i) *a description and comparative assessment of all alternatives identified during the environmental impact assessment process;*
    - (j) *a summary of the findings and recommendations of any specialist report or report on a specialised process;*
    - (k) *a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;*
  - (l) *an assessment of each identified potentially significant impact, including—*
    - (i) *cumulative impacts;*
    - (ii) *the nature of the impact;*

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- (iii) the extent and duration of the impact;*
- (iv) the probability of the impact occurring;*
- (v) the degree to which the impact can be reversed;*
- (vi) the degree to which the impact may cause irreplaceable loss of resources; and*
- (vii) the degree to which the impact can be mitigated;*
- (m) a description of any assumptions, uncertainties and gaps in knowledge;*
- (n) a reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;*
- (o) an environmental impact statement which contains—*
  - (i) a summary of the key findings of the environmental impact assessment; and*
  - (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;*
- (p) a draft environmental management programme containing the aspects contemplated in regulation 33;*
- (q) copies of any specialist reports and reports on specialised processes complying with regulation 32;*
- (r) any specific information that may be required by the competent authority; and*
- (s) any other matters required in terms of sections 24(4)(a) and (b) of the Act.*
- (3) The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in subregulation 31(2)(g), exist.*

## 2.0 INTRODUCTION

LEAP was appointed by Platinum High Tech Development (Pty) Ltd as Independent Environmental Consultants to undertake the appropriate environmental process for the proposed development on Klerksoord Extension 25 on Portion 147, Part of Portions 146, the Remaining Extent of Portion 160 and the Remaining Extent of Portion 164 of the Farm Witfontein 301-JR and Klerksoord Extension 26 on Portion RE/145 and Parts of Portions 146, RE/160 and RE/164 of the Farm Witfontein 301-JR. The process was registered for an EIA with the Gauteng Department of Agriculture and Rural Development (GDARD) under Regulation 544 & 545 of the National Environmental Management Act (Act No 107 of 1998) and was assigned the reference number **GAUT 002/07-08/N0897**

## 3.0 OBJECTIVES

The following objectives have been set:

- Preparation of the Environmental Impact Assessment Report by describing the context of the proposed development, including the bio-physical, socio-economic and institutional environments;
- Identification of impacts that the proposed development could have on the bio-physical and social environment;
- Assessment of the attitudes of the surrounding landowners and other interested and affected parties (I&APs) to such a proposed development;
- Recommendation of measures that will reduce, mitigate or eliminate identified negative impacts and improve the positive impacts; and therefore
- Determine whether the proposed development site is deemed suitable for the proposed development from an environmental perspective.

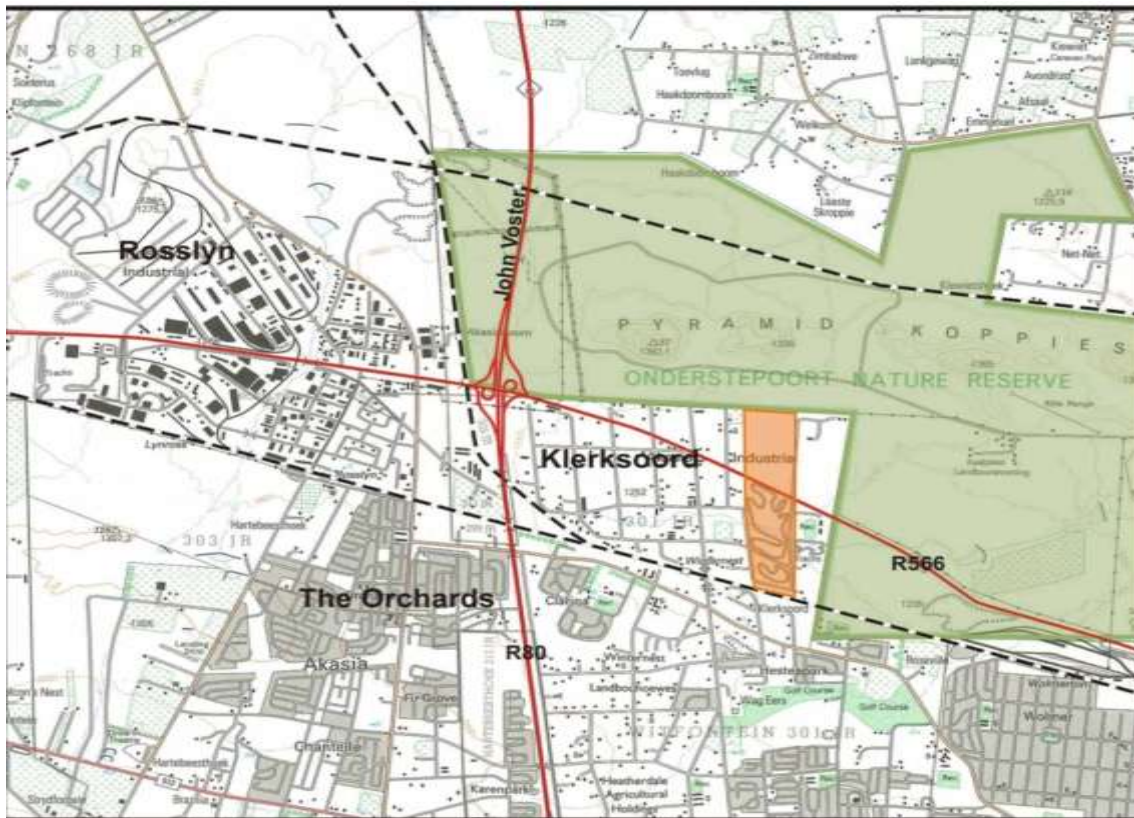
## 4.0 ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

The Environmental Assessment Practitioner is Dr. Gwen Theron who is a registered professional member of the following associations:

- SACLAP (South African Council for Landscape Architectural Profession)
- ILASA (Institute of Landscape Architects South Africa)
- IAIA (International Association for Impact Assessments)

Please refer to **Annexure A** – Prof Gwen Theron’s Curriculum Vitae

## 5.0 LOCATION



**Figure 1: Locality map**

The subject property is located within the municipal area of jurisdiction of the City of Tshwane Local Municipality. The R566 runs roughly through the centre of the proposed site, dividing it into two parts: the northern section containing Klerksoord Extension 25 and the southern section containing Klerksoord Extension 26. The northern section is located directly adjacent to the Onderstepoort Nature Reserve (Pyramid Koppies) and the City of Tshwane Municipality TOK Building. Most of the other surrounding properties are used for light industrial activities or are vacant at this stage.

The site is approximately 2km from the R80 (John Voster Drive) / R566 intersection, 5 km from Orchards and Rosslyn Industrial Park and approximately 5km from Bon Accord Dam. **See Figure 1: Locality Map.** The property is approximately 77,82 ha in extent (Klerksoord Ext 25 is approximately 36.22ha in extent and Klerksoord Ext 26 is approximately 41,6ha in extent).

## 6.0 BRIEF DESCRIPTION OF THE PROPOSED DEVELOPMENT

### 6.1 PROPOSED LAND USES

It is proposed that Klerksoord Ext 25 consist of 155 erven and roads, and, that Klerksoord Ext 26 consist of 596 erven and roads as indicated in Table 1.

- a) Residential 1 = 589 erven with a total area of 19.142Ha
- b) Residential 3 = 4 erven with a total area of 4.563Ha
- c) Business = 1 erf with a total area of 0.624Ha
- d) Public Open Space = 2 erven with a total area of 6.8175Ha
- e) Roads = With an area of 10.4125Ha

The FSR for item b) above is 0.9 and for item c), 0.4.

The below-mentioned land use rights will be incorporated into the City of Tshwane's Town Planning Scheme, 1980 in terms of the provisions of section 125 of the Town Planning and Townships Ordinance, 1986 (Ordinance 15 of 1986). However, these rights will be incorporated in accordance with the proposed phasing of the township as illustrated on the proposed township layout plan that accompanies the application documents. The proposed land uses are discussed below.

**Table 1: Proposed Land Use Schedule**

DESCRIPTION	ERF SIZE (ha)	PROPOSED ZONING
Klerksoord Ext 25	36.22	<ul style="list-style-type: none"> <li>• Industrial 1 (excluding a public garage) (150 erven)</li> <li>• Industrial 1 (including place of amusement, restaurant, shop, office and institution) (1 erf)</li> <li>• Private open space</li> <li>• "Special" for access (3 erven)</li> </ul>
Klerksoord Ext 26	41.6	<ul style="list-style-type: none"> <li>• Residential 1 (589 erven)</li> <li>• Residential 3 (4 erven)</li> <li>• Business (1 erf)</li> <li>• Public open space (2 erven)</li> </ul>

### 6.2 LAYOUT

The layout of the proposed development is indicated on **Figure 2(a): Proposed layout**. However, to fully understand the layout it is important to review the remainder of the report specifically the environmental factors, and the town planning components.



Figure 2(a): Proposed layout for Klerksoord Ext 25



Figure 2(b): Proposed layout for Klerksoord Ext 26

## **7.0 NEMA LISTED ACTIVITIES TO BE APPLIED FOR**

In April 2006 the Minister of Environmental Affairs and Tourism passed Environmental Impact Assessment Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998 (NEMA). The regulations replaced the Environmental Impact Assessment (EIA) regulations which were promulgated in terms of the Environment Conservation Act, 1989 in 1997. The most recent regulations came into place on 18 June 2010 and, therefore, all application must be made in terms of these NEMA regulations. The purpose of this process is to determine the possible negative and positive impacts of the proposed development on the surrounding environment and to provide measures for the mitigation of negative impacts and to maximise positive impacts.

Notice No. R 543 to R 547, specifically 544,545 and 546 list activities that must be considered in the process to be followed. The Activities listed in Notice No. R 545 and 546 requires that the Scoping and EIA process be followed. However, the draft guidelines document supplied by DEAT states that if any activity being applied for is made up of more than one listed activity and the scoping and EIA process is required for one or more of these activities, the full EIA process must be followed for the whole application.

The proposed development includes a number of listed activities and therefore it will be necessary to follow a full EIA process (as an independent process) in terms of NEMA. The applicant is therefore applying for the following listed activities.

**Table 2: Listed Activities to be applied for**

<b>Regulations</b>	<b>Activity No (s)</b>	<b>Description</b>
GN Reg 544 18 June 2010	9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water - (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
GN Reg 544 18 June 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more
GN Reg 544	11	The construction of: (i) canals; (ii) channels;

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18 June 2010		<ul style="list-style-type: none"> <li>(iii) bridges;</li> <li>(iv) dams;</li> <li>(v) weirs;</li> <li>(vi) bulk storm water outlet structures;</li> <li>(vii) marinas;</li> <li>(viii) jetties exceeding 50 square metres in size;</li> <li>(ix) slipways exceeding 50 square metres in size;</li> <li>(x) buildings exceeding 50 square metres in size; or</li> <li>(xi) infrastructure or structures covering 50 square metres or more</li> </ul> <p>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>
GN Reg 544 18 June 2010	18	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</p> <ul style="list-style-type: none"> <li>(i) a watercourse;</li> <li>(ii) the sea;</li> <li>(iii) the seashore;</li> <li>(iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater-</li> </ul> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving.</p>
GN Reg 544 18 June 2010	22	<p>The construction of a road, outside urban areas,</p> <ul style="list-style-type: none"> <li>(i) with a reserve wider than 13,5 meters or,</li> <li>(ii) where no reserve exists where the road is wider than 8 metres, or</li> <li>(iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice June of 2010.</li> </ul>
GN Reg 544 18 June 2010	37	<p>The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where:</p> <ul style="list-style-type: none"> <li>(a) the facility or infrastructure is expanded by more than 1000 metres in length; or</li> <li>(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more–</li> </ul> <p>excluding where such expansion:</p> <ul style="list-style-type: none"> <li>(i) relates to transportation of water, sewage or storm water within a road reserve; or</li> <li>(ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.</li> </ul>
GN Reg 544 18 June 2010	39	<p>The expansion of</p> <ul style="list-style-type: none"> <li>(i) canals;</li> <li>(ii) channels;</li> <li>(iii) bridges;</li> <li>(iv) weirs;</li> <li>(v) bulk storm water outlet structures;</li> <li>(vi) marinas;</li> </ul> <p>within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an</p>



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		increased development footprint but excluding where such expansion will occur behind the development setback line.
GN Reg 544 18 June 2010	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres – excluding widening or lengthening occurring inside urban areas.
GN Reg 545 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;

### 8.0 DESCRIPTION OF THE INSTITUTIONAL ENVIRONMENT

The land development proposal of the proposed development site is influenced by the varying scales of institutional environments. The institutional context that is considered and reflected upon ranges from that of international, national, provincial and local / municipal, while each institutional arena as it decreases in scale, requires development planning that is more detailed and responsive to the proposed development site and the surrounding environment.

The following institutional framework documents are relevant to the proposed township and development site.

### 8.1 INTERNATIONAL CONTEXT

Relevant International Conventions to which South Africa is part of and which should influence the proposed site development:

**Table 3: International context**

CONVENTION	RESPONSE
<ul style="list-style-type: none"> <li>■ Ramsar Convention on Wetlands, 1971</li> <li>■ Framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.</li> </ul>	<p>The site is part of the Quaternary catchment A23E, which drains via the Apies River and two wetlands occupy the southern portion of the property.</p> <ul style="list-style-type: none"> <li>■ Development to occur outside of the 1:100 year floodline</li> <li>■ Rehabilitation of this drainage line should be implemented as far as possible.</li> </ul> <p>Development and particularly storm water management, to be responsive to surrounding wetlands / hydrological systems which drain into the Apies River. The implementation of attenuation and dissipation measures to minimise the velocity and quantity of storm water and therefore minimising environmental impacts is essential.</p>

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	Please refer to the <b>Draft Environmental Management Plan (EMP) – Annexure K</b> for further information in this regard.
<ul style="list-style-type: none"> <li>■ Agenda 21 adopted at the United Nations Conference on Environment and Development (UNCED) in 1992</li> <li>■ Action plan and blueprint for sustainable development.</li> </ul>	<p>The proposed development is to be planned, constructed and operated with sustainability as a key prerequisite and baseline standard.</p> <p>Please refer to <b>Annexure K – Draft EMP</b> for practical steps in achieving best practice methodologies.</p>
<ul style="list-style-type: none"> <li>■ Convention on Biological Diversity, 1995</li> <li>■ Provided and added stimulus for a re-examining and harmonization of its activities relating to biodiversity conservation.</li> </ul>	<p>An ecological specialist completed an assessment of the proposed development site to determine the biodiversity and habitat value. This assessment is to inform the planning and design phases as far as possible.</p>

## 8.2 NATIONAL CONTEXT

The following national legislature is to be considered and applied to the development proposal during the environmental process:

**Table 4: National Context**

LEGISLATURE	RESPONSE
<b>8.2.1 Development Facilitation Act (DFA), 1995 (Act No 67 of 1995)</b>	
An act which formulates a set of general principles to serve as guidelines for land development that encourage economically sound, socially acceptable and politically correct town planning. The following principles are applicable:	Even though the town planning procedure is not following the DFA process, the DFA principles have great importance with respect to good planning and development and are therefore to be aligned to as far as possible.
Promote integration of social, economic, institutional and physical aspects of land development	<p>The township establishment process and the environmental impact assessments are transparent and offer the opportunity for interested and affected parties to participate / comment on the proposed development.</p> <p>The processes have been designed to ensure that people's rights in respect of a healthy and economically viable environment are protected.</p> <p>All these aspects are taken into account during the environmental process to ensure a sustainable development.</p>
Promote availability of residential and employment opportunities in close	A number of employment opportunities will be provided for workers during the construction phase of the project which

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proximity to each other	will occur over a number of years. The establishment of the Klerksoord Extension 25 and Klerksoord Extension 26 Townships (preferred land use) celebrates and promotes a close linkage between living and working environments.
Promote a diverse combination of land uses	Diverse land use is key to the success of this proposal as a mixed-use nodal development.
Discourage urban sprawl and promote a compact city	The proposed development site is strategically located along accessible transport corridors and urban amenities.
Development of skills and capacities	Skills development and capacity building will be an essential component of the construction phase while numerous opportunities in the retail, business and management industries will be made available during the operational phase. Adjoining unemployed community members be employed and trained as far as possible during the construction phase.  For further information please refer to <b>Annexure K – Draft EMP</b>
Furthermore, the DFA encourages environmentally sound land development practices and the promotion of the sustained protection of the environment.	The environmental impact assessment process ensures that sound land development practices are implemented, creating a balance between environmental, social and economic requirements.
<b>8.2.2 National Environmental Management Act (NEMA), 1998 (Act No 107 of 1998) and the Environmental Impact Assessment Regulations</b>	
NEMA aims to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state and to provide for matters connected therewith. The Act recognises that many inhabitants of South Africa live in an environment that is harmful to their health and well being and focuses on the following:	NEMA principles are to be adhered to, with specific reference to development that promotes integrated environmental management, while being socially, environmentally and economically sustainable.  The proposed development layout must reflect NEMA principles, such as protection of the environment for present and future generations by preventing pollution and ecological degradation, promoting conservation and securing ecologically sustainable development and utilisation of natural resources.
Everyone has the right to an environment that is not harmful to his or her health or well-being	Please refer to the <b>Draft EMP (Annexure K)</b> which discusses health and safety issues during the construction phase.

