

Garankuwa Cemetery Expansion
Ga-Rankuwa Ecological Overview
City of Tshwane

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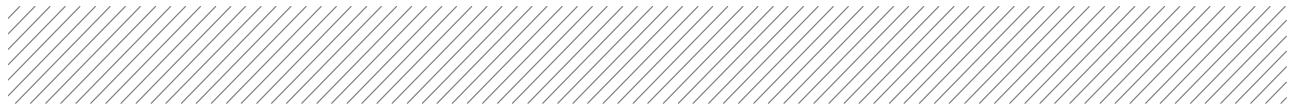


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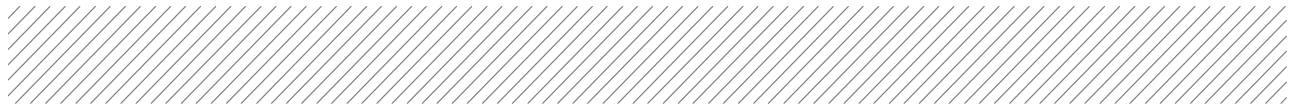


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Acronyms

Acronym	Meaning
ADU	Animal Demography Unit
AGIS	Agricultural Geo-Referenced Information System
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
CoT	City of Tshwane
DEM	Digital Elevation Model
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EMP	Environmental Management Plan
ESA	Ecological Support Area or
GDARD	Gauteng Department of Agriculture and Rural Development
GG	Government Gazette
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
IUCN	International Union for Conservation of Nature
MASL	Metres Above Sea Level
NBA	National Biodiversity Assessment
NEMBA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
PRECIS	National Herbarium Pretoria Computerised Information System
QDS	Quarter Degree Square
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SRTM	shuttle radar topography mission
TPI	Topographic Position Index
TWI	Topographic Wetness Index
UCT	University of Cape Town
WMA	Water Management Area

1 Introduction

The City of Tshwane is proposing to expand the existing cemetery site on the Remaining Extent of Portion 3 of the Farm Sjambok Zijn Oude Kraal 258 JR in Ga-Rankuwa. This report aims to provide information regarding the ecological characteristics of the proposed site aimed for expansion.

1.1 Report details

The table below highlights the details of this report in accordance with Appendix 6 of GN No. R. 982 of 4 December 2014 and provides hyperlinks to the relevant sections within the report.

Table 1: Report details

Item	Description
Details of specialist	General details
Declaration of independence	Declaration of independence
Scope of report and purpose of report	Introduction
Date and season of site visit	Field survey
Methodology	Methods
Site sensitivity	Ecosystem
“No go” areas and buffers	Ecosystem
Environmental sensitivity map	Local biodiversity features
Assumptions and information gaps	Knowledge gaps
Findings and implications	Results
Mitigation measures (EMPr)	Recommendations
Conditions for the EA	Recommendations
Monitoring requirements	N/A
Opinion on authorisation of activity	Conclusion
Consultation process	N/A
Comments and responses	N/A
Any other information	N/A

1.2 Knowledge gaps

This assessment was limited to one site visit towards the end of the flowering season. A medium level of confidence for the presence or absence assessment of Species of Conservation Concern (SCC) potentially occurring within the study area is therefore given. The likelihood of occurrence for SCC was largely based on previous records for the Quarter Degree Square (QDS) as well as the presence of suitable habitat.

2 Study area context

2.1 Regional biodiversity context

The study area is located in the City of Tshwane Municipality of the Gauteng Province. The municipality is approximately 217 457 ha in size of which approximately 41.7% is regarded as remaining natural areas. The municipality contains 8 formally land-based protected areas which covers 4.8% of the municipal area. The bulk of the municipality is situated within the Savanna (75.15%) biome with the Grassland biome represented by the remainder of the municipal area. There are 12 nationally classified vegetation types and nine threatened ecosystems within the municipality.

The Crocodile (West) and Marico Water Management Area (WMA) contributes all of the drainage within the municipality. The seven main rivers transecting the municipality are Apies, Crocodile, Hennops, Jukskei, Pienaars, Sand and Tolwane River. A mere 1% of the municipality consist of formally classified freshwater wetland areas. Biodiversity features associated with the study area are indicated in **Figure 1** below.