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<p>The State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities</p>	<p>This development will provide employment opportunities (construction and operational phase therefore forming an inclusive environment with employment opportunities in close proximity to accommodation.</p>
<p>Inequality in the distribution of wealth and resources, and the resultant poverty, are among the important causes as well as the results of environmentally harmful practices;</p>	<p>Good integration is ensured due to the mixed land use character of the proposed development, as well as its location within the urban realm along public and private transport corridors. A number of communities and individuals will be able to access and invest in the proposed development.</p>
<p>Sustainable development requires the integration of social, economic and environmental factors in the planning. implementation and evaluation of decisions to ensure that development serves present and future generations</p>	<p>Social and environmental aspects are taken into consideration during the environmental impact assessment process, along with appropriate market feasibility research, to ensure that the project is viable and sustainable. The proposed development responds to the Regional Spatial Development Framework of the local municipality.</p>
<p>Everyone has the right to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that:</p> <ul style="list-style-type: none"> <li>■ prevent pollution and ecological degradation</li> <li>■ promote conservation</li> <li>■ secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development</li> </ul>	<p>The proposed development plan ensures that areas of cultural and ecological value are maintained. Also, please refer to the Draft EMP (<b>Annexure K</b>) which thoroughly discusses aspects that are related to ecological preservation, conservation and sustainable development.</p>
<p>The environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must co-operate with, consult and support one another</p>	<p>Applicable national, provincial and municipal legislation is taken into account and aligned to during the environmental impact assessment process</p>
<p>Furthermore, this act develops a framework for integrating good environmental management into all development activities, while establishing principles guiding the exercise of functions affecting the environment. Integrated Environmental Management</p>	<p>A thorough impact assessment process has been undertaken – derived from:</p> <ul style="list-style-type: none"> <li>■ Public Participation</li> <li>■ Specialist studies</li> <li>■ Map assessments</li> <li>■ Institutional and legal assessment</li> </ul>

<p>(IEM) is designed to ensure that the environmental consequences of development proposals are understood and adequately considered in the planning, implementation and management of all developments. It is intended to guide, rather than impede the development process by providing an approach to gathering and analysing information, and ensuring that it can be easily understood by all interested and affected parties in the development. The purpose of IEM is to resolve or lessen any negative environmental impacts and to enhance positive aspects of development proposals.</p>	<p>This process allows for adequate planning and mitigation. Please refer to <b>item 15</b> of this report which provides information on the assessment process.</p>
<p><b>8.2.3 The National Water Act, 1998 (Act No 36 of 1998)</b></p>	
<p>The National Water Act:</p> <ul style="list-style-type: none"> <li>■ Recognizes that water is a scarce and unevenly distributed national resource which occurs in many different forms which are all part of a unitary, inter-dependent cycle</li> <li>■ Recognizes that while water is a natural resource that belongs to all people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources</li> <li>■ Acknowledges the National Government’s overall responsibility for and authority over the nation’s water resources and their use, including the equitable allocation of water for beneficial use, the redistribution of water, and international water matters</li> <li>■ Recognizes that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users</li> <li>■ Recognizes that the protection of the quality of water resources is</li> </ul>	<p>In essence, the proposed development should align to the purpose of this Act, therefore ensuring that the nation’s water resources are protected, utilised, developed, conserved, managed and controlled in ways that take the following into account:</p> <ul style="list-style-type: none"> <li>■ Meeting basic human needs of present and future generations</li> <li>■ Promoting equitable access to water</li> <li>■ Promoting efficient, sustainable and beneficial use of water in the public interest</li> <li>■ Reducing and preventing pollution and degradation of water resources</li> <li>■ Facilitating social and economic development</li> <li>■ Providing for the growing demand for water use</li> </ul> <p>The Act requires that (where applicable) the 1:50 and 1:100 year flood line be indicated on all the development drawings that are being submitted for approval. These flood lines have been indicated, however they do not directly affect the proposed development site.</p> <p>Please refer to <b>Figure 9 – Environmental Composite</b>.</p>

<p>necessary to ensure sustainability of the nation’s water resources in the interests of all water users</p> <ul style="list-style-type: none"> <li>■ Recognizes the need for the integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level so as to enable everyone to participate</li> </ul>	
<p><b>8.2.4 National Environmental Management: Biodiversity Act, (Act No 10 of 2004)</b></p>	
<p>The National Environmental Management: Biodiversity Act aims to provide for the management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act1, 1998; including the –</p> <ul style="list-style-type: none"> <li>■ Protection of species and ecosystems that warrant national protection</li> <li>■ The sustainable use of indigenous biological resources</li> <li>■ The fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources</li> <li>■ The establishment and functioning of a South African National Biodiversity Institute; and for matters connected therewith</li> </ul>	<p>An ecological specialist was appointed to undertake the flora and fauna biodiversity assessment, with specific attention to Red Data Listed species, habitats and biodiversity</p> <p>The specialist study is aligned to requirements of this act.</p> <p>The proposed development aligns to the purpose of this Act and the above-mentioned specialist report.</p> <p>The sustainable utilisation of indigenous biological resources, i.e. indigenous vegetation species will be reintroduced to the newly created urban open spaces as far as possible, thereby resulting in an ecological urban regeneration strategy.</p> <p>Please refer to <b>Annexure K – Draft EMP</b> for additional information.</p>
<p><b>8.2.5 The National Heritage Resources Act, 1999 (Act No 25 of 1999) (NHRA)</b></p>	
<p>The NHRA focuses on the following, that have reference to the development of land:</p> <ul style="list-style-type: none"> <li>■ To introduce an integrated and interactive system for the management of the national heritage resources</li> <li>■ To promote good government at all levels, and empower civil society to</li> </ul>	<p>The proposed development should respond to the requirements of the National Heritage Resources Act as well as that of the South African Heritage Resources Agency (SAHRA).</p> <p>Section 38 of the NHRA makes provision for application by developers for permits before any heritage resources may be damaged or destroyed.</p> <p>A specialist in the field was appointed to conduct a Cultural Heritage Resources Impact Assessment.</p>

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<p>nurture and conserve their heritage resources so that they may be bequeathed to future generations</p> <ul style="list-style-type: none"> <li>■ To lay down general principles for governing heritage resources management throughout the Republic</li> <li>■ To introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa</li> <li>■ To establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources at national level</li> <li>■ To set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance</li> <li>■ To provide for the protection and management of conservation-worthy places and areas by local authorities; and to provide for matters connected therewith</li> </ul>	<p>No archaeological artefacts, features or structures were recorded during the survey of the proposed site of development. The foundations of several brick and mortar structures were recorded, however, none of these structures are older than 60 years and are therefore not protected by the National Heritage Resources Act (Act no 25 of 1999). An informal cemetery, with approximately 20 graves, was recorded on the northern periphery of the area. If the cemetery cannot be fenced off, the graves will have to be exhumed, relocated and buried in a formal cemetery. Informal cemeteries fall under the protection of Section 36 (and possibly even Section 35) of the National Heritage Resources Act (Act 25 of 1999).</p> <p>In the event that artefacts / graves / areas of cultural significance are discovered during the construction phase, all work should be halted and a cultural heritage practitioner should be appointed to examine the site and make appropriate recommendations.</p>
<p>This legislation aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations. It recognises that our heritage is unique and precious and it cannot be renewed as it –</p> <ul style="list-style-type: none"> <li>■ Helps us to define our cultural identity and therefore lies at the heart of our spiritual well-being and has the power to build our nation</li> <li>■ Has the potential to affirm our diverse cultures, and in so doing shape our national character</li> </ul>	<p>The importance of cultural heritage and its related preservation is discussed within the Draft EMP (<b>Annexure K</b>).</p> <p>The EMP places focus on the education of people regarding places of heritage value and artefacts, should they come across them during their work activities.</p>

<ul style="list-style-type: none"> <li>■ Celebrates our achievements and contributes to redressing past inequities</li> <li>■ Educates and deepens our understanding of society and encourages us to empathise with the experience of others</li> <li>■ Facilitates healing and material and symbolic restitution and it promotes new and previously neglected research into our rich oral traditions and customs</li> </ul>	
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### **8.3 PROVINCIAL CONTEXT**

Please note that the below section only highlights some of the most prudent issues in this regard.

**Table 5: Provincial context**

DOCUMENT	RESPONSE
<b>8.3.1 Gauteng Planning and Development Act (Act No 3 of 2003) (GPDA)</b>	
The GPDA states that Policy, administrative practice and law in the Province shall promote development and land use which:	
Promotes the more compact development of urban areas and the limitation of urban sprawl and the protection of agricultural resources;	The proposal addresses this requirement via its position within the urban realm adjacent to existing and proposed transport corridors and adjacent to urban amenities. Also, the mixed-use character caters for high densities which will minimise the necessity for urban development on the outskirts of urban areas.
Supports the correction of historically distorted spatial patterns of settlement in Gauteng;	To be addressed as far as possible with regard to the provision of more affordable high density accommodation therefore catering for a greater socio-economic spectrum.
Promotes integrated land development in rural and urban areas in support of each other;	This proposal forms part of a greater planning framework for the area and integration is ensured via appropriate service and infrastructure provision, the provision of linking transport corridors and the continuity of ecological corridors.
Results in the use and development of land that optimises the use of existing resources such as engineering services and social facilities; and	Existing bulk services are to be utilised as far as possible with appropriate upgrades where necessary.
Owns positive development qualities,	The urban design framework and planning



<p>particularly with regard to public environments.</p>	<p>methodologies cater for inclusive design at a pedestrian scale, incorporating public open spaces and positive streetscapes.</p>
<p>Policy, administrative practice and law in the Province shall with due regard to the principles of the National Environmental Management Act, 1998 (Act 107 of 1998) promote sustainable development that:</p> <ul style="list-style-type: none"> <li>■ Is within the fiscal, institutional and administrative means of the Province</li> <li>■ Meets the basic needs of all citizens in an affordable way</li> <li>■ Establishes viable communities with convenient access to economic opportunities, infrastructure and social services</li> <li>■ Optimises the balanced use of existing resources, including resources relating to agriculture, land, water, minerals, services infrastructure, transportation and social facilities</li> <li>■ Balances environmental considerations of preserving natural resources for future generations with economic development practices and processes</li> <li>■ Ensures the safe utilisation of land by taking into consideration its biophysical factors such as geology and undermined or hazardous areas</li> </ul>	<p>Sustainable principles are to be incorporated as far as possible within the planning, design, construction and operational phases therefore ensuring an appropriate balance between social, economic and environmental contexts.</p> <p>The environmental impact assessment process ensures that sound land development practices are implemented, creating a balance between environmental, social and economic requirements.</p>
<p><b>8.3.1 The Gauteng Draft Red Data Policy</b></p>	
<p>The primary purpose of the Draft Red Data Policy is to protect red data plant species in Gauteng Province. The Red Data plant policy is based on the following basic principles: Species endemic to the province of Gauteng must be afforded the utmost protection, as they occur nowhere else in the world. As the relevant provincial agency, this Department's responsibility towards Gauteng endemics is absolute; Conservation of only one population essentially ignores the lowest level of biodiversity that is genetic diversity. It is therefore imperative that</p>	<p>An ecological specialist was appointed to assess the proposed development sites fauna and flora biodiversity, with specific attention to Red Data Listed species.</p> <p>Only one orange Data Listed floral species were noted during the field assessment namely the <i>Eucomis autumnalis</i> subsp <i>clavata</i>. No protected tree species as listed by DWAF (National Forests Act 84 of 1998)) were noted.</p> <p>By developing this portion of land which is centrally located within the urban realm and adjacent to</p>

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<p>all populations of Red Data plant species are protected;</p> <p>In situ conservation is preferable to ex situ conservation. Removing a population from its natural habitat and placing it under artificial conditions results in the erosion of the inherent genetic diversity and characteristics of that species;</p> <p>In order to ensure the persistence of a population, it is imperative that the ecological processes maintaining that population persist;</p> <p>In order to ensure the persistence of a plant population, it is vital that pollinators are conserved. To conserve pollinators, the habitat must be managed to provide appropriate nest sites for pollinators and a seasonal succession of suitable forage and host plants. Pollinators must be protected from herbicide and pesticide application and soil disturbance must be prevented;</p> <p>Translocation of Red Data species is an unacceptable conservation measure since the translocated species may have undesirable ecological effects;</p> <p>Rural parts of the province should be protected from insensitive developments and urban sprawl/encroachment should be discouraged. Policy guiding developments should therefore be less lenient in rural areas;</p> <p>Red Data plant species historically recorded on a site, but not located during searches within species flowering seasons may be dormant (as a seed bank or subterranean structures such as bulbs/tubers/etc.) due to unfavourable environmental conditions;</p> <p>Suitable habitat adjacent to known populations of Red Data plant species has a high probability of being colonized;</p> <p>In order to protect a plant population that occurs in a fragmented landscape from edge effects, it is necessary to protect it with a buffer zone that extends from the edge of the population; and</p> <p>The transformation of natural vegetation to</p>	<p>existing and future urban infrastructure, urban sprawl and the development of rural locations are minimised.</p> <p>No RDL faunal species were observed during the field survey of the proposed development area. The proposed site will contain large numbers of small and medium mammals because of the Onderstepoort Nature reserve bordering the proposed site to the north and the undisturbed nature of the vegetation on the site. Four red data mammal species may on occasion move through the site from the nature reserve. These species will probably move back to the nature reserve as soon as disturbance in the form of development starts on site.</p> <p>It was found that the proposed development will not result in the loss of ecologically sensitive and important habitat units, ecosystem function, loss of faunal habitat nor the loss or displacement of threatened or protected fauna, avifauna, reptiles or amphibians.</p> <p>Please refer to Annexure D – Faunal and Flora Biodiversity Assessment</p> <p>Please refer to Figure 9 – Environmental Composite</p>
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<p>crops is considered as permanent as urbanization and may cause the extinction of Red Data plant populations and their pollinators.</p>	
<p><b>8.3.2 The Gauteng Draft Ridges Policy</b></p>	
<p>The quartzite ridges of Gauteng are one of the most important natural assets in the northern provinces of South Africa. This is because these ridges, and the area immediately surrounding the ridges, provide habitat for a wide variety of fauna and flora, some of which are Red List, rare or endemic species or, in the case of certain of the plant species, are found nowhere else in South Africa or the world. The ridges also fulfil functions that are necessary for the sustainability of ecosystems such as the recharging of groundwater, wetlands and rivers, wildlife dispersal and providing essential habitat for pollinators. Ridges also have a socio-cultural role in that they provide aesthetically pleasing environments that are valued by residents, tourists and recreational users. Human activities such as urbanization, mining and the planting of alien vegetation may undermine the contribution that ridges make to the environment.</p> <p>The conservation of ridges falls within the ambit of the environmental right and this policy comprises one of the measures that GDARD has taken to give effect to the environmental right in respect of ridges, therefore ensuring that:</p> <ul style="list-style-type: none"> <li>■ The use of ridges is sustainable;</li> <li>■ Members of the public are able to make informed decisions regarding proposals for development on ridges and the use of ridges;</li> <li>■ Officials make consistent decisions in respect of planning and environmental applications that involve negative impacts on ridges; and</li> <li>■ The Department’s responsibility in respect of the protection of the environment is</li> </ul>	<p>No Ridges as delineated by this policy occur on the proposed development site. Please refer to <b>Figure 3 – GDARD Policies</b></p>

<p>carried out in an efficient and considered manner.</p>	
<p><b>8.3.1 GDARD Conservation Plan, Version 3</b></p>	
<p>A comprehensive Provincial Conservation Plan (C-Plan) was launched as a decision support tool in September 2005 to protect the province’s ecosystems and associated biodiversity and to act as an information tool for the conservation of sensitive areas. The C-Plan was an outcome of the Gauteng Biodiversity Gap Analysis Project (BGAP). The C-Plan system maps important biodiversity areas in Gauteng and provides information to protect important and sensitive areas within the province. This information is used by government as a decision-making tool with regard to EIA approvals.</p> <p>The second version (C-Plan version 2) indicated that 25 percent of Gauteng needs to be conserved to meet the Province’s biodiversity targets. The C-Plan includes protected areas, irreplaceable and important sites due to the presence of Red Data species, endemic species and potential habitat for these species to occur.</p>	<p>According to CPlan3 the proposed development site is not affected by dolomite or irreplaceable areas.</p> <p>Please refer to <b>Figure 3 – GDARD Policies</b> and <b>Figure 4 – GAPA</b></p> <p>Please refer to <b>Annexure D – Faunal and Flora Biodiversity Assessment</b>.</p>
<p><b>8.3.1 Protection of Agricultural Land in Gauteng Revised Policy (June 2006)</b></p>	
<p>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:</p> <ul style="list-style-type: none"> <li>■ Feed the nation;</li> <li>■ Provide upcoming farmers with access to productive land; and</li> <li>■ Meet national targets set in this regard.</li> </ul> <p>Land with high agricultural potential is a scarce non-renewable resource and the need to protect it is a high priority for GDARD. GDARD applies a risk averse and cautious approach when development of such land for purposes other than agricultural production is proposed. The risk</p>	<p>The proposed development site falls within the urban edge and according to the Gauteng Agricultural Potential Atlas (GAPA Version 3), is not situated within a region delineated as an Agricultural Hub; however the GAPA information indicates that a portion of the development site has moderate agriculture potential.</p> <p>Please refer to <b>Figure 4 – GAPA</b></p>

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<p>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.</p> <p>GDARD 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. The 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.</p>	
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### 8.4 LOCAL CONTEXT

Please note that the below section only highlights some of the most prudent issues in this regard.