2.2 Geology and soils

The study area is divided into a southern site and a northern site each with its own soil characteristics. The southern site is characterised by strongly structured dark coloured cracking soils dominated by clays with a high swell-shrink potential. These soils tend to have a high natural fertility. The northern site is characterised by red structure less soils that drain freely. These soils tend to have restricted depth, and drain excessively. They are therefore highly erodible and have a low natural fertility. However, these soils have favourable physical properties.

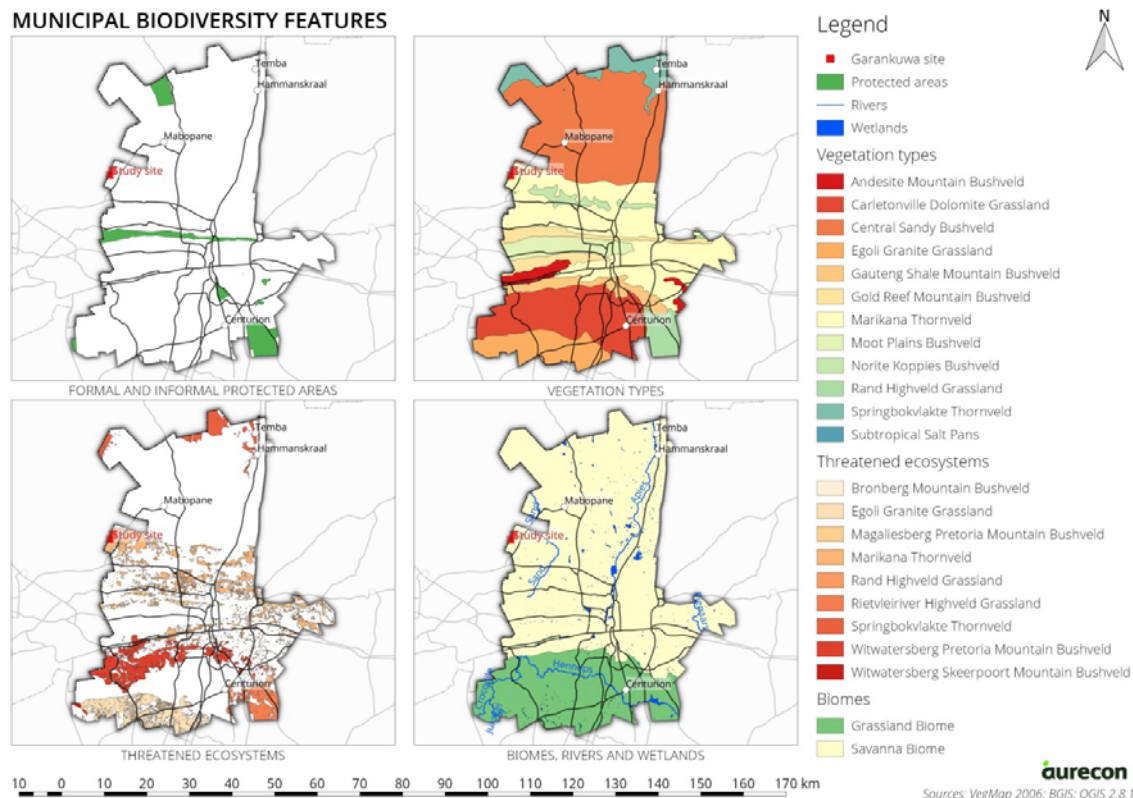


Figure 1: Municipal biodiversity features



3 Methods

3.1 Field survey

A brief site visit was conducted on the 20th of February 2015 by an ecologist, an Environmental Assessment Practitioner (EAP), officials from Gauteng Department of Agriculture and Rural Development (GDARD) and the representatives of Tshwane Municipality. A supplementary field survey was performed on the 3rd of March 2015 by an ecologist in order to gain some insight into the general ecological characteristics of the areas affected by the proposed activity. During the second field visit the site area was covered on foot and recorded with a handheld GPS, with which a series of geo-referenced photographs were also taken (refer to Appendix A for geo-referenced photographs).

The focus of the survey was to gather information on habitat attributes that might potentially foster Red Data species and / or nationally protected species within the proposed construction footprint of the project. These SCC are species either listed under the International Union for Conservation of Nature (IUCN) database (2014) or National Environmental Management: Biodiversity Act (NEMBA) (No. 10 of 2004), and protected trees listed under the National Forests Act 1998 (Act No 84 of 1998). The diversity and high level ecological integrity of the habitats on site was also assessed.