**Table 6: Local Context**

DOCUMENT	RESPONSE
<p><b>8.4.1 City of Tshwane Local Municipality Spatial Development Framework (SDF) 2008</b></p> <p>Klerksoord is a region within the City of Tshwane as a centre where “nodal development” has to be encouraged.</p> <p>Direct quotes from the SDF include the following:</p> <p>“Klerksoord should be provided with proper infrastructure to encourage formal industrial development, focused on job creation.</p> <p>The areas between Rosslyn and Klerksoord as well as the area to the south of the PWV2 and north of the railway line and the Rainbow Junction area are indicated as mixed use areas. Future job opportunities are expected to take place along the proposed N4 Corridor Development as indicated on the Spatial Development Framework of North Western Region. These areas form part of a job opportunity belt connecting Rosslyn in the west</p>	<p>All these aspects have been responded to as per the urban design framework and the town planning application.</p>

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<p>with the proposed new Freight Airport in the east (Region 2). The mixed use areas are strategically located on main transportation axis' including rail infrastructure. The mixed use areas would be ideal to accommodate higher order land uses, which are supportive of the manufacturing sector and could include offices, high tech/ light industries, retail and conference facilities”</p>	
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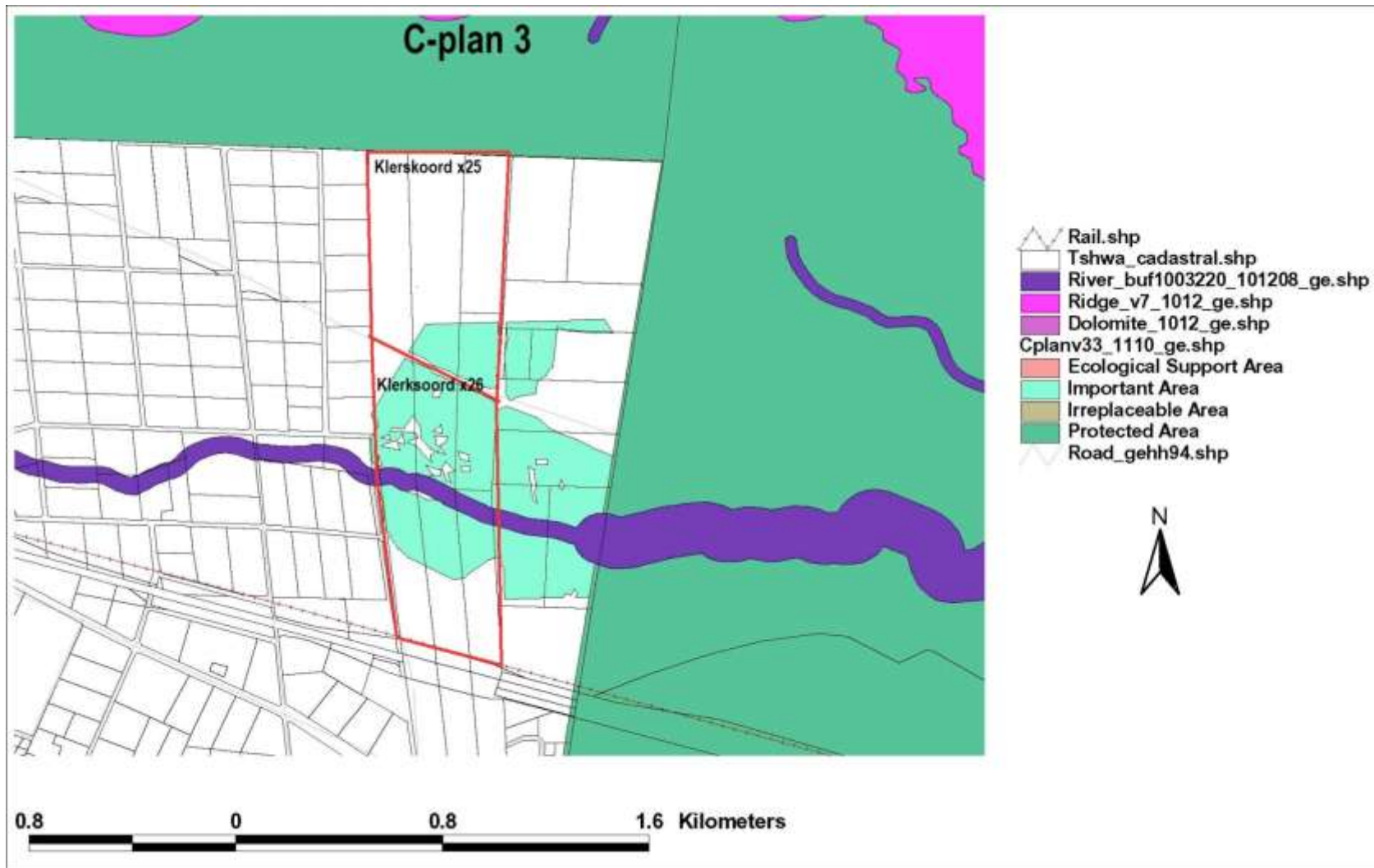


Figure 3: GDARD Policies (Source CPlan3)

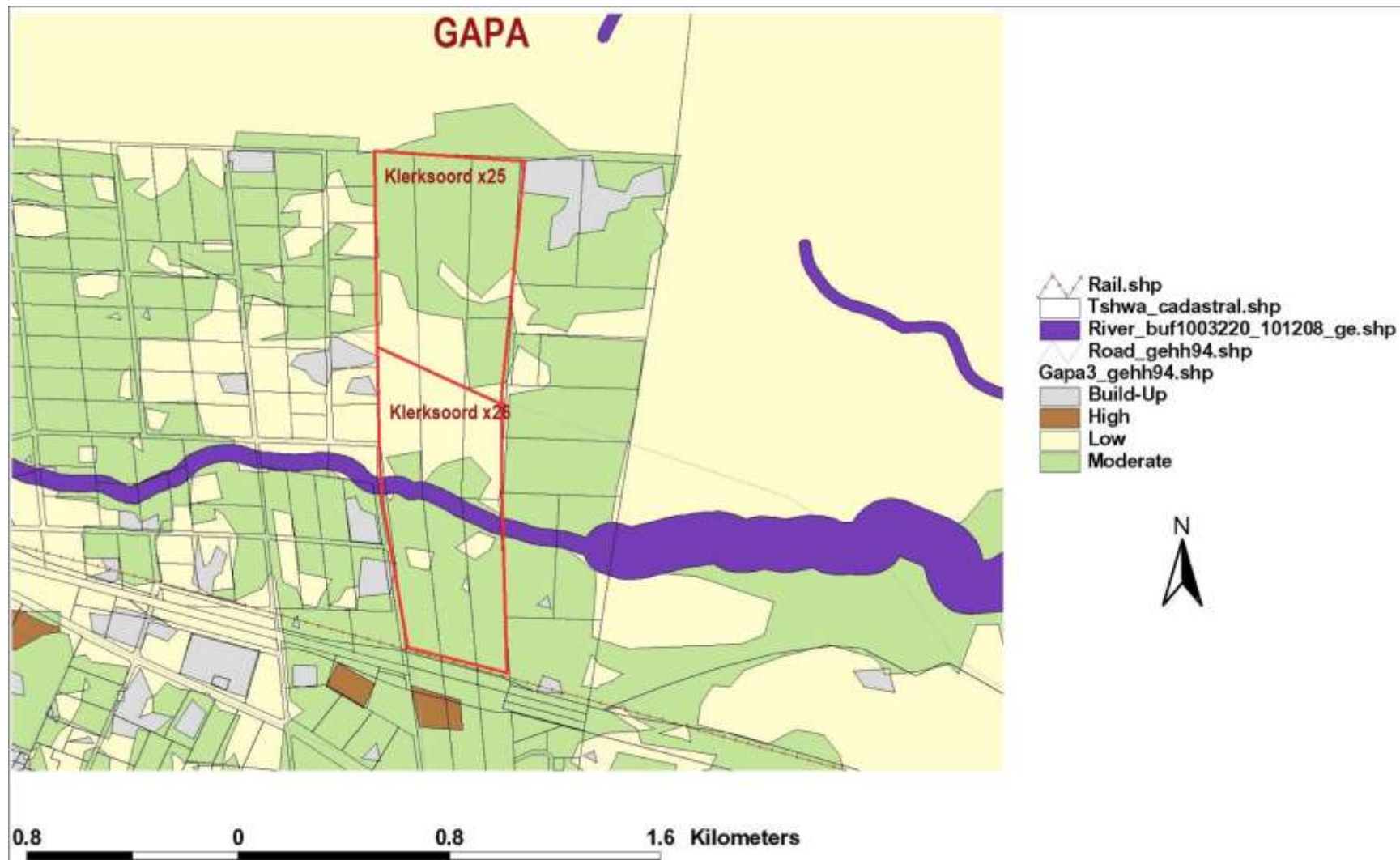


Figure 4: GAPA ( Source CPLAN 3)



## 9.0 DESCRIPTION OF THE BIO-PHYSICAL ENVIRONMENT

### 9.1 CURRENT LAND USE, ZONING AND SITE CHARACTER

The proposed site is zoned “Industrial 2” in terms of the Peri Urban Town Planning Scheme, 1975 of the City of Tshwane and is currently vacant, however there are indications of informal settlers on the site.

### 9.2 SURROUNDING LAND USE, ZONING AND CHARACTER

Land use in the jurisdictional area of City of Tshwane. The section of the site located north of the R566 is adjacent to the Onderstepoort Nature Reserve and is surrounded by industrial activities, a primary school, City of Tshwane Municipality TOK Building and vacant land. The areas surrounding the section lying south of the R566 are mostly dominated by industrial activities. Most of the land east of the northern section is vacant. There are informal settlers on the vacant land immediately west of the southern section of the proposed township.

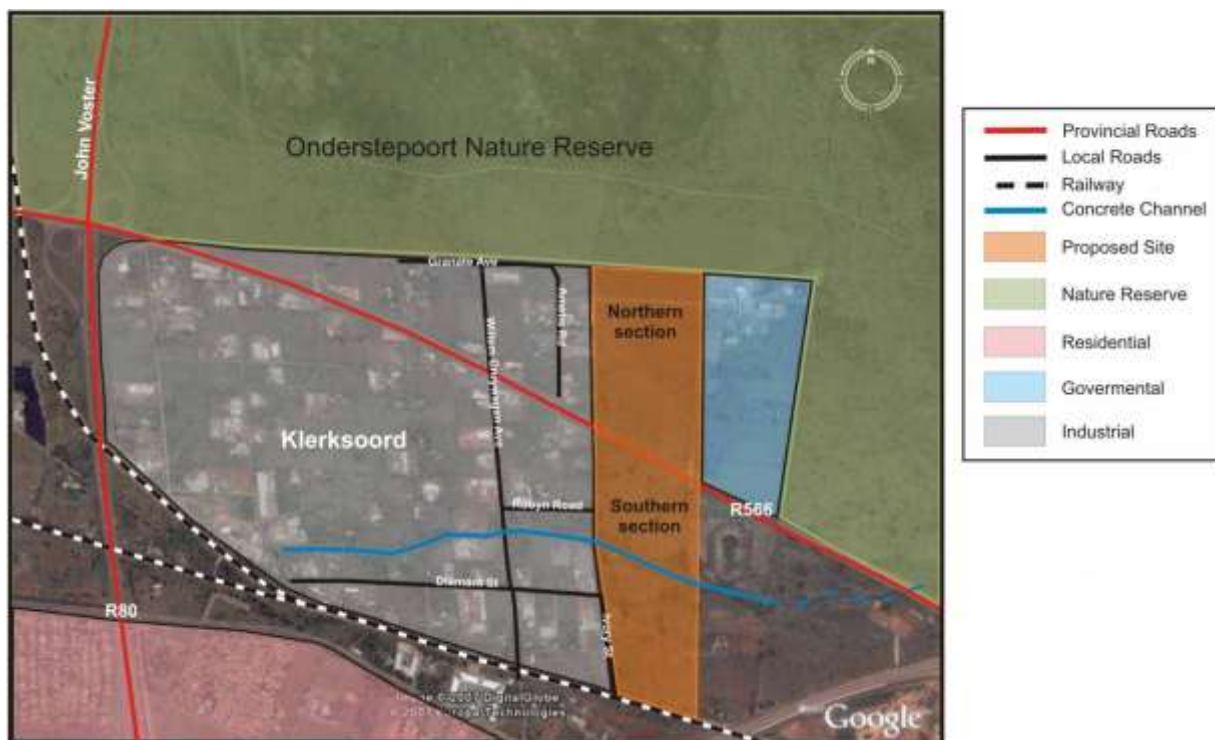


Figure 5: Aerial photo with adjacent land uses

### 9.3 TOPOGRAPHY

The site has a gentle slope with a gradient of approximately 1% towards the south east of the property.

#### Implications:

The topographical character of the site will not result in major implications on the proposed development.

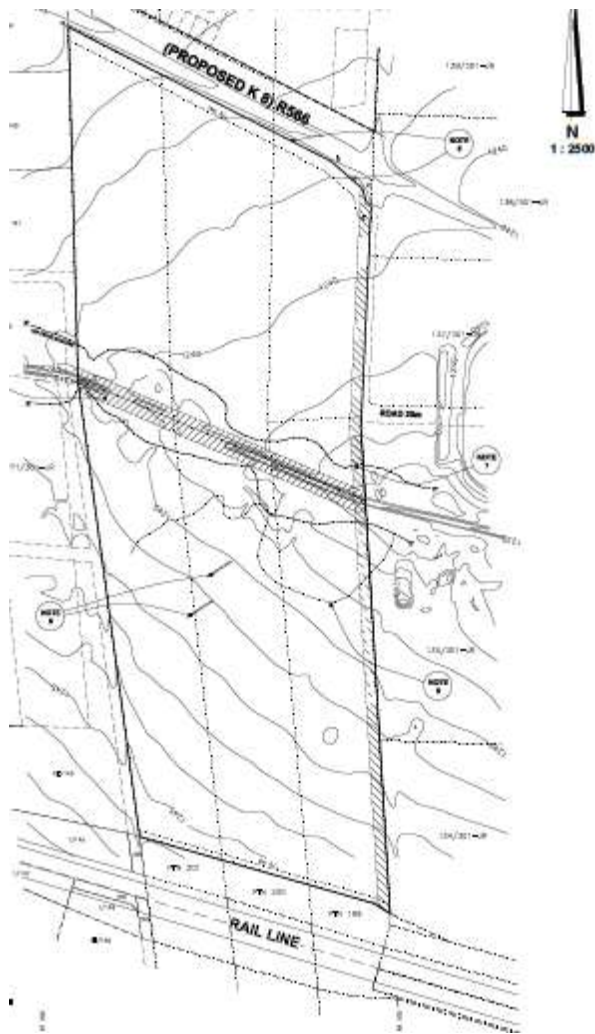


Figure 6: Contour Map of X26

## 9.4 HYDROLOGY

The slope of the proposed site has a gentle gradient down towards the south east and minor concentrations of runoff in shallow localized gullies will occur on the site. The flow of surface water will be towards the canalized gully that traverses the southern portion of the site and forms the primary drainage feature. With the exception of the R566 road which has obviously affected storm water drainage from the site, no other significant drainage features were identified.

No groundwater seepage was recorded, but it must be anticipated that seasonal fluctuations of the level of the perched water table may occur.

### Implications:

No development is to occur within the 1:100 or 1:50 year floodline delineation. Development and particularly storm water management, to be responsive to surrounding wetlands / hydrological systems. The implementation of attenuation and dissipation measures to minimize the velocity and quantity of storm water and therefore minimizing environmental impacts is essential.

## 9.5 CLIMATIC CONDITIONS

Climatic conditions of the Gauteng Province vary significantly. Regionally, the site lies within the dry subtropical climate in the mid latitude of the world climate classification. The area receives most of its rainfall in summer with a total rainfall of between 600 to 700 mm per year. Temperatures vary between 7°C and 35°C during summer and -5°C and 24°C during the winter months.

### Implications:

No specific development implications have been identified.

### 9.6 GEOTECHNICAL INVESTIGATION

For full details, please refer to **Annexure B** for the Phase 1 **Geotechnical Investigation** compiled by *Africa Exposed Consulting Engineering Geologists*.

#### **Methodology**

The investigation comprised of profiling the soil in 16 test pits as well as laboratory testing of samples of the representative soil layers.

#### **General geology**

From available literature and as well as observations made during the site inspections it is evident that the site is underlain by norite and gabbro of the Main Zone of the Rustenburg Layered Suite, Bushveld Igneous Complex. Typically these rocks decompose in-situ, forming a surface horizon of black, highly expansive clay known as "black turf", while this residual material may often be covered in a horizon of transported fine colluvial sand.

The investigation revealed that the entire site is underlain uniformly by gabbro, and no structural features were identified that will affect the geology.

As a result of deep and extensive chemical weathering, the rockmass has been reduced to residual silty sand and gravels at depth and active clayey soils close to the surface. By experience it is known that the depth of this material varies considerably and is usually underlain by residual gabbro, at depths that vary from approximately 1.0m to greater than 5m.

#### **Soil profiles**

##### ■ Transported Soils

The entire site is blanketed by a layer of variable thickness of transported hillwash. The material can be described as being reddish brown, medium dense, silty sand that was up to 2.3m deep in the extreme southern and northern portions of the site. With increasing depth it was noted that the soil became ferruginised with many ferricrete nodules present within the soil structure. The remainder of the site can be characterized by a thin layer of hillwash that is on average some 0.3m thick. This material was described as being dark grey to black, firm sandy clay which is rich in organic matter.

##### ■ Reworked Residual Gabbro

With the exception of the extreme southern and north eastern portions of the site, the entire area is underlain by an extremely weathered and reworked residual gabbro. The soil is described as being dark grey to black, firm to stiff, shattered and slickensided sandy clay. Typically these soils are derived from the in-situ decomposition of the underlying basic igneous rock formations and are composed of between 30% and 60% clay, in which montmorillonite is the predominant and often only clay mineral. The high proportion of active clay present in the soil profile gives rise to a highly active material in which significant heave and shrinkage movements are possible. This is borne out by the shattered and slickensided structure described as well as the deep desiccation cracks recorded in the upper portions of the soil profile.

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- Residual Gabbro  
The residual gabbro soil which originates from the in-situ weathering of the parent rock underlies the entire site at an average depth of 2.0m. This material was generally described as a light yellowish brown, speckled silty and clayey sand that is of dense consistency. This material is generally inert, and the contact between this horizon and the overlying active clay is usually well defined and easily identified in the field.
- Gabbro Bedrock  
Completely to highly weathered gabbro bedrock was encountered in nine of the test pits excavated on the central portions of the site. The rock varies in hardness in relation to the degree of weathering and may vary from very soft rock to medium hard rock. The excavator used to dig the test pits was a CAT 428 TLB, and the machine refused at an average depth of 2.5m below current ground level.