3.2 Desktop survey

3.2.1 Literature assessment

A large component of the assessment was conducted based on information gathered from the South African National Biodiversity Institute (SANBI) and its affiliated links. Intensive sampling was beyond the scope and level of this assessment and the assessment therefore focussed on combining information gathered from the literature and the field survey to formulate a matrix that could shed light on the ecological integrity of the site.

3.2.2 GIS

The Gauteng Conservation Plan (C-plan) v3.3 (Compaan, 2011) was used as a baseline in the evaluation of ecologically sensitive areas. In addition, all national biodiversity datasets were also used to provide background information for the site (i.e. NFEPA¹, NBA² etc.).

The wetland boundaries and surface water were mapped from aerial imagery (Google Earth and Bing maps) and were delineated conservatively during the desktop study, which was augmented during the site survey and as part of the habitat unit assessment.

4 Results

4.1 Site context

4.1.1 Local biodiversity features

The site is situated within the Marikana Thornveld vegetation type (Mucina & Rutherford, 2006). It has a conservation status of vulnerable according to Mucina & Rutherford (2006), and is listed in the gazetted national list of threatened ecosystems (National Environmental Management: Biodiversity

¹ National Freshwater Ecosystem Priority Area

² National Biodiversity Assessment

Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).

The site area is not classified into one of the biodiversity categories (i.e. Critical Biodiversity Area, Ecological Support Area, Important Area and or Protected Area) of the Gauteng C-Plan. In addition, according to the Gauteng C-Plan, the study site does not provide suitable habitat for any near threatened / Orange Listed floral species.

The sub-quaternary catchment applicable to the study site is classified as a low priority / status unknown according to the NFEPA atlas. The Rosespruit is located approximately 1.9 kilometres south-west from the site and flows in a north-west direction. The Rosespruit present ecological state is characterised as moderately modified / Class C and in a largely modified river condition (Nel & Driver, 2012). **Figure 2** below gives an overview of the local biodiversity within the immediate surroundings of the study site.



Figure 2: Local biodiversity features

4.2 Fauna and flora observed during the site visit

Photographs including some of the conspicuous fauna and flora species observed during the site visit are shown below. These species are characteristic for the study area.



Figure 3: *Bubulcus ibis*



Figure 4: *Euplectes orix*



Figure 5: *Aristida congesta*



Figure 6: *Ziziphus mucronata*

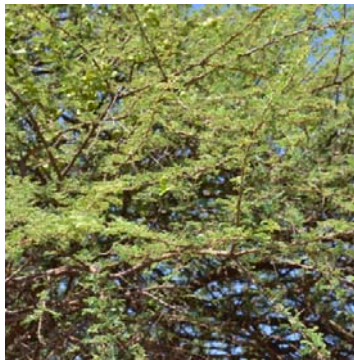


Figure 7: *Acacia tortillis*



Figure 8: *Grewia flava*

4.3 Habitat units

Habitat units were first delineated using an unsupervised clustering technique on the latest satellite imagery. The initial clusters were then subjectively grouped into broad units based on field observations and interpretation of available satellite imagery. Two main habitat units were delineated. Habitat units are indicated in **Figure 15** below.

4.3.1 Habitat unit 1 Thornveld

Habitat unit 1 consist of characteristic tall *Acacia nilotica* and *Acacia karoo* thornveld with short *Acacia tortillis* cover. Other characteristic species observed were *Ziziphus mucronata*, *Dichrostachys cinerea* subsp. *Africana*, *Rhus lancea* and *Grewia flava*. Grasses that dominate include *Heteropogon contortus*, *Elionurus muticus* and *Aristida congesta*.

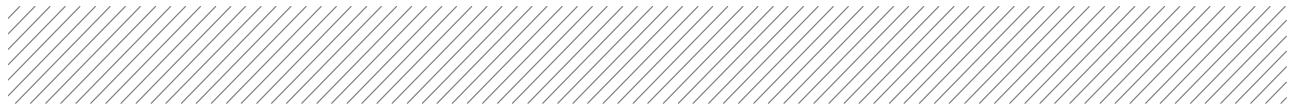


Figure 9: Shorter thornveld



Figure 10: Tall *Acacia nilotica* thornveld



Figure 11: *Ziziphus mucronata* and *Rhus lancea* clump

4.3.2 Habitat unit 2 Transformed

Habitat unit 2 consist of areas where earthworks and illegal dumping has taken place. These areas are mostly located patchily within the northern site area and include heaps of building rubble and soil.