### Groundwater

No groundwater seepage was encountered on the site, however it must be anticipated that shallow groundwater may occur in isolated areas throughout the site after periods of sustained rainfall. Appropriate precautions should therefore be implemented beneath all the structures and paved areas, as well as on any exposed excavated surfaces in the terraces.

### Slope stability and erosion

No natural slope instabilities will occur

### Implications

There are no adverse conditions indicating that development cannot take place on the site for the proposed structures. The whole of the site is thus economically and practically developable. Development inside the 1:100 year floodline should be avoided at all costs unless special design techniques are incorporated.

## 9.7 AGRICULTURAL POTENTIAL

The proposed development site, according to the Gauteng Agricultural Potential Atlas (GAPA Version 3), is not situated within a region delineated as an Agricultural Hub, therefore it was not necessary to complete an Agricultural potential assessment was not completed. However, the GAPA information indicates that a portion of the development site has moderate agriculture potential (see **Figure 4**)

### Implications

Although the land may have high agricultural soils in parts, the land lies inside the urban edge and is designated for development.

## 9.8 ECOLOGICAL ASSESSMENT

Please refer to the **Ecological Assessment** as completed by *Galago Environmental Fauna and Flora Specialists* and the **Wetland Sensitivity, Function and PES Assessment** as completed by *Scientific Aquatic Services*, and are attached under **Annexure D**.

The ecological assessment studies were undertaken to determine the overall condition and ecological status of the proposed development site, as well as the occurrences (and possible potential habitat) of any RDL faunal or floral species. The findings of this studies should be used to propose recommendations and mitigation actions for the construction and management phases of the proposed development activity pertaining to various ecological processes, as well as to develop an Environmental Management Plan (EMP).

A desktop study to gain background information on the physical habitat and potential faunal and floral biodiversity lists of the proposed development site and surrounding areas was initially undertaken. These lists included the RDL species applicable to the area and a description of the physical habitat and vegetation types represented within the area. This information was then cross-referenced with the data from the habitat assessments done during the field survey. The field surveys for the Ecological Assessment were undertaken during February 2008 and the field surveys for the Wetland Sensitivity, Function and PES Assessment were undertaken during September 2011.

### 9.8.1 Vegetation type status and general area assessment

Mucina and Rutherford (2006) classify the area as Marikana Thornveld at an altitude between 1050 m and 1450 m. They describe the area as open *Acacia karroo* woodland, occurring in valleys and slightly undulating plains with some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitats protected from fire.

The conservation status of this vegetation type is endangered, with 48% transformed and industrial development is a major threat. Its conservation target is 19%, with less than 1% of it statutorily conserved, for example, in Magaliesberg Nature Area and Onderstepoort Nature Reserve. Erosion is very low to moderate. Alien invasive plants occur localised in high densities and especially along the drainage lines.

Two wetlands have been identified on the study area. The wetlands occupy approximately 5% of the total study area. These wetlands have been identified as seepage wetlands, are situated on a footslope and feed into a formalised canal. According to Taka Echo and Land Rehab CC. both wetlands show signs of being permanently wet wetlands. Their soil sample shows low mottling content with anaerobic characteristics and predominantly fine textures poorly drained gleyed soil. Both wetlands have similar hydrological characteristics with their hydrology being dependent on the sub-surface flow that is generated by the immediate catchment.

Plants such as *Typha capensis*, *Imperata cylindrica* and the alien species *Arundo donax*, occur within the wetland boundaries, which is indicative of a permanent or semi-permanent wetland. At the time of the assessment by SAS in September 2011, no permanent water, apart from that within the canalised stream, was present within the delineated wetland area. This may be due to the delayed rainy season and is considered to be natural seasonal variation.

## KLERKSOORD DEVELOPMENT DRAFT EIA

Through visual observation, it was evident that wetland ecological condition, functionality and service provision differed throughout the system and that the wetland may be divided into smaller sections or management units of similar sensitivities. These discrepancies within the wetland system are primarily due to site disturbances such as; bush encroachment, trampling and informal walkways, dumping, past construction activities and related altered topography, burning due to informal fires on the study area and alien plant invasion, by species such as *Arundo donax*, *Sesbania bispinosa*, *Campuloclinium macrocephalum* and *Tithonia rotundifolia*.

From the results of the assessment, it is evident that the overall wetland feature has a low to moderate level of ecological function and service provision. Due to the large number of disturbances related to the site, it is unlikely to harbour populations of RDL faunal and floral species. The wetland does however, provides good habitat for certain faunal species with special mention of avifauna, and as such does deserve some level of conservation.

Historical infrastructure development, such as the concrete channel construction and related changes in surface topography, rubble dumping, alien vegetative invasion and bush encroachment also contribute to the transformed nature of the wetland feature.

Management Unit A was deemed to have both a low ecological/ habitat integrity and functionality, as disturbances in this area were deemed to be very high.

Management Unit B was deemed to have a low ecological integrity, with moderate functioning, as the wetland in this section provides some level of flood attenuation and streamflow regulation.

Management Unit C provide moderate functionality in terms of wetland services, and moderate ecological importance and should remain undeveloped. A 30m buffer zone and an ecological corridor to link the two areas of moderate sensitivity in order to protect this management unit should be maintained.

The wetland function and service provision assessment indicated a low to moderate level of ecological function and service provision within different sections of the wetland. The wetland feature's present ecological state was determined to fall within class D – Largely Modified. The ecological management class determined by the *South African Wetland Assessment Classification System* is D – Largely Modified.

Six main vegetation types (areas for investigation) were identified on the proposed site, these included the following:

- Railway Area
- Grassland and Vlei
- Area south of R566
- Area north of R566
- Grassland Area

### 9.8.2 Floral assessment

#### 9.8.2.1 *Railway Area*

The vegetation in this area is a mixture of indigenous and exotic plants of which the trees are the most prominent. This area borders onto the railway line as well as an accompanying gravel road. All along this road are signs of habitat disturbance concomitant with the occurrence of weeds. This area is bordered by a gravel road on all four sides. This area is almost level and has a relatively high number of trees comprising 10 species, with *Acacia karroo* the most abundant. Dwarfing, also known as the bonsai effect of the clayish soil, was observed on some of the trees and shrubs such as *Acacia karroo*, *Acacia tortilis* and *Ehretia rigida*.

The grass population reflects some areas of climax development with *Themeda triandra* very prominent. In other areas where *Themeda triandra* is absent, other grass species and weeds occur indicating degrees of disturbance. More than 20 grass species were identified. Most of the disturbed areas occur along the border of the area, but there are signs of temporary dwellings being erected in the tree areas.

No Red Data species were found within this area or in the 200m zone outside the borders of this area.

#### 9.8.2.2 *Grassland and Vlei area*

The grassland and vlei area slopes down slightly to the north and ends in a vlei area flowing from west to east. The prominent wet areas of the vlei is most probably caused by a concrete canal blocking off the natural flow of the water to the east, with the result of wet areas next to the canal during the rainy season. Some weed species occur along the canal. Others like *Imperata cylindrica*, *Setaria sphacelata* and *Typha capensis* are very typical for a wetland.

This area consists of typical open woodland with some trees and abundant grass interspersed with herbs and geophytes and may experience frequent winter veld fires. The species diversity and richness is remarkable, especially the number of different grass species, geophytes and annuals.

Several illegal dumping sites for garden waste and domestic refuse were found and may well be the source for some of the exotic species found in this area.

The area slopes down to the north, with a change in the soil from a red loamy clay to a coarse, black turf. This is also evident in the occurrence of sedges, Spanish Reed and *Typha*. *Sesbania bispinosa* grows abundantly and very lush along the canal.

No Red Data species were found within this area, or in the prescribed zone outside the borders of this area.

#### 9.8.2.3 *Area south of R566*

This represents the area between the canal and the R566 road and has the smallest number of species for the total area designated. This is because of the low species diversity of the area. *Acacia karroo* and *Aristida bipartita*, interspersed with few other species, occur on large parts of Area C. However, a large number of grasses such as *Paspalum dilatatum*, *Cynodon dactylon*, *Aristida congesta* and *Tragus*

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*berteronianus*, associated with disturbed areas, are prominent. The bonsai effect is clearly visible on some of the trees in this area.

The vegetation of area south of R566 is determined by the black turf soil. Some weeds are present, mostly in the disturbed areas, but not in such large numbers as in some of the other areas. The majority of the weeds occur along foot paths, vehicle tracks and the canal. There is a large informal settlement on the western border of area and it may be the origin of the many foot paths in this area. Several dumping sites were found for garden waste and building rubble. *Catharanthus roseus* and *Agapanthus* plants were also found in this area.

No Red Data species were found within this area, or in the 200m zone outside the borders of this area.

### **9.8.2.4 Area North of R566**

This is a relatively level area comprising open grassland with a relatively high species diversity. This is also evident in the low number of trees, relatively high number of grasses and nine species of geophytes. A large part of the area north of the R566 is dominated by *Themeda triandra* and *Hyparrhenia hirta* respectively. *Acacia karroo* is the most dominant of the few tree species. Some of the trees and large shrubs appear in sparsely distributed groups. The road reserve along the R566 is often mowed and the signs of disturbance are clearly visible in the specific grass and weed species present. This is also the area with only one Category 1 declared weed (Pom pom weed) and one Category 3 invader (*Syringa*).

There is one Orange Listed plant species on the entire study site. Only three plants of *Eucomis autumnalis* subsp *clavata* were found.

No Red Data species were found within this section, or in the 200m zone outside the borders of this area.

### **9.8.2.5 Mixed Exotic and Indigenous Area**

This area is most probably the site of a former farm dwelling. This assumption is supported by the presence of some exotic trees in a relatively small garden area. Further evidence is the presence of *Cenchrus ciliaris* (Foxtail Buffalo grass) which is usually cultivated for grazing and does not occur naturally in this area. It occurs in alternating strips with *Hyparrhenia hirta* and has even spread to the neighbouring area north of the R566.

The dominance of *Cenchrus ciliaris* is very evident in the absence of other grass species that are typical for this area. The same applies for the absence of geophytes that were removed or destroyed during previous cultivation activities. The presence of several invader species as well as two Category 1 declared weeds, are also typical for the garden of a farm dwelling. Many seedlings of some of these invaders have been spotted and they pose a threat to the remainder of the natural vegetation.



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### 9.8.2.6 *Grassland Area*

In comparison to the other five areas, the vegetation of the grassland area is the least disturbed. This is notwithstanding the impact of the road crossing the grassland area from east to west. However, it links onto the neighbouring Onderstepoort Nature Reserve to the north and shows a very similar vegetation that comprises an open grassland with some trees. This is also reflected by the low number of trees and shrubs compared to the larger number of grasses, geophytes and herbs.

Only two Category 1 declared weeds were found and seven undeclared weeds which shows a high degree of climax vegetation with little disturbance. A single specimen of *Lantana camara* was nonetheless found on this site as well as the only sighting of Dodder (*Cuscuta campestris*).

Some single leaved specimens of *Eriospermum cooperi* were found. This site is also the only one with visible granite outcrops amongst the plants, and can be explained by its closeness to the granite koppies in the adjacent Nature Reserve.

No Red Data species were found within this section, or in the prescribed zone outside the borders of this area where access was possible.

### 9.8.2.7 *Red Data Species*

No Red Data species was found on the study site as indicated on the data of Red-listed the quarter degree grid in which the study site is situated.

According to the data of Orange-listed species supplied by GDACE, only three species namely, *Habenaria kraenzlinian*, *Stenostelma umbelluliferum* and *Trachyandra erythrorrhiza* occur in open grassland and have been recorded from the 2628CA quarter degree grid in which the proposed site is situated.

None of these species were collected or observed in this study site.

However, three plants of *Eucomis autumnalis* subsp *clavata* were observed in the area north of the R566.

## 9.8.3 *Faunal assessment*

The faunal assessment included field observations in conjunction with an extensive literature study. This is done due to the fact that many faunal species are often secretive, have nocturnal habitats or climatic conditions during the assessment may not be suitable to enable observations to occur (example, winter, cold, rain or wind). Field work included traversing of the habitats with a sweep net in order to identify insects. No nocturnal assessments or specific trapping for small mammals or insects was conducted on the property. Detailed discussion of the different faunal taxa follows below:

### 9.8.3.1 *Mammals*

From a mammal habitat perspective, two of the four major habitat types are present on the study site, i.e. terrestrial and arboreal. No bat caves are present on the site.

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Large mammals have long since succumbed to farming activities, and only medium-sized mammals can be expected in the region, for example baboons, monkeys, duiker and steenbok. Of the 43 mammal species expected to occur on the study site, four were confirmed during the site visit, namely:

- *L. saxatilis* (Scrub hare)
- *C. hottentotus* (African mole rat)
- *C. penicillata* (Yellow mongoose)
- *G. sanguinea* (Slender mongoose)

All four have of the above species behaviour's and habitat utilisation mechanisms allowing co-existence with human habitation and activities. The fact that the two small and swift carnivores are catholic in their diets contribute to their ability to resist great civilization pressures.

It should be noted that potential occurrences are interpreted to be possible over a period of time as a result of expansion and contractions of population densities and concomitantly of ranges. All feral mammal species expected to occur on the study site (e.g. house mice, house rats, dogs and cats) were omitted from the assessment since these species normally associate with human settlements.

It can be expected that medium-sized mammals will venture onto the site from the adjoining nature reserve, namely: duiker, steenbok brown hyena, baboons and monkeys. The crevices in the rocky randjie to the north, as well as larger trees present bats with ample daytime roosting sites. These small flying mammals are sure to overfly the site during their dusk quests for aerial insects.

The relatively high diversity is due to: the large size of the site and adjoining properties; the fact that it is bordering a nature reserve from where an influx of animals is possible; and fairly good quality of conservation.

Presently, the grass cover is dense and high. This provides excellent cover and nourishment for small mammals. The tall grass will favour grass-climbing mice. The soils are sub-optimal for burrowing mammals, but the areas with red sandy soils can be expected to allow for the occurrence of small burrowing mammals. The woody component on the northern section consists mostly of shrub-like *Acacias* too small to meet the requirements of arboreal mammals. However, larger trees in the southern section are ideal for arboreal mammals such as galagos, woodland dormice, *Acacia* rats and black-tailed tree rats.

The 500 meters of adjoining properties vary from pristine conditions in the Onderstepoort Nature Reserve, to usage typical to smallholdings, to industrial and business sites. The potential of immigration from the nature reserve is excellent.

The likelihood of hedgehogs occurring in the grasslands of the site is good, especially when considering the conservation provided in the adjoining nature reserve. The adjoining nature reserve furthermore increases the potential of brown hyenas, African wild cats and African weasels venturing onto the site itself.

### 9.8.3.2 *Birds*

Only one distinct bird habitat system was identified namely the *Acacia* savanna and mixed *Acacia* or broadleaf woodland. This woodland varies in density from dense bush to open *Acacia* savanna woodland with scattered trees and large open grassland areas between the trees. Some areas on the proposed site have been disturbed through past and present human activities and a network of human tracks and roads criss-cross the area especially within the southern portion of the study site. Exotic trees such as *Eucalyptus* sp also occur. The bird species within this habitat generally include a variety of arboreal passerines such as drongos, warblers, flycatchers, shrikes, sunbirds, waxbills and weavers as well as arboreal non-passerines such as doves, cuckoos, woodpeckers. Many of these species make use of the thorny nature of *Acacia* trees to build their nests. *Acacia* trees generally attract many insects and in turn attract a good diversity of typical *Acacia* savanna bird species.

Twenty-two Red Data bird species were recorded within the 2528CA q.d.g.c. Eight of these have disappeared from the area or were not recorded for this quarter degree grid cell during the time of the southern African Bird Atlas project. It is unlikely that they will ever be seen in this region again, except maybe on rare occasions in protected areas. Three of these species used to breed within the said q.d.g.c (Tarboton, 1987) and none have been recorded breeding for the q.d.g.c. during the period of the Southern African bird atlas project.

Most of the Red Data species that have been recorded indicate a low to very low reporting rate. The Cape Vulture and the Ayres's Hawk-Eagle indicate a low reporting rate compared to the other birds that indicate a very low reporting rate. No suitable breeding and foraging habitat exists site for any of the above-mentioned Red Data bird species. This decline in breeding species is probably due to the large extent of development that has taken place during a short space of time.

The development should not have a negative affect on the Red Data bird species recorded for the 2528CA q.d.g.c. The site is surrounded by development, which results in disturbance and human presence on site is high. In addition, there is also a lack of sufficient breeding and foraging habitat on the study site. The only negative affect that the development will have on the bird species that occur or that are likely to occur on site is the destruction of habitat for development which will result in the decline in bird species diversity. However, suitable habitat is found for these birds within the Onderstepoort Nature Reserve that borders the study site to the north.

### 9.8.3.3 *Reptiles and Amphibians*

Apart from the road and graded tracks, no agricultural activities have taken place. As the site is incompletely fenced, it is probable that it was not used for grazing. The herpetofauna can thus be assumed to be reasonably undisturbed and even a source for re-colonisation of the adjacent sites, several of which are occupied smallholdings. Several savannah lizards, such as two *Nucras* species, may occur in the open grassveld, while the Tree Agama (*Acanthocercus atricollis*) has been recorded from the foot of the Magaliesberg. Both listed cobra (*Naja* spp.) species are inhabitants of tropical

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savannah and their southern range limit coincides with this mountain range, although some infiltration through gaps in the range and along river valleys does occur.

No records of the Red Data species, the Striped Harlequin Snake (*Homoroselaps dorsalis*) are known from this area north of the Magaliesberg.

The Near Threatened Giant Bullfrog (*Pixycephalus adspersus*) is present in the general area but has not been confirmed from the study site. No sites suitable for breeding ponds were noticed but the terrain does appear suitable as dispersal area.

### 9.8.3.4 Red Data Fauna

The property was assessed for the presence of red data or threatened faunal species. Both national and provincial red data species lists were consulted. **No RDL faunal species were observed** during the field survey of the proposed development area.