Figure 12: Earthworks and dumping



Figure 13: Degraded veld on southern site



Figure 14: Existing cemetery boundary at southern site



Figure 15: Habitat units

5 Discussion

5.1 Ecosystem

Overall, the floral species composition of the northern site is representative of a remnant of what used to be Marikana Thornveld vegetation type. Although natural vegetation exists within the southern site, this area has largely been impacted by overgrazing and illegal thoroughfare from the main road to the suburban area.

The ecosystem function is marginally intact and provides habitat for generalist fauna and avi-fauna species, but isn't sufficiently connected to other natural landscapes. At the current rate of rural development within the area, both sites will likely be completely disconnected from any remaining natural landscapes. Illegal dumping across the northern site and illegal thoroughfare through the southern site will continue to alter the natural vegetation composition of these sites.

The sensitivity mapping rules for biodiversity assessments state that all good condition natural vegetation should be designated as sensitive. Taking into account that the site does not constitute a critical biodiversity or ecological support area, all natural vegetation areas were designated as being moderately sensitive (**Figure 16**).



Figure 16: Sensitivity

5.2 Fauna

The Virtual Museum (VM) database³ provides a platform to access distribution records for fauna species. The literature study focussed on querying the VM database to generate species lists for the 2527DB QDS. The initial literature study revealed one faunal SCC previously recorded within the 2527DB QDS. These results were cross referenced with data from the IUCN Red List of Threatened Species to extract information on the ecology and threats pertaining to the recorded SCC. These species are discussed below.

5.2.1 Giant Bullfrog *Pyxicephalus adspersus*

The following excerpt is quoted regarding the Giant Bullfrog:

“The Giant Bullfrog (*Pyxicephalus adspersus*) has been removed following re-assessment of the species' status in South Africa. The species is not truly Near Threatened in South Africa (no quantitative analysis of the Giant Bullfrog distribution against the IUCN criteria can consider them as such) and the most recent evaluation of the status of the Giant Bullfrog in December 2009 did not consider the species sufficiently threatened to be listed as Near Threatened (Prof. Louis du Preez, pers. comm.)” (Conservation, 2012). Suitable habitat does not exist for giant bullfrog within the study site. The likelihood of occurrence is therefore regarded as low.

³ Developed by the Animal Demography Unit (ADU) of the University of Cape Town (UCT)

5.3 Flora

The National Herbarium Pretoria Computerised Information System (PRECIS)⁴ provides an electronic database system to access distribution records on southern African plants. The literature study focussed on querying the PRECIS database to generate species lists for the 2527DB QDS as well as querying the latest Gauteng C-Plan (v3.3) for suitable habitat regarding SCC.

The initial literature study (limited to the PRECIS database and Gauteng C-Plan) revealed five SCC previously recorded within the 2527DB QDS and no SCC for which suitable habitat exist according to the Gauteng C-plan. The initial results were cross referenced with data from the Red List of South African Plants to extract information on the ecology and threats pertaining to the recorded SCC. All SCC previously recorded within the QDS are discussed below in Section 5.3.1.

5.3.1 IUCN listed floral species

Bushman Poison Bulb *Boophane disticha*

This terrestrial bulbous amaryllid is mostly found scattered within dry grassland and rocky areas. It is threatened by overharvesting for the medicinal plant trade and therefore declining as a result. It is currently listed as declining according to the Red List of South African Plants (Williams, et al., 2008). This species was not located during the site visit, and suitable habitat does not exist for this species within the study site. The likelihood of occurrence is therefore regarded as low.

Common Vlei Crinum *Crinum macowanii*

This terrestrial bulbous amaryllid is mostly found scattered within mountaingrassland and stony slopes with characteristic hard dry shale, gravelly soil or sandy flats (Williams, et al., Crinum macowanii Baker, 2008). All Crinum spp. is threatened by overharvesting for the medicinal plant trade. No Crinum spp. was observed within the study area. In addition, the likelihood of occurrence for *Crinum macowanii* within the study area is regarded as low due to a lack of suitable habitat. Soils throughout the study site are largely shallow black and brown clayey soils.