Four red data mammal species may on occasion move through the site from the nature reserve. These species will probably move back to the nature reserve as soon as disturbance in the form of development start on the site.

### Implications

- The proposed development site contains wetlands, riverine and associated riparian habitats that could potentially be impacted negatively through ecologically insensitive construction methods.
- Construction should be limited to the dry seasons as far as possible, with silt fencing and sediment traps being implemented to negate the impact of soil erosion and sub-sequential siltation of the associated aquatic habitats
- The proposed development activities, if undertaken in an environmentally responsible manner and the proposed ecological sensitivity map is adhered to, is perceived to have an insignificant effect on the overall conservation of RDL species within the region.

## 10.0 DESCRIPTION OF SOCIO-ECONOMIC ENVIRONMENT

### 10.1 CULTURAL HERITAGE ASSESSMENT

For further information, please refer to **Annexure E** for the **Cultural Heritage Resources Impact Assessment** as completed by *The Archaeology Contracts Unit of the University of South Africa*

#### 10.1.1 Scope of the Study

An independent heritage consultant was appointed to conduct a survey to locate, identify, evaluate and document sites, objects and structures of cultural importance found within the boundaries of the proposed development site. The following are the most important sites and objects protected by the National Heritage Act:

- Structures or parts of structures older than 60 years
- Archaeological sites and objects
- Palaeontological sites

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- Meteorites
- Ship wrecks
- Burial grounds
- Graves of victims of conflict
- Public monuments and memorials
- Structures, places and objects protected through the publication of notices in the Gazette and Provincial Gazette
- Any other places or object which are considered to be of interest or of historical or cultural significance
- Geological sites of scientific or cultural importance
- Sites of significance relating to the history of slavery in South Africa
- Objects to which oral traditions are attached
- Sites of cultural significance or other value to a community or pattern of South African history

### **10.1.2 Methodology**

All relevant maps and documents on the site were studied. The site was visited and evaluated.

### **10.1.3 Findings**

No archaeological artefacts, features or structures were recorded during the survey of the proposed area of development. The foundations of several brick and mortar structures were recorded; however, none of these structures are older than 60 years and are therefore not protected by the National Heritage Resources Act (Act no 25 of 1999).

An informal cemetery, with approximately 20 graves, was recorded on the northern periphery of the area. The graves are orientated east-west with the headstones on the western side. Except for one partial notation no inscriptions were visible on the headstones. As such, it is impossible to determine the date of the burials. If the cemetery cannot be fenced off, and impact inevitable the graves will have to be exhumed, relocated and buried in a formal cemetery. Informal cemeteries fall under the protection of Section 36 (and possibly even Section 35) of the National Heritage Resources Act (Act 25 of 1999).

In this regard a Phase 2 investigation (i.e. grave relocation) is proposed.

#### **Implications**

From a heritage point of view the proposed development can continue with mitigation measures put in place. Should any archaeological sites or graves be exposed during construction work it should be reported to the relevant Authorities or Institutions.

## **10.2 NOISE IMPACT ASSESSMENT**

For further information, please refer to **Annexure C** for the **Environmental Noise Impact Assessment** as completed by *dBA Acoustics*

### 10.2.1 Scope of Study

The noise survey was carried out in order to determine the prevailing ambient noise levels in the vicinity of the proposed development.

The purpose of this study is to identify noise sources in and around the proposed development, which may have an impact on the development and to recommend mitigatory measures for compliance to the Noise Control Regulations and the South African National Standards SANS 10103 of 2008 - The measurement and rating of environmental noise with respect to annoyance and to speech communication.

The aspect, is noise and to quantify and assess the intrusion of traffic and train noise from the abutting road and/or railway line. These two sources are the main contributor to the prevailing ambient noise level for this area. The light industrial area to the west creates noise to a certain extent and there was some noise audible on the boundary between the industrial park and the proposed development. The stretch along the railway line will only be exposed to noise when there is a train after which the prevailing ambient noise level will be maintained.

### 10.2.2 Methodology

A site visit was conducted, the ambient noise was measured, Noise emissions during daytime and night time at the proposed residential development were measured, noise impacts and te assessment of the noise impact conducted.

### 10.2.3 Findings

#### ■ Noise Impact during Daytime

The prevailing noise level along the R 566 boundary is 64.0dBA and at the Northern boundary abutting the Onderstepoort Nature Reserve, the prevailing sound pressure level is 44.4dBA. Along the railway line at the Southern boundary the sound pressure level when a train passes the measuring site the sound pressure level is 66.1 dBA and during no train activities the sound pressure level is 50.1dBA.

There are other noises i.e. bird and insect noise which is there all the time due to the nature of the environment. The distant traffic noise is at times audible throughout the property depending on the intensity of the traffic and the wind direction.

#### ■ Noise Impact during night time

During night time the prevailing ambient noise level is made up of insect noise and traffic noise. There is very little sound from the industrial area as most of the industries close at 18h00.

The prevailing noise level along the R 566 boundary is 61.4dBA and at the Northern boundary abutting the Onderstepoort Nature Reserve, the sound pressure level is 43.1dBA. Along the railway line at the Southern boundary the sound pressure level when a train passes the measuring site the sound pressure level is 66.1 dBA and during no train activities the sound pressure level is 45.6dBA. The distant traffic noise becomes more audible at night as the cars travel at higher speeds with the resultant increase in the sound pressure level.

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The increase in the prevailing noise level is only for the duration the trains are in the vicinity of the receptor.

The prevailing noise levels are for the external environment and not the internal environment of a building and/or house.

### **10.2.4 Results**

The results in terms of SANS 10103 of 2008 – The measurement and rating of environmental noise with respect to annoyance and to speech communication and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise.

#### **SANS 10103 of 2008.**

There is a constant flow of traffic along the R 566 provincial road, which runs through the middle from the eastern to the western side of the proposed development. This creates a situation that the prevailing ambient noise levels are higher at this portion of the proposed development and at times higher along the southern boundary when there is a train. The prevailing ambient noise level along the western boundary is typical of the noise levels expected along a light industrial area.

The sound pressure level will decrease along the R 566 road by 3.0dB and along the boundary next to the light industrial area by 6.0dB per doubling of the distance from the source.

#### **SANS 10210 of 2004**

There will be no impact on the prevailing ambient noise levels should the traffic volume increases by 160 vehicles per hour in the vicinity of the proposed development along the R566 road.

The internal traffic and industrial activities will not have an impact on the residential areas to the South of the proposed development due to the distance between the light industrial area and the residential area and the higher sound pressure levels along the railway line.

#### **Implications**

- A 1.5 m earthberm with a 1.8m wall to be erected along the boundary of the property abutting the railway line to create a noise barrier along the Southern boundary.
- The distance between the railway line boundary and the houses to be 30m.
- The distance between the houses and the R 566 road will have to be 20m and a 2.0m wall to be erected on the entire boundary abutting the road.
- The entertainment area and sleeping areas of the houses abutting the road and the railway line will have to face away from the road and/or the railway line.
- A 2.0m wall to be erected along the entire length of the residential area abutting the light industrial area.

The proposed development will be in line with SANS 10103 of 2008 – The measurement and rating of environmental noise with respect to annoyance and to speech communication and the Gauteng Noise

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Control Regulations, provided that the acoustic screening measures are in place before occupation of the units may take place.

### 10.3 VISUAL INTEGRITY OF THE AREA

Due to the topography and location of the study area, the proposed development will have some visual impact. However, it could have a positive impact if the development is planned well and integrated into the surroundings.

The following visual criteria were used to determine what possible visual impact the proposed development could have on the surrounding environment:

**Table 7: Visual Impact Analysis**

<b>PREDICTED IMPACT</b>			
<b>Visual criteria</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
Quality of the area	The site or surrounding environment has little or no natural quality	<b>The site or surrounding environment has some natural quality</b>	The site or surrounding environment has a definite natural quality
Compatibility with surrounding environment	The development will blend in / compliment the surrounding environment completely	<b>The surrounding environment will be able to accommodate the development without looking out of context</b>	The surrounding environment will not be able to accommodate the development. Development will look abnormal in setting
Viewing distance	Continuous viewing distance to site is less than 500m	Continuous viewing distance to site is between 500 m and 1 km	<b>Continuous viewing distance to site is more than 1 km</b>
Visual acceptance capability	The environment can visually accept the type of development, due to its location adjacent to the existing CBD	<b>The environment can moderately accept the type of development, due to its varied vegetation and land-uses</b>	The environment cannot visually accept the type of development, due to its unvarying vegetation and land-uses

The visual assessment shows that the visual quality of the development can fit into the surrounding areas due to the similar scale and texture of the proposed Industrial and residential units. . However, the views from the surrounding areas towards the site will be different than currently experienced. Although large areas of the natural lands will be retained, the residents will not be able to see it directly from their houses as it is currently perceived.





**Figure 7: Views from the adjacent lands will be impacted with the proposed development.**

### **Implications**

It can be deduced that the proposed development will be able to blend in with the surrounding environment and will not look out of place due to its location within the urban realm. However, the views from the existing developed areas will largely be changed to be a developed areas rather than natural areas.

The architectural and landscape architectural guidelines for the proposed development will be developed to allow for a positive aesthetic influence on the surrounding environment. The guidelines will include placing of buildings, aspects of finishes, lights pollution, colours to blend into the surrounding colours, heights of buildings, and roof finishes. Aesthetics and contextual appropriateness is to be a major aspect of these guidelines.

## **10.4 INFRASTRUCTURE AND SERVICES**

### **10.4.1 Traffic and Access Routes**

Please refer to **Annexure F – Transportation Assessment** as completed XXX.

To date a

### Figure 8: Intersections requiring upgrading as identified in the traffic Impact assessment

#### Implications

The township layout plan excludes the areas currently used and to be used for provincial roads in future and it is therefore confirmed that the road planning can be accommodated when the township has been developed.

#### 10.4.2 Civil Services

Please refer to **Annexure G – Civil Engineering Services Outline Scheme Report** as completed *Civil Concepts Consulting, Civil and Structural Engineers*

##### 10.4.2.1 Water

The total daily water demand for Klerksoord Extension 25 is 743.3 Kl/d. The average flow over a 24 hour period was calculated as 8.5lps and the peak flow (4x factor) was calculated as 34.0lps.

The total daily water demand for Klerksoord Extension 26 is 1 077.26Kl/d. The average flow over a 24 hour period was calculated as 12.47lps and the peak flow (4x factor) was calculated as 49.87lps.

The existing City of Tshwane's bulk water network, which lies to the West of both townships, comprises the following:

- A 380mm diam bulk pipe along Granate Street up to the intersection with Willem Cruywagen Street.
- A 160mm diam pipe along Robyn Street up to the intersection with Willem Cruywagen Street.
- A 100mm diam pipe along Diamant Street up to the intersection with Willem Cruywagen Street.
- Along Willem Cruywagen Street there is a 200mm diam water pipe which connects to the above three pipes.
- From the 200mm diam pipe, the proposed two townships will be fed and these existing pipes include a 160mm diam pipe along the Northern boundary of Klerksoord Ext 25; a 160mm diam pipe along the Western boundary of both townships; and a 200mm diam pipe along the Southern boundary of Ext 26.
- The internal water network will connect to the pipes mentioned in e) and each erf will be provided with a water connection off this network.

During detail design stage, GLS Consulting Engineers, who do the water master planning for the City of Tshwane, will be appointed to analyse the bulk water network supplying these townships and if they find that upgrading of the bulk water network is required, then this work will be done by the Developer, using the bulk service contributions which are payable.

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### **Implications**

The internal network of the development will connect to the existing infrastructure at various positions. All water infrastructures, with the exception of the on-site services, will be laid in the road reserves or in municipal erven earmarked for this purpose. No added environmental impact is anticipated.

#### **10.4.2.2 Sewer**

The total sewage outflow for the proposed development of Klerksoord Extension 25 was calculated as 588.44Kl/d. The average flow over a 24 hour period was calculated as 6.81lps and the peak flow (3x factor) was calculated as 20.43lps.

The total sewage outflow for the proposed development of Klerksoord Extension 26 was calculated as 680.5Kl/d. The average flow over a 24 hour period was calculated to be 7.88lps and the peak flow (3x factor) was calculated to be 23.63lps

The Bulk sewer network of the existing City of Tshwane's bulk sewer network comprises of the following:

- **Klerksoord Ext 25**  
There are existing 160mm diam sewers along the Western and Eastern boundaries of the township. These sewers connect to a 160mm diam sewer which flows in an Easterly direction adjacent to Provincial Road R566. This sewer increases to a 250mm diam pipe, and at this point turns to the South and joins to the existing 450mm diam bulk sewer which flows adjacent to the stormwater canal which flows through Klerksoord Ext 26. The internal sewers within this township will connect to the above sewers and a sewer connection will be provided to each erf.
- **Klerksoord Ext 26**  
As stated above, there is an existing 450mm diam bulk outfall sewer adjacent to the stormwater canal which flows in an Easterly direction through this township. The internal sewers within this township will connect to the above sewers and a sewer connection will be provided to each erf.

During detail design stage, GLS Consulting Engineers, who do the sewer master planning for the City of Tshwane, will be appointed to analyse the bulk sewer network supplying these townships and if they find that upgrading of the bulk sewer network is required, then this work will be done by the Developer, using the bulk service contributions which are payable.

### **Implications**

Sewer reticulation and treatment can be supplied to the facility by connecting into the existing facility. No added environmental impact is anticipated.

#### **10.4.2.3 Storm water**

- **Klerksoord Ext 25**  
This township falls in a South Easterly direction. The internal storm water network within the township will drain to this point, from where a bulk storm water pipe will be laid along the Eastern

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boundary of Klerksoord Ext 26 to the existing storm water canal which runs through Klerksoord Ext 26.

### ■ Klerksoord Ext 26

As stated above there is an existing concrete lined storm water canal approximately in the middle of the township, which flows in an Easterly direction. The internal storm water networks, either side of the canal, will drain to the canal and discharge their storm water into the canal. The 1:50 and 1:100 year flood lines over the canal have been calculated and the storm water generated by both townships will be released within the flood lines.

### Implications

Storm water can be accommodated in storm water attenuation structures. No added environmental impact is anticipated. A storm water management plan will be submitted to the City of Tshwane and GDARD.

### 10.4.3 Electrical Supply

Please refer to **Annexure H – Electrical Services Report** as completed by *D.J.J Conradie & Partners*

The after diversity maximum demand (ADMD) for the phased development, based on the proposed land uses is 4592.18kVA

There are no existing electrical services on the property. The City of Tshwane Metropolitan Municipality has informed the electrical engineers that the necessary capacity can only be made available once Rietvlei In-Feed station and Wolmer 132kV/11kV Sub-Station have been upgraded and commissioned. The upgrade of Wolmer 132kV/11kV is in process but the commissioning date has not been confirmed by Tshwane Energy and Electricity.

The external electrical network of the proposed development shall be handed over to the City of Tshwane Metropolitan Municipality. The electrical network shall be designed and installed in accordance with the standards of the City of Tshwane Metropolitan Municipality.

Supply cables shall be installed from Wolmer 132kV/11kV Sub-Station to Klerksoord satellite Sub-Station. The internal medium voltage (MV) reticulation will be done by means of 11kV underground cables feeding from the Klerksoord satellite substation. Miniature substations will be installed to transfer the voltage from 11000 V to 400/240V to make a Low Voltage Bulk supply available to each applicable stand. The miniature substations will be installed in the road reserve. The low voltage distribution shall be done by means of an underground low voltage cable network.

Streetlights will be installed in all road reserves along all new and existing roads bordering the proposed development.

The network design shall comply with the standards of the City of Tshwane Metropolitan Municipality. The following was used for design purposes:

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- Residential: 60A 1 phase 3.5kVA - 5kVA/Unit ADMD
- Commercial: 8kVA/100m<sup>2</sup> of applicable FSR
- Maximum Voltage Variation: 380/230 V ± 10%

The following energy savings methods shall be investigated for possible implementation for the proposed development:

- Use of energy efficient lighting,
- Use of day light wherever possible in lieu of artificial lighting,
- Use of renewable solar powered lighting for external lighting,
- Switching off of all electrical appliances at night and times not in use,
- Use of high-efficient HVAC systems,
- Possibility of co-generation in co-operation with the supply authority,
- Use of solar water heating,
- Setting thermostats of water heaters at the most efficient level,
- Insulation of hot water pipes and hot water storage tanks,
- Use of low-flow shower heads,
- Use of high-efficient electric motors,
- Use of variable speed drives on electric motors,
- Use of appropriate conductor size to reduce distribution losses,
- Optimisation to achieve a power factor of 0.9 lagging or better,
- Use of control methods to reduce maximum demand and exploit off peak electricity tariffs,
- Insulation of windows, walls, ceilings and roofs.

### **Implications**

Electricity can be supplied to the facility by connecting into the existing facility. Additional cables and lines will run along the existing roads and servitudes. No environmental impact is anticipated.

## **11.0 PUBLIC PARTICIPATION**

Please refer to **Annexure I for the Public Participation Report**.

The Public Participation Process is being conducted as an essential component of the Environmental Impact Assessment Process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2006 (Version 1).

### **11.1 NOTIFICATION OF INTERESTED AND AFFECTED PARTIES**

Interested and Affected Parties were notified of the public participation process for the proposed development in the following ways:

- A newspaper advertisement was placed in the Pretoria News Newspaper on 22 November 2007.
- Detailed site notices were prepared in accordance with the requirements of the Regulations and were erected at the main entrance to the property, as well as other visible points, on 22 November 2007

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- A Background Information Document (BID) was posted, faxed, emailed or hand delivered to adjacent landowners. Written acknowledgement has been gathered from each of these landowners. The BID document provides information concerning the proposed development. Interested and affected parties were invited to submit written comments concerning the proposed development and become part of the environmental process
- The Ward Councillor for the Klerksoord area (Witfontein area) Marnette Sutherland was informed regarding the proposed development via e-mail notification
- Local authority officials were contacted by the relevant consultants

### **11.2 PUBLIC MEETING**

It was indicated that there is no need for a Public Meeting to be conducted as a thorough Windeed search was done for the adjacent owners and I&AP's.

All responses, issues and comments raised by I&AP's have been recorded in detail in the Comments and Response Register in **Table 8** and under the Public Participation Report in **Annexure I**.

### **11.3 ISSUES AND CONCERNS**

Written correspondence received from I&APs by LEAP has been collected and a list of all issues and concerns compiled. These are referred to the appropriate specialists for addressing. A list of issues and concerns was drawn up from the following sources:

- Written correspondence received from I&APs
- Issues identified by specialist studies
- Comments from Ward Councillor
- Comments from municipal officers
- Field observations

The Environmental Impact Assessment aims to address these issues & concerns from the public, and those identified during all the other methods of impact identification. All issues and concerns received throughout the entire environmental assessment process will be addressed in the Final Environmental Impact Assessment. Issues and concerns are addressed in this report.

### **11.4 PUBLIC INSIGHT**

The Scoping Report was made available for public insight electronically and in hard copy to the registered I&APs. The expected impacts, as issued by the I&APs are included in the issues and response register as attached to this report, also **Table 8** below.

This Draft Environmental Impact Assessment (EIA) Report will also be made available for public review for a period of 30 days from end of April to the end of May. Comments received on the Draft EIA will be included within the Comments and Response Report (Appendix 6) of the Public Participation Report (**Annexure I**)

11.5 ISSUES AND RESPONSE REGISTER

Table 8: Comments and response register

No	NAME	DATE	COMMENT	RESPONSE
1.	I Venter	29/11/2007	Please let me know when you plan to start the development	Will do
2.	M Khambule (Represent Department of Water Affairs & Forestry)	16/05/2008	<p>The Department does not have objection to the proposed development providing that the following issues are addressed to the Department’s satisfaction:</p> <ol style="list-style-type: none"> <li>1. Page 10 of the scoping report drafted by NLA states that the site is underlain by Malmani dolomites. The safe development of the site should involve careful geotechnical assessment of the delineated area, appropriate planning and appropriate design of structures and services. It is highly recommended that a geotechnical specialist be appointed to do the investigation. The geotechnical report must include but not be limited to:                             <ol style="list-style-type: none"> <li>(a) Demarcation of low, medium and high risk areas with specific development notes of each</li> <li>(b) Water precautionary measures for each stability zone</li> <li>(c) Indicate proposed best site for erection of structures</li> <li>(d) Anticipated foundation problems and foundation type recommendations</li> <li>(e) Geophysical investigations</li> <li>(f) Geological investigation.</li> </ol> </li> <li>2. Underground wet services such as manholes, sewer and water pipes should be designed and constructed so as to minimise maintenance requirements and avoid potential leakage points.</li> <li>3. Provision should be made in all water bearing pipelines to accommodate differential movements without causing pipelines or joints to leak.</li> <li>4. Special attention must be given to reducing accumulation of water on site.</li> </ol>	Noted

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No	NAME	DATE	COMMENT	RESPONSE
			<ol style="list-style-type: none"><li>5. Blasting on dolomite can lead to severe disturbance of metastable dolomite environment, giving rise to sinkhole formation. If blasting is necessary and appropriately experienced blaster should be recommended.</li><li>6. The wetland delineation report must be submitted to this Department for evaluation before the development takes place.</li><li>7. No development should take place before authorization from GDACE is obtained.</li></ol>	

### Implications:

The issues and responses as per the public participation report are to be reviewed and addressed as far as possible. I&APs are to be contacted and informed regarding the environmental process.



### **12.0 ENVIRONMENTAL COMPOSITE MAP**

An Environmental Composite Map was configured to clearly understand the various environmental characteristics and areas of significance that could be taken into consideration. This map indicates the following in relation to the proposed development site:

- 1:100 year floodline delineation
- Contours
- High, medium and low ecological sensitivity
- Red data species with buffer areas.
- Wetland areas with buffers
- Ridge with buffer areas

**Please refer to Figure 9 – Environmental Composite**

### **13.0 ALTERNATIVES IDENTIFIED & MOTIVATION FOR PROPOSED DEVELOPMENT**

The concept of Integrated Environmental Management suggests that an Environmental Impact Assessment process, to determine the possible impact of the proposed activity, should incorporate the consideration of feasible alternatives. A reasonable number of possible proposals or alternatives, to achieve the same objective should be assessed. The identification, description, evaluation and comparison of alternatives are important for ensuring a sound environmental scoping process.

Alternatives should be considered as a norm within the Environmental Process. These should include, as applicable, the demand alternative, scheduling alternative, land use alternative (including the NO-go option), location alternatives and service alternatives.

#### **13.1 DEMAND ALTERNATIVES**

Having regard to the size of the proposed development site (Klerksoord Ext 25 is approximately 36.22 hectares and Klerksoord Extension 26 is approximately 41.6 hectares), of which the majority is to be developed (the remaining to be a public open space), and the location within the City of Tshwane: to develop the land as a mix use Townships known as Klerksoord Extension 25 and Klerksoord Extension 26) would align to the City of Tshwane's urgent needs which include the provision of Economic Development and Job Creation.

Klerksoord is earmarked for major expansions and development of a regional node. It follows that, in a general sense, the demand alternative only presents two logical alternatives namely:

- To retain the site as open land (the status quo); or
- To develop the land as a mix use development known as Klerksoord Extension 25 and Klerksoord Extension 26 and provide additional housing, business opportunities, etcetera, therefore increasing economic sustainability in the area.

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The financial requirement that is necessary to maintain the area as a agricultural land is rising every year and it is becoming more and more difficult to keep the space free of criminal activities as well as squatters. It appears that, from a demand perspective, the alternative of developing the land as an infill portion in the area concerned would be appropriate.

### **13.2 PROCESS ALTERNATIVES**

It would appear that the process relevant to the establishment of a development area can only be achieved by way of one of two alternatives, namely:

- An application in terms of the Development Facilitation Act, 1995 or alternatively (preferred alternative)
- An application in terms of the Town Planning and Townships Ordinance, 1986 (Ordinance 15 of 1986)

Although the Town Planning and Townships Ordinance process is being followed, the value of the DFA principles have been realised and responded to. The end result in respect of either of the above-mentioned processes would be similar in that the development area will result in the transformation of a portion of land into a Mixed-use urban complex.

In a general sense, the Development Facilitation Act, 1995 promotes integrated planning and the consideration of all relevant aspects which underpin the development process when compared to the Ordinance. The development process per se (in a physical sense) does not offer viable alternatives to consider other than making reference to typical construction methods relevant to the building of roads, the laying of subterranean infrastructure and the like. Clearly, methods applied may involve more or less manual labour in certain circumstances. In the development proposal under consideration, manual labour will indeed be feasible having regard to the scale and extent of the development which, in turn, will enhance employment creation and should be preferred as the alternative construction method where practically possible.

### **13.3 SCHEDULING ALTERNATIVES**

The development of a mix use nodal development of the scale and nature proposed by the land development applicant is not specifically sensitive to weather patterns or cycles. There does not appear to be a more or less preferred time to undertake the physical development associated with a new urban complex in the form of road construction and the laying of infrastructure. Typically, the rainy season (spring and summer) may impact negatively on the construction related activities and may result in "down time". It follows that, if possible, the construction periods should accord with the winter months to avoid down time related to rain. Following this alternative it may also result in less of an impact on the possibility of top soil erosion during flash thunderstorms and increased runoff where new trenches lie exposed to the elements for a restrictive period of time. However, suitable mitigation methods can be employed to curb washing of storm water into sensitive wetland areas.

### **13.4 LOCATION ALTERNATIVES**

Location alternatives for the proposed development, which constitutes mix use light nodal development such as the preferred activity alternative, include the following:

### **13.4.1 Inner-city location**

An inner-city location would be environmentally and socially feasible, however economically unviable, provided that the same area extent of land be found available for development as inner-city resources are very scarce.

### **13.4.2 Suburban location**

Not socially, environmentally or economically feasible due to the following:

- Not situated adjacent to primary movement corridors
- Not accessible to a range of socio-economic population groups
- Isolated nature of development and therefore not inclusive
- Contrasting densities and heights with regard to the mixed-use nodal development
- Availability of land at an affordable cost minimal

### **13.4.3 Urban edge / rural location**

Although land is available in this location at a lower economic cost, this location is socially and environmentally less feasible due to the following:

- Lack of proximity to social amenities, services and infrastructure
- Locating a nodal development far from other urban facilities
- Loss of land that is environmentally / ecologically valuable
- Creation of urban sprawl

### **13.4.4 Infill development location (preferred)**

This is the most preferred location type due to the balance achievable between social, environmental and economic requirements:

- The land belongs to the City of Johannesburg.
- Aligns to the prerequisites of the Johannesburg SDF
- Situated within the urban realm adjacent to existing and proposed urban infrastructure, service and amenities
- Socially inclusive due to its location to numerous communities and along public transport routes

## **13.5 LAND USE ALTERNATIVES**

The following Land Use alternatives have been investigated

### **13.5.1 Alternative 1: No-go Option**

This implies that the site be left as is and that no development or alteration be done. If this alternative is pursued the sites existing habitat will be retained. This option has the following drawbacks:

The potential to provide additional airport facilities, which appears to be in accord with the prevailing land use regime in the area and the thinking of the local municipality to the population, will be lost;

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- The potential to provide additional housing, which appears to be in accord with the prevailing land use regime in the area and the thinking of the local municipality to the population, will be lost;
- A very viable opportunity to exploit the limited commercial opportunities in the area and creating jobs and income for the local market will be negated;
- The area will fall further in disrepair and the protection and appropriate management of the ecological significant areas will be negated; or
- Illegal squatters or vagrants will remain and inhabit the site.

Given the fact that the site will eventually degenerate if left unmanaged, and the fact that it is most likely unsuitable to be utilised for grazing or agricultural purposes due to its location, it is reasonable to state that the no-go option is less favourable than some of the other options presented. Furthermore, should this property not be developed it would be left as an isolated and disconnected land due to all the surrounding areas that have already received environmental authorisation and on which development will proceed.

### **13.5.2 Alternative 2: Low Density Development**

This option will make provision for the subdivision into “Residential 1” (one dwelling per stand) erven only. The result of such a development will be a high income exclusive development where no social responsibility or economic sustainability and job creation can be considered. Limited ecological land will remain as all the land will be taken up by roads or erf portions.

### **13.5.3 Alternative 3: Light Industrial Development**

The introduction of a light industrial development only, although suited to the general functioning and land uses of the surrounding urban environment and other light industrial areas, is considered unsuitable due to the following reasons:

- Over-saturation of a single-use activity
- Lack of diversity and vibrancy associated with a mixed-use development
- Higher risk of pollution to the surrounding drainage lines and the wetland systems

### **13.5.4 Preferred alternative: Mix use Light Industrial / Residential Development**

Mixed Use Light Industrial / Residential development with private and public open space in the form of a conservation and nature park area (preferred alternative), see **Figure 2: proposed Layout**. Although there are many parcels of land available in the City of Tshwane area, the land under investigation is owned by the Applicant. The proposed development will complement the existing industrial and residential land uses in the area, while being responsive to the ecological feature on the site, providing a public and private open space for recreation and conservation purposes. The proposed development supports the City of Tshwane’s strategic objectives for creating infill development where appropriate.

For further information please refer to **Annexure J – Town Planning Motivation**. (Not yet available)

### 13.6 ALTERNATIVES FOR SERVICES AND OTHER LISTED ACTIVITIES

Table 9: Alternatives for services and other activities

INDICATE THE NUMBER AND DATE OF THE RELEVANT NOTICE:	ACTIVITY NO (S) (IN TERMS OF THE RELEVANT OR NOTICE) :	DESCRIPTION AND COMMENTS ON ALTERNATIVES
GN reg 544 Item 9 18 June 2010	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water - (iii) with an internal diameter of 0,36 metres or more; or (iv) with a peak throughput of 120 litres per second or more, excluding where: such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or  where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	No alternative for this activity exists.  The sewer reticulation system will be designed to take the capacity of sewer generated by the development and adequately transfer it to the existing sewer treatment plant. The pipe sizes will be selected to ensure adequate capacity to effectively transport all effluent.  Applicable alternative: Selection of materials to be utilised and the location of the pipes.
GN Reg 544 Item 10 18 June 2010	The construction of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or  inside urban areas or industrial complexes with a capacity of 275 kilovolts or more	There is no alternative for this listed activity  Eskom through the City of Tshwane provides electricity to the area. It is anticipated that the capacity will be reduced by implementing energy saving measures. Transmission will happen in the regular manner.
GN Reg 544 Item 11 18 June 2010	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures;	No alternative for this activity exists.  The development is planned to accommodate a 32 m buffer from any wetland and stream area.  Where stream crossings are required, they will be implemented according to the DWAF requirements.

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INDICATE THE NUMBER AND DATE OF THE RELEVANT NOTICE:	ACTIVITY NO (S) (IN TERMS OF THE RELEVANT OR NOTICE) :	DESCRIPTION AND COMMENTS ON ALTERNATIVES
	<p>(vii) marinas;            (viii) jetties exceeding 50 square metres in size;            (ix) slipways exceeding 50 square metres in size;            (x) buildings exceeding 50 square metres in size; or            (xi) infrastructure or structures covering 50 square metres or more</p> <p>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>	
<p>GN Reg 544            Item 18            18 June 2012</p>	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</p> <p>(i) a watercourse;            (ii) the sea;            (iii) the seashore;            (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater- but excluding where such infilling, depositing, dredging, excavation, removal or moving.</p>	<p>No alternative for this activity exists.</p> <p>The development is planned to accommodate a 32 m buffer from any wetland and stream area.</p> <p>Where stream crossings are required, they will be implemented according to the DWAF requirements.</p>
<p>GN Reg 544            Item 22            18 June 2012</p>	<p>The construction of a road, outside urban areas,</p> <p>(i) with a reserve wider than 13,5 meters or,            (ii) where no reserve exists where the road is wider than 8</p>	<p>There is no alternative for this listed activity</p> <p>The improvement of adjacent roads will be required by the City and provincial Roads Agencies.</p>

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INDICATE THE NUMBER AND DATE OF THE RELEVANT NOTICE:	ACTIVITY NO (S) (IN TERMS OF THE RELEVANT OR NOTICE) :	DESCRIPTION AND COMMENTS ON ALTERNATIVES
	metres, or (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice June of 2010.	
GN Reg 544 Item 37 18 June 2010	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where: (c) the facility or infrastructure is expanded by more than 1000 metres in length; or (d) where the throughput capacity of the facility or infrastructure will be increased by 10% or more—excluding where such expansion: (iii) relates to transportation of water, sewage or storm water within a road reserve; or (ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	No alternative for this activity exists.  The sewer reticulation system will be designed to take the capacity of sewer generated by the development and adequately transfer it to the existing on site sewer treatment plant. The pipe sizes will be selected to ensure adequate capacity to effectively transport all effluent. Applicable alternative: Selection of materials to be utilised and the location of the pipes. Where stream crossings are required, they will be implemented according to the DWAF requirements.
GN Reg 545 Item 39 18 June 2010	The expansion of (vii) canals; (viii) channels; (ix) bridges; (x) weirs; (xi) bulk storm water outlet structures; (xii) marinas; within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development	No alternative for this activity exists.  The northern and southern parts of the Klerksoord X26 must be connected with a road as required by the municipality. It is thus necessary to enter the wetland areas with the development.

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INDICATE THE NUMBER AND DATE OF THE RELEVANT NOTICE:	ACTIVITY NO (S) (IN TERMS OF THE RELEVANT OR NOTICE) :	DESCRIPTION AND COMMENTS ON ALTERNATIVES
	footprint but excluding where such expansion will occur behind the development setback line.	
GN Reg 545 Item 47  18 June 2010	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres – excluding widening or lengthening occurring inside urban areas.	There is no alternative for this listed activity  The improvement of adjacent roads will be required by the City and provincial Roads Agencies.
GN Reg 545 Item 15 18 June 2010	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;	The total area of the proposed development site is approximately 199.62 hectares.  Please refer to item 13.5 of this report for varying land use and layout options, as well as Table 10



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### 14.0 COMPARISON OF ALTERNATIVE LAND USES

Please refer to the Table 10: Comparison of alternatives below, a comparison of the four alternative activities for the proposed development site with regards to layout and densities, engineering and design alternatives, road access, storm water management, waste collection, sewer disposal, impact on the surrounding environment and visual impact. Within this comparison it may be assumed that mitigation measures have been adequately implemented. The impact rating is as follows:

High	-	5
Medium	-	3
Low	-	1
Lowest score	-	8
Highest score	-	40

**Table 10: Comparison of alternatives**

	<b>Alternative 1: No-go</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 2: Low Density Residential</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 3: Light Industrial</b>	<b>Consequence or Impact Rating</b>	<b>Preferred Alternative: Mix use light industrial / residential Development</b>	<b>Consequence or Impact Rating</b>
Layout and densities	The site will remain as it currently exists. The potential for the site to fall into disrepair is high, along with inappropriate management / control and the potential for informal settlement invasion.  The No-go option is not considered desirable.	Medium – 3  No improvements will be implemented.	A low density layout is monotonous and unresponsive to the SDF and will not create a balance between social, economic and environmental requirements for the growing urban environment.	High – 5  Due to lack of diversity and vibrancy and responsive-ness to city requirements	Monotonous and mono-functional. Unresponsive to the RSDF and will not create a balance between social, economic and environmental requirements for the growing urban environment.	High – 5  Due to lack of diversity and vibrancy and responsive-ness to city requirements	A mix use Light Industrial / Residential development with a layout that is responsive to the city requirements creating a balance between environmental, social and economic requirements. Optimal utilisation of land to promote an accessible development.	Low – 1  Urban design framework that responds to city requirements
Engineering and design	This alternative will not currently require upgrading of engineering services; however no upgrades will be implemented to the benefit of the surrounding area.	Med-low – 2  No improvements will be implemented	Structural and design aspects can be accommodated within this proposal.  Positioning of services will be strategically planned according to the	Med-low – 2  The systems will be designed to function optimally and measures can be implemented to ensure effective	Structural and design aspects can be accommodated within this proposal.  Positioning of services will be strategically planned according to the	Med-low – 2  The systems will be designed to function optimally and measures can be implemented to ensure effective	Structural and design aspects can be accommodated within this proposal.  Positioning of services will be strategically planned according to	Med-low – 2  The systems will be designed to function optimally and measures can be implemented to ensure effective

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	<b>Alternative 1: No-go</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 2: Low Density Residential</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 3: Light Industrial</b>	<b>Consequence or Impact Rating</b>	<b>Preferred Alternative: Mix use light industrial / residential Development</b>	<b>Consequence or Impact Rating</b>
			proposed layout to prevent further impacts on the environment.	monitoring and maintenance	proposed layout to prevent further impacts on the environment.	monitoring and maintenance	the proposed layout to prevent further impacts on the environment.	monitoring and maintenance
Road access	To remain as existing. No upgrades will be required and implemented.	High – 5  No improvements will be implemented in an area that desperately requires road upgrades	Minimum upgrades to entrances and accesses according to the traffic engineering report. Limited public transport improvement and accessibility due to gated community.	High – 5  Due to gated community structure in an area that should be accessible	Entrances and accesses as well as road upgrades according to the traffic engineering report.	Med-low – 2  Increase in traffic to be accommodated due to surrounding road upgrades	Upgrades of 5 intersections. Entrances and accesses as well as road upgrades according to the traffic engineering report.	Med-low – 2  Increase in traffic to be accommodated due to surrounding road upgrades
Stormwater management	The storm water is currently managed as sheet flow. The site drains naturally towards the streams which borders the flow. Better management options could be implemented to prevent erosion.	Medium – 3  No storm water management	Storm water management via a storm water drainage system composed of storm water inlets and pipes along internal roads which connecting to attenuation structures. No water will be released into natural systems without retention and slowing down of the water. Accumulated storm water can be utilised for irrigation of open spaces.	Medium – 3  Effective storm water management can be implemented	Storm water management via a storm water drainage system composed of stormwater inlets and pipes along internal roads which connecting to attenuation structures. No water will be released into natural systems without retention and slowing down of the water. Accumulated storm water can be utilised for irrigation of open spaces.	Med Low – 2  Effective storm water management can be implemented	Storm water management via a storm water drainage system composed of stormwater inlets and pipes along internal roads which connecting to attenuation structures. However, storm water will be drained in a north-south direction and no provision has been made for stormwater retention.	Med Low – 2  Effective storm water management can be implemented
Waste collection	No waste management strategies are currently being implemented.	High – 5  No improvements will be implemented. Illegal dumping will continue	Refuse removal to be provided by the Johannesburg Municipality, however waste is to be minimised by the provision of waste transfer stations	Med-low – 2  Effective waste management due to structure and management by Body Corporate.	Refuse removal to be provided by the Johannesburg Municipality, however waste is to be minimised by the provision of waste transfer stations	Med-high – 4  Due to hazardous waste risk	Refuse removal to be provided by the Johannesburg Municipality, however waste is to be minimised by the provision of waste transfer stations	Med-low – 2  Effective waste management due to structure and management by individual land parcels

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	<b>Alternative 1: No-go</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 2: Low Density Residential</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 3: Light Industrial</b>	<b>Consequence or Impact Rating</b>	<b>Preferred Alternative: Mix use light industrial / residential Development</b>	<b>Consequence or Impact Rating</b>
Sewer disposal	No additional requirement.	Medium – 3  No improvement to system in the area	Improvement of municipal sewage reticulation system. Increase on load.	Medium – 3  Less time for expansion due to probably once-off roll out	Improvement of municipal sewage reticulation system. Increase on load.	Medium – 3  Phased nature of development will ensure the correct and timeous planning associated with the potential requirements for upgrading of sewer system	Improvement of municipal sewage reticulation system. Increase on load	Medium – 3  Phased nature of development will ensure the correct and timeous planning associated with the potential requirements for upgrading of sewer system
Impact on surrounding environment	No change expected other than the potential degradation that could be resultant of poor site management and illegal informal occupation.	Med – 3  No change, however possibility of illegal squatters and illegal dumping	Impact on the ecological environment is mitigated due to the provision of adequate open space for ecological connectivity and preservation.  No surrounding community benefit as the development will most likely be gated and inaccessible with no economic and social facilities that are available for surrounding neighbourhoods.	High – 5  A definite change in land use, although strict access control with no surrounding community access	Impact on the ecological environment is mitigated due to the provision of adequate open space for ecological connectivity and preservation.  Great pollution hazard of surrounding environment.	Med-high – 4  A definite change in land use  No accessible social or economic facilities for surrounding community	Impact on the ecological environment is mitigated due to the provision of adequate open space for ecological connectivity and preservation.  The community will benefit due to the provision of various commercial enterprises, the improvement of bulk infrastructure as well as various job opportunities.	Med-low – 2  A definite change in land use, along with a mix of economic and social land uses that will benefit surrounding community
Visual impact	Visual impact will not change.	Low – 1	Unilateral and monotonous mass of development. Lack of diversity and vibrancy	Med – 3  Can potentially be mitigated with greening	Visual impact of monotonous industrial activities. Haphazard building forms, materials and colours. Due to the land use type not much aesthetic design detail is considered. High lighting pollution.	High – 5  Can be mitigated via strict design guidelines	Vibrancy and diversity associated with mixed-use character under an umbrella of guidelines (materials, lighting, greening, forms, etc)	Med-low – 2  Architectural guidelines and aesthetic requirements

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	<b>Alternative 1: No-go</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 2: Low Density Residential</b>	<b>Consequence or Impact Rating</b>	<b>Alternative 3: Light Industrial</b>	<b>Consequence or Impact Rating</b>	<b>Preferred Alternative: Mix use light industrial / residential Development</b>	<b>Consequence or Impact Rating</b>
IMPACT SCORE		25		27		28		17

## 15.0 POTENTIAL IMPACTS

### 15.1 METHODS USED TO IDENTIFY POTENTIAL IMPACTS

A combination of the following methods was used to identify impacts during the Scoping and EIA Processes:

### 15.2 SPECIALIST STUDY FINDINGS

All the legally required specialist studies were conducted (as required by GDARD as per DEA guidelines). Often more than one study was conducted in the same discipline to verify or to supplement findings. The findings of such specialist studies highlighted potential impacts on protected or endangered species and/or environments. The following shows a list of the impacts according to specialist studies:

**Table 11: Possible impacts according to specialist studies**

SPECIALIST STUDY	IMPACT IDENTIFICATION
Flora	<p>The area in which the proposed site is situated can be classified as Marikana Thornveld, situated in the Grassland Biome. The vegetation in the area ranges from pristine in some areas to disturbed in various degrees across the site. The proposed site will take many years to return to its original state if left to natural ecological forces. The habitat of the site is suitable for some red- and orange – listed plant species in the grid studied, but no red listed Plant species were found, because the natural vegetation has been destroyed.</p> <p>There is one Orange Listed plant species on the entire study site. Only three plants of <i>Eucomis autumnalis</i> subsp <i>clavata</i> were found. It is also recommended that some of the interesting plants found on site be incorporated in the landscaping of the site.</p> <p>Two wetlands have been identified on the proposed site. The wetlands occupy approximately 5% of the total area. These wetlands have been identified as seepage wetlands, are situated on a footslope and feed into a formalised canal. Their soil sample shows low mottling content with anaerobic characteristics and predominantly fine textures poorly drained gleyed soil. Both wetlands have similar hydrological characteristics with their hydrology being dependent on the sub-surface flow that is generated by the immediate catchment.</p> <p>Plants such as <i>Typha capensis</i>, <i>Imperata cylindrica</i> and the alien species <i>Arundo donax</i>, occur within the wetland boundaries, with is indicative of a permanent or semi-permanent wetland.</p> <p>The overall wetland feature has a low to moderate level of ecological function and service provision.</p> <p>A 30m buffer zone and an ecological corridor to link the two areas of moderate sensitivity in order to protect this management unit should be maintained.</p>

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SPECIALIST STUDY	IMPACT IDENTIFICATION
Fauna	<p>No RDL faunal species were observed during the field survey of the proposed development area. The proposed site will contain large numbers of small and medium mammals because of the Onderstepoort Nature reserve bordering the proposed site to the north and the undisturbed nature of the vegetation on the site. Four red data mammal species may on occasion move through the site from the nature reserve. These species will probably move back to the nature reserve as soon as disturbance in the form of development starts on site.</p> <p>It was found that the proposed development will not result in the loss of ecologically sensitive and important habitat units, ecosystem function, loss of faunal habitat nor the loss or displacement of threatened or protected fauna, avifauna, reptiles or amphibians. The near threatened Giant Bullfrog (<i>Pixycephalus adspersus</i>) is present in the general area but is not confirmed to be present on the site. There were areas within the proposed development site that offer good habitat type and quality that would support a wide diversity of species, many of which are RDL.</p>
Geotechnical	<p>The site is underlain by norite and gabbro of the Main Zone of the Rustenburg Layered Suite, Bushveld igneous Complex. Typically these rocks decompose in-situ, forming a surface horizon of black, highly expansive clay known as “black turf”, while this residual material may often be covered in a horizon of transported fine colluvial sand.</p> <p>The geological investigation revealed that the entire site is underlain uniformly by gabbro, and no structural feature identified that will affect the geology.</p> <p>As a result of deep and extensive chemical weathering, the rockmass has been reduced to residual silty sand and gravels at depth and active clayey soils close to the surface. The depth of this material varies considerably and is usually underlain by residual gabbro, at depths that vary from approximately 1.0m to greater than 5m.</p>
Agricultural Potential	<p>According to the Gauteng Agricultural Potential Atlas (GAPA Version 3), the proposed development site is not situated within a region delineated as an Agricultural Hub.</p>
Cultural Heritage	<p>No archaeological artefacts features or structures were recorded on the proposed site. The foundations of several brick and mortar structures were observed but none older than 60 years.</p> <p>An informal cemetery with approximately 20 graves was recorded on the northern periphery of the site. If the cemetery cannot be fenced off then the graves will have to be exhumed and relocated and buried in a formal cemetery. Informal graves fall under the protection Section 36 (and possibly Section 35) of the National Heritage Resources Act (Act 25 of 1999).</p>

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SPECIALIST STUDY	IMPACT IDENTIFICATION
	Should archaeological artefacts or skeletal material be revealed in the area during construction activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place.
Traffic Impact	The proposed public transport infrastructure for the proposed development is expected to facilitate a high level of public transport service provision. Public transport patronage is however dependent on many factors including frequency of services, connectivity to origins and destinations elsewhere, integration with other public transport nodes such as Gautrain and BRT, journey duration and quality of service.
Services provision	Bulk services are available, or will be available along with required upgrades. The appropriate links will be installed to these services. Communication with the applicable municipal departments will be maintained to ensure adequate supply plans without hindering the supply to the surrounding areas.

### Site Inspection

The environmental consultant and specialists conduct several site visits and identified potential sensitive environments. These areas are then red-flagged to be investigated further and excluded from development.

### Desktop Studies

Specialist reports such as the geotechnical and agricultural assessments are used to identify those areas and aspects that may be impacted on, but that will not be identified through the other specialists' studies.

### Public Participation

Conducting public participation produces an issues list. Such a list needs to be screened for relevant impacts which then need to be addressed by specialist studies or identified for further investigation. A very comprehensive public participation process was followed, including a public meeting.

### GDARD Policies, Review / Terms of Reference

GDARD C-Plan 3 as well as the policies provides the red flags that must be investigated by the specialists. Furthermore, the GDARD officials and the different sub-directorates within the department review the application and give comments to the relevant environmental officer. The issues identified are forwarded to the environmental consultant and these issues are addressed or translated as impacts.

## 15.3 IMPACT IDENTIFICATION

Environmental impacts can be classified according to physical impacts, bio-physical impacts and socio-economic impacts and can occur during the construction and / or operational phases.

### 15.3.1 Physical Impacts

- Geological impacts
- Topographical impacts
- Air quality

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- Soil and land capability
- Water quality and availability – surface and ground water

### **15.3.2 Biophysical**

- Impacts on flora and flora habitats
- Sensitive landscapes (wetlands and flood plains)

### **15.3.3 Socio-economic Impacts**

- Noise pollution
- Visual impact
- Sites of cultural significance
- Safety and security
- Impact on ambience of the area
- Traffic increase on roads
- Services being inadequate and malfunctioning (including electricity, waste management, water, sewage management systems)
- Run away fires due to poor fire management and lack of capacity to fight fires.
- Improved tax base
- Bulk contributions which result in the improvement of infrastructure in the area

## **15.4 ASSESSMENT OF IMPACTS**

### **15.4.1 Definition of terms**

**Construction Phase:** All construction or related activities, from occupation by the contractor, until the contractor leaves the site.

**Operational Phase:** All activities related to and including the operation and maintenance of the proposed development.

**Nature:** The type of effect the specific activity will have on the environment

**Probability:** Degree of certainty of impacts

**Duration:** Lifetime of the impact

**Scale:** Spatial scale of the impact

**Magnitude:** Degree/severity of impact

### **15.4.2 Methodology**

The significance of the identified impacts will be determined using the approach outlined below. This incorporates two aspects for assessing the potential significance of impacts (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998), namely occurrence and severity, which are further sub-divided as follows:

#### **Table 12: Methodology to Assess Impacts**



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Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Magnitude (severity) of impact	Scale / extent of impact

To assess each of these factors for each impact, the following four ranking scales are used:

Probability	Duration
5 – Definite/don't know	5 – Permanent
4 – Highly probable	4 – Long-term
3 – Medium probability	3 – Medium-term (8-15 years)
2 – Low probability	2 – Short-term (0-7 years) (impact ceases after the operational life of the activity)
1 – Improbable	1 – Immediate
0 – None	
Scale	Magnitude
5 – International	10 – Very high/don't know
4 – National	8 – High
3 – Regional	6 – Moderate
2 – Local	4 – Low
1 – Site only	2 – Minor
0 – None	

Once these factors are ranked for each impact, the significance of the two aspects, occurrence and severity, is assessed using the following formula:

SP (significance points) = (probability + duration + scale) x magnitude

The maximum value is 150 significance points (SP). The impact significance will then be rated as follows:

SP >75	Indicates <b>high</b> environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 – 75	Indicates <b>moderate</b> environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP <30	Indicates <b>low</b> environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.

### 15.5 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Please refer to **Table 13** which indicates the quantification of impacts related to construction activities and **Table 14** which indicates the quantification of impacts related to the operational activities, as per the methodology identified above.

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Also please refer to Annexure K for the Draft Environmental Management Plan (EMP).

Legend:	M:	Magnitude of impact	High	>70	<b>SBM:</b> Significance Before Mitigation
	D:	Duration of impact	Mod.	30 -70	<b>SAM:</b> Significance After Mitigation
	S:	Scale of impact	Low	0 - 30	
	P:	Probability of unmitigated occurrence occurring			

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**15.5.1 Construction Phase**

**Table 13: Quantification of impacts related to construction activities**

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
<b>15.5.1.1 Physical Impacts</b>											
Geology	There are no expected construction related impacts on the geology of the proposed development site and surrounding areas										<ul style="list-style-type: none"> <li>None, although geological monitoring should commence during the Construction Phase by the Geotechnical engineer</li> </ul>
Topography	Construction activities including levelling of road and building surfaces	Erosion	4 3	2 2	2 1	6 4	48 24	SBM SAM	M L	<ul style="list-style-type: none"> <li>Demolition and construction activities should preferably take place during the dry months</li> <li>All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur</li> <li>All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed</li> <li>Where erosion may potentially occur, dissipaters such as gravel beds or straw bales must be installed to prevent erosion.</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	
Air quality	Construction activities and vehicles on site.	Dust pollution that affects adjacent developments.	3 2	2 2	2 1	6 4	42 20	SBM SAM	M L	<ul style="list-style-type: none"> <li>Dust to be minimised by spraying down (water truck) of construction site daily</li> </ul>	
Soils and land capability	Site clearance for road construction and construction of units and other structures	Compaction of topsoil	4 2	2 2	1 1	6 4	42 20	SBM SAM	M L	<ul style="list-style-type: none"> <li>The top (200-300mm) layer (as applicable) of all areas to be excavated for the purposes of construction shall be stripped and stockpiled in areas where this material will not be damaged, removed or compacted.</li> <li>This stockpiled material shall be used for the rehabilitation of the site.</li> <li>Weeds appearing on the stockpiled topsoil shall be removed by hand before seeding.</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	

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Environmental Component	Activity	Potential Impact	Environmental Significance Score									Mitigation Measures
			P	D	S	M	Total	Rating				
	Site vehicles and storage of fuel on site	Contamination by fuel and lubricant spillages from vehicles	3 2	2 2	1 1	5 4	30 20	SBM SAM	M L		<ul style="list-style-type: none"> <li>Provision of proper re-fuelling and maintenance facilities and procedures will reduce the likelihood of soil contamination</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	
Water quality and availability	Storage of fuel and re-fuelling of construction vehicles	Fuel or chemical spillage and pollution of surface and/or ground water	3 1	2 2	2 2	6 4	42 20	SBM SAM	M L		<ul style="list-style-type: none"> <li>Good housekeeping by contractor</li> <li>Store new and used oils in bunded areas</li> <li>No co-handling of reactive liquids or solids should be allowed</li> <li>Create and monitor an inventory of chemicals held on site</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	
	There will be no construction related impact on the quantity of groundwater available to surrounding borehole users										<ul style="list-style-type: none"> <li>None, although groundwater monitoring should commence during the Construction Phase</li> </ul>	
<b>15.5.1.2 Biophysical Impacts</b>												
Flora	Site clearing for construction activities	Loss of species diversity and habitat characteristics	5 4	2 2	1 1	10 8	80 56	SBM SAM	H M		<ul style="list-style-type: none"> <li>Most of the site will be transformed due to the requirement to develop this site as a regional node</li> <li>The Environmental Control Officer (ECO) is to be trained to be able to identify any possible red data species</li> <li>Set up a planting list together with the ecologist from which all rehabilitation in the development must be done – only indigenous and non-invasive species</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	
Fauna	Site clearing for construction activities	Loss of species diversity and habitat characteristics	5 4	2 2	1 1	10 8	80 56	SBM SAM	H M		<ul style="list-style-type: none"> <li>Most of the site will be transformed due to the requirement to develop this site as a regional node</li> <li>The riparian zones with associated floodlines to be retained</li> <li>The Environmental Control Officer (ECO) is to be trained to be able to identify any possible red data species</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	

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Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
Sensitive landscapes	Construction activities – wetland and associated buffer areas	Loss of valuable landscape and habitat	4	3	1	8	64	SBM	M	<ul style="list-style-type: none"> <li>The sensitive drainage line areas adjacent and off the proposed development site are to be fenced off from all construction activities</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>
			2	3	1	4	24	SAM	L	
Conservation	Delineation of conservation area – wetland areas and associated buffers	Conservation and maintenance of valuable landscape and habitat – benefit to local and regional biodiversity by minimising fragmentation of ecological systems	3	2	2	4	28	SBM	L	<ul style="list-style-type: none"> <li>Delineation of the conservation area prior to commencement of construction activities</li> <li>Education of construction workers regarding the value of the conservation area</li> </ul>
			4	2	3	6	42	SAM	M	
<b>15.5.1.3 Socio-economic Impacts</b>										
Noise pollution	All construction activities	Nuisance to surrounding land owners	4	3	2	6	54	SBM	M	<ul style="list-style-type: none"> <li>Locate noisy machines and equipment maintenance areas as far away from sensitive receptors as possible</li> <li>Adherence to acceptable working hours</li> <li>Adherence to Occupational Health and Safety Act</li> <li>Ear protection for workers that may be affected by noise</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>
			3	3	1	4	28	SAM	L	
Visual integrity	Construction activities	Visibility of dust and construction activities from surrounding	3	3	2	6	48	SBM	M	<ul style="list-style-type: none"> <li>Apply dust control measures diligently, especially on provincial roads</li> <li>Apply recommendations of specialist regarding colour and construction of site structures during the Construction Phase</li> </ul>
			2	3	2	4	28	SAM	L	

## KLERKSOORD DEVELOPMENT DRAFT EIA

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
		roads, properties and tourist locations									
Sites of cultural significance	No areas of cultural significance were found on the proposed development site										<ul style="list-style-type: none"> <li>Should any potentially culturally significant artefacts or graves, etc be found during construction activities all activities should be stopped until an assessment by a Cultural Heritage practitioner has been completed</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>
Safety and security	Construction workers in the area	Increase in crime in area and increase in squatters of vacant land	4 2	3 3	3 2	8 4	80 28	SBM SAM	H L	<ul style="list-style-type: none"> <li>Proper management and planning</li> <li>No construction work will be allowed on Sundays</li> <li>A limited number of workers along with security guards will be allowed to sleep on site, however within a cordoned-off secure area</li> <li>All staff will carry identification, access control will be enforced and the site will be swept and a search will be done each night</li> <li>The development will have 24-hour access control and security</li> <li>A CLO (Community Liaison Officer) should be employed</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	
	Construction works	Migration of job seekers into the area in search of employment	3 2	3 3	2 2	6 4	48 28	SBM SAM	M L	<ul style="list-style-type: none"> <li>No on-site recruitment is to take place</li> <li>The CLO (Community Liaison Officer) to be consulted regarding employment of members of the surrounding communities.</li> </ul>	
		Increase in construction traffic	4 3	3 3	3 2	8 4	80 32	SBM SAM	H M	<ul style="list-style-type: none"> <li>The access of large trucks will be investigated to provide a suitable access route that does not become a nuisance to existing residents</li> <li>Only a specified number of trucks at any one time will be allowed onto the property</li> <li>Construction vehicles and activities must aim to avoid peak hour traffic times (weekdays 7-8am and 5-6pm)</li> <li>Establish an all-weather site access and wheel wash or shake down to prevent soil and materials from being trekked onto the road</li> </ul>	

## KLERKSOORD DEVELOPMENT DRAFT EIA

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
		Decrease in safety due to increased traffic	4 3	3 3	2 2	10 6	90 48	SBM SAM	H M	<ul style="list-style-type: none"> <li>• Security fencing and barriers</li> <li>• Perimeter fence patrols</li> </ul>
Local services	Construction activities that utilise local services	Inadequate service provision to adjacent properties and malfunctioning of services	2 1	3 3	2 2	4 2	28 12	SBM SAM	L L	<ul style="list-style-type: none"> <li>• The service systems are to be designed according to the minimum requirements of, and submitted to the Local authority for approval.</li> <li>• No construction activities must commence on site prior to obtaining the necessary approval</li> </ul>
Fire	Cooking fires by construction workers	Veld fires	3 1	3 3	3 2	6 4	54 24	SBM SAM	M L	<ul style="list-style-type: none"> <li>• A designated area shall be assigned for fire making by the construction workers, so as to ensure that run-away veld fires do not occur</li> <li>• This will reduce air pollution by excessive smoke</li> </ul>
Improved tax base for local municipality	Employment of construction workers	Decrease in unemployment and crimes related to unemployment	4 5	3 3	2 2	8 8	72 80	SBM SAM	M H	<ul style="list-style-type: none"> <li>• Local labour to used as far as possible for the installation of services and the construction of the retirement village and associated infrastructure</li> <li>• Local training and capacity building programmes</li> <li>• Construction timeframe could be lengthy due to the extent and phased nature of the proposed development</li> </ul>
		BEE development opportunities	2 3	3 3	2 2	4 6	28 48	SBM SAM	L M	<ul style="list-style-type: none"> <li>• Contract requirements to involve and train BEE companies</li> </ul>
	Local demand for goods and services	Decrease in unemployment and empowerment of local trade and industry	2 3	3 3	2 2	4 6	28 48	SBM SAM	L M	<ul style="list-style-type: none"> <li>• Local products, goods and services to be utilised as far as possible during the construction phase</li> <li>• Local training and capacity building programmes</li> </ul>

**KLERKSOORD DEVELOPMENT DRAFT EIA**

**15.5.2 Operational Phase**

**Table 14: Quantification of impacts related to the operational phase**

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
<b>15.5.2.1 Physical Impacts</b>											
Geology	There are no expected operational related impacts on the geology of the proposed development site and surrounding areas										<ul style="list-style-type: none"> <li>None, although geological monitoring should possibly commence during the Construction Phase by the Geotechnical engineer.</li> </ul>
Topography	Construction activities including levelling of road and building surfaces continued during operational phase	Erosion	4 3	2 2	2 1	6 4	48 24	SBM SAM	M L	<ul style="list-style-type: none"> <li>Demolition and construction activities should preferably take place during the dry months.</li> <li>All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur.</li> <li>All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed.</li> <li>Where erosion may potentially occur, dissipaters such as gravel beds or straw bales must be installed to prevent erosion.</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	
Air quality	Construction activities and vehicles on site continued during operational phase	Dust pollution that affects adjacent developments								<ul style="list-style-type: none"> <li>Roads will be paved and dust will thus be eliminated</li> </ul>	
Soils and land capability	There are no expected operational related impacts on soils and land capability of the proposed development site and surrounding areas									<ul style="list-style-type: none"> <li>Weeds appearing on the area must be maintained and eradicated</li> <li>For further information please refer to the Draft EMP (Annexure K)</li> </ul>	



**KLERKSOORD DEVELOPMENT DRAFT EIA**

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
Water quality and availability	General usage of water (household, business, irrigation, etc)	Water wastage	4 2	4 1	3 2	6 4	66 20	SBM SAM	M L	<ul style="list-style-type: none"> <li>Waste water to be recycled and re-used as far as possible to ensure that minimum amounts are required for aspects like irrigation.</li> <li>Good monitoring and management measurements to be set in place by facilities managers</li> </ul>
	Malfunctioning of sewage treatment plant or any other serious pollution event	Water pollution	3 2	3 2	3 1	8 6	72 30	SBM SAM	H M	<ul style="list-style-type: none"> <li>Adequate measures to be put in place to prevent surface and groundwater contamination of any kind – responsibility of civil engineers</li> <li>No French drains allowed</li> <li>All sewage infrastructure is to be maintained and checked at yearly intervals</li> <li>A plan should be put in place that caters for the event of a large fuel spill in the water – to form part of the recommendations of the RoD by GDARD</li> </ul>
	There will be no operational activities that should impact on the quantity of groundwater available to surrounding borehole users									
<b>15.5.2.2 Biophysical Impacts</b>										
Flora	General human interference and impact	Loss of species diversity and habitat characteristics	4 2	4 1	1 1	6 4	54 16	SBM SAM	M L	<ul style="list-style-type: none"> <li>Walkways throughout the open spaces and conservation zones will be strategically placed and users will be enforced to only use delineated walkway areas so as not to damage surrounding habitats</li> <li>Landscaping guidelines which include an allowable indigenous vegetation list that attracts fauna is to be formulated and made a condition of sale</li> <li>No exotic vegetation will be allowed</li> </ul>

## KLERKSOORD DEVELOPMENT DRAFT EIA

Environmental Component	Activity	Potential Impact	Environmental Significance Score									Mitigation Measures
			P	D	S	M	Total	Rating				
Fauna	General human interference and impact	Loss of species diversity and habitat characteristics	4 2	4 1	1 1	6 4	54 16	SBM SAM	M L		<ul style="list-style-type: none"> <li>Walkways throughout the open spaces (drainage line area) will be strategically placed and users will be enforced to only use delineated walkway areas so as not to damage surrounding habitats</li> <li>Landscaping guidelines which include an allowable indigenous vegetation list that attracts fauna is to be formulated and made a condition of sale</li> <li>Minimal to no exotic vegetation will be allowed</li> </ul>	
Sensitive landscapes	General human interference and impact	Loss of valuable landscape and habitat associated to drainage line to the west of the proposed development site	4 2	4 1	1 1	6 4	54 16	SBM SAM	M L		<ul style="list-style-type: none"> <li>Walkways through sensitive landscapes will be strategically placed and users will be enforced to only use delineated walkway areas so as not to damage surrounding habitats</li> </ul>	
Conservation	Delineation of conservation corridor associated to floodlines – western drainage corridor	Rehabilitation, conservation and maintenance of this landscape and habitat – benefit to local and regional biodiversity by minimising fragmentation of ecological systems	2 4	1 4	2 5	4 8	20 88	SBM SAM	L H		<ul style="list-style-type: none"> <li>Conservation management to be done in collaboration with the local municipality</li> </ul>	

**KLERKSOORD DEVELOPMENT DRAFT EIA**

Environmental Component	Activity	Potential Impact	Environmental Significance Score						Mitigation Measures		
			P	D	S	M	Total	Rating			
<b>15.5.2.3 Socio-economic Impacts</b>											
Noise pollution	As the site will be established and due to the airport activities related to the operational phase no major impacts are expected, however, due to the phased nature of the project construction activities will continue for a lengthy period										<ul style="list-style-type: none"> <li>Please refer to the noise mitigation measures during construction phase (<b>Table 14</b>), as well as the Draft EMP (Annexure K)</li> </ul>
Visual integrity	Higher density caused by development and change in land use	Change in sense of place of the specific site, however appropriate and good design will result in an improved urban character and will positively enhance the site and surrounding urban context potentially raising economic value of surrounding areas	4 3	4 4	2 2	8 4	80 36	SBM SAM	H M		<ul style="list-style-type: none"> <li>Architectural guidelines (including aspects of roof and wall finishes, colours, heights of buildings, and lighting), as well as Landscape Architectural guidelines (screening, buffering, functioning, aesthetics etc) for the development will be developed to promote the enhancement of this urban area and therefore creating new and valuable places with a modified and positive urban mixed-use sense of place that is vibrant and diverse</li> </ul>
Sites of cultural significance	Some areas of cultural significance were assessed on the proposed development site and should be investigated further.										<ul style="list-style-type: none"> <li>Should any potentially culturally significant artefacts or graves, etc be found during the operational phase, the development management is to be informed and a Cultural Heritage practitioner is to be contacted to decide on a way forward</li> </ul>

## KLERKSOORD DEVELOPMENT DRAFT EIA

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
Safety and security	Active operational phase with variety of functions and activities ranging from residential, business and commercial	Decrease in crime due to the creation of a more secure environment and minimising of vacant land	2 4	2 4	1 2	4 8	20 80	SBM SAM	L H	<ul style="list-style-type: none"> <li>Security provided via passive surveillance</li> <li>Appropriate environmental design to address safety and security issues (CSIR publication)</li> <li>Good accessibility for emergency and police services</li> </ul>
Traffic increase	Increase of residents and users of the area	Additional vehicles on road	4 3	4 3	3 2	8 4	88 24	SBM SAM	H L	<ul style="list-style-type: none"> <li>All requirements of local municipality to be adhered to</li> <li>All improvements to road infrastructure as recommended by traffic engineer to be adhered to</li> </ul>
Local services	Operational activities not to influence the availability of services to surrounding land owners									<ul style="list-style-type: none"> <li>The engineers compiling the services report and designing services are to ensure that adequate measures are in place to ensure adequate service delivery that does not influence surrounding areas</li> <li>All requirements by local municipality to be adhered to regarding service reticulation and delivery</li> </ul>
Fire	There are no expected operational related occurrences other than normal urban activities that may result in site fires.									<ul style="list-style-type: none"> <li>Adequate positioning of fire hydrants according to CoJ standards.</li> </ul>
Improved tax base for local municipality	Employment of workers during the operational phase – business sector, landscaping and maintenance, cleaning, medical staff, etc.	Decrease in unemployment and crimes related to unemployment	4 5	2 4	2 3	4 8	32 96	SBM SAM	M H	<ul style="list-style-type: none"> <li>Local labour and employees to be made use of as far as possible for all aspects of the operational phase</li> <li>Local training and capacity building programmes</li> </ul>

## KLERKSOORD DEVELOPMENT DRAFT EIA

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
		BEE development opportunities	2 3	2 4	2 2	4 6	24 54	SBM SAM	L M	<ul style="list-style-type: none"> <li>BEE companies to be trained and involved in during the operational phase of the development – e.g. Management of retail facilities, maintenance, landscaping, etc.</li> </ul>
	Local demand for goods and services	Decrease in unemployment and empowerment of local trade and industry	2 3	2 4	2 2	4 6	24 54	SBM SAM	L M	<ul style="list-style-type: none"> <li>Local products, goods and services to be utilised as far as possible during the operational phase – shops, frail care centre, craft centre, etc.</li> <li>Local training and capacity building programmes</li> </ul>
	Increase in service delivery and number of erven	Increase in taxes raised on property								<ul style="list-style-type: none"> <li>None required</li> </ul>
Bulk Contributions	Improvement of infrastructure	Increased service provision, minimisation of traffic congestion								<ul style="list-style-type: none"> <li>Should we well planned and strategically implemented in coordination with the City of Tshwane and GAUTRANS</li> </ul>

### 16.0 CONCLUSIONS

The development proposal has no fatal flaws in terms of the institutional, bio-physical or socio-economic environments. In fact, it is believed that the proposed development compliments the required and desired balance to be achieved between socio-economic and ecological / environmental factors.

The key issue possible impact is the destruction of sensitive / significant environments. New urban parks are to be created with focus on the recreation of green spaces with high ecological value.

The key issue related to land use has been addressed and the preferred alternative is recommended due to the balance that is retained between ecological and socio-economic factors, which align to the City of Tshwane's Regional Spatial Development Framework which mentions the proposed development as a future regional node.

Risks and potential impacts related to the construction and operational phases have been addressed within the quantification of impacts process. The EMP should be strictly adhered to, therefore mitigating impacts as far as possible.

It is undeniable, that the proposed development has an optimal location within the urban realm adjacent to existing urban amenities, services and infrastructure and that it is a logical area for infill development, especially with regard to the environmental authorisations that have been obtained for all the areas surrounding the proposed development site. Should this site not be developed, it will remain as an isolated and unconnected land area that will be vulnerable to crime and potential illegal informal occupation.

### 17.0 RECOMMENDATIONS

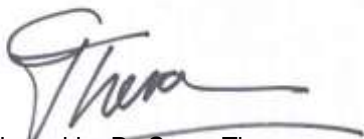
It is recommended that the 'Mix use Nodal Development' option which has been identified as the preferred alternative is used. It is further recommended that this application be approved with the following conditions:

- All requirements from the Tshwane Municipality be adhered to including:
- Engineering services report addressing provision of services.
- Conditions and recommendations by the Engineering Geologists be adhered to
- All other state departments' comments and input be adhered to, including but not limited to:
  - Department of Water Affairs and Forestry
  - South African Heritage Resource Agency
- All mitigation measures as described in this report and specialist reports are adhered to by the developer (these measures will be made part of the EMP).
- The conditions of the Record of Decision from GDARD be written into the EMP and be implemented as such.

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- The EMP, as attached to this document, and as amended after the EA is received, should be made part of the contractual documents of contractors. The project manager must also account for the cost of this document's implementation before construction takes place.
- An Environmental Control Officer (ECO) should be appointed to audit the EMP on a bi-weekly basis during construction phase.
- A penalty system is set up for non-compliance to the EMP to be severe enough to practically control construction and operational activities on site.
- The EMP must be made issued to individual stand developers for implementation
- That the surrounding community be kept up date through the Town Planning Application process and during Construction Phase of the project.

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PrLArch 97082  
7 March 2012