Stenostelma umbelliferum

This terrestrial succulent from the dogbane family prefers deep black turf in open woodland specifically in the vicinity of drainage lines. The species has experienced significant declines as a result of habitat destruction associated with mining (specifically platinum and chrome) in the North West province and urban expansion in the northern boundary of Pretoria. In addition, due to the fertile nature of this species habitat, its habitat is highly sought after for cultivation. Recent field surveys have however located numerous large subpopulations that were previously overlooked. In addition, it appears that the species favours disturbance. It is currently listed as near threatened according to the Red List of South African Plants (Victor, Bester, & Pfab, Stenostelma umbelliferum (Schltr.) S.P.Bester & Nicholas., 2007). No suitable habitat exists for this species. Likelihood of occurrence is therefore regarded as low.

Cape Holly *Ilex mitis*

This terrestrial tree species from the holly family is found along rivers and streams in forests and thicket communities and occasionally in the open. This species has experienced significant declines due to bark-stripping for the medicinal plant trade. This practice is however largely limited to the Eastern Cape and is not severely impacted throughout the rest of its range (Williams, et al., 2008). No suitable habitat exists for this species within the study area. Likelihood of occurrence is therefore regarded as low.

⁴ Developed and maintained by the National Herbarium in Pretoria



Adromischus umbraticola

This terrestrial succulent from the stonecrop family are found on south-facing rock crevices on ridges (Helme & Raimondo, 2006). No suitable habitat exists for this species within the study area. Likelihood of occurrence is therefore regarded as low.

6 Recommendations

- In the unlikely event that the SCC referred to in this report and any additional SCC are found within the study sites, appropriate ex situ and/or in situ conservation measures should be developed and implemented with the approval of the Gauteng Department of Agriculture and Rural Development.
- Protected species and other SCC should be rescued and placed in a nursery managed by City of Tshwane for the benefit of local communities (many of these species have value as medicinal plants) or donated to a research institute (e.g. SANBI or botanical garden) prior to conversion into a cemetery, rather than simply being destroyed upon receipt of a permit.
- Where feasible, viable populations of SCC can also be translocated to degraded or untransformed areas within the broader study area which provide potentially suitable habitats. However such translocations should ensure that no ecological degradation of the host habitat occurs as a result of the translocation or the introduced species, and will have to be evaluated by a botanist for each species and each potential translocation area.
- According to the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared alien weeds must be effectively controlled by the landowner. City of Tshwane should implement an alien plant control program for the control of weeds and aliens throughout the cemetery as well as the adjacent riparian and wetland habitats
- No development should occur within the 1 : 100 year flood line of any drainage line. This includes perennial and non-perennial streams and rivers and is in accordance with the National Water Act (no. 36 of 1998), except where the necessary legal authorisation in terms of a water use license is obtained.
- Should the necessary legal authorisation be obtained it is advised that no development should take place within the buffers as indicated by the Gauteng Conservation Plan v3.3.



7 Conclusion

The terrestrial habitats within habitat units 1 and 2 within both sites provides very limited habitat for Red List and Orange List fauna and flora species. The site has moderate ecological functionality and contributes to the local ecology of the area by means of habitat provision and natural terrestrial buffer for the dispersal and movement of generalist fauna and flora species within the local area.

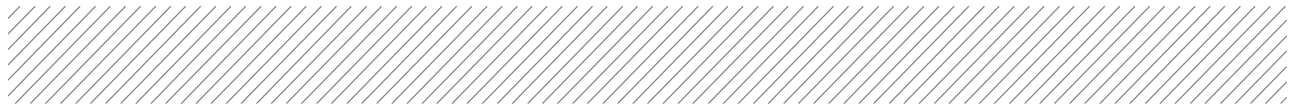
However, rapid rural expansion within the area results in injudicious use of the site for dumping and illegal thoroughfare from the main road to the adjacent suburban area. In addition, both the northern and the southern sites are patchy remnants of natural and semi-natural vegetation that use to cover the larger study area. In the absence of access control to the site and control of illegal activities, the study site will continue to deteriorate.

Based on the adherence to recommendations outlined above and the observations and outcomes of this assessment outlined below, there appears to be no objection towards the authorisation of the proposed activity. Any objection can only be motivated by the unlikely, but confirmed presence of any of the Red and / or Orange List fauna and flora species mentioned in this report. In addition, the following national and provincial attributes of the site based on published data should also be taken into account:

- The site is not located within an ecological support (ESA) or critical biodiversity (CBA) area
- The surrounding land cover could be classified as heavily modified
- The surrounding land use could be classified as rural development gradually transitioning into semi-urban development
- It is located within the urban edge as indicated by the Gauteng C-plan v3.3
- The edge effects from the surrounding rural and semi-rural landscape will continue to alter the remaining natural composition of the site.

8 References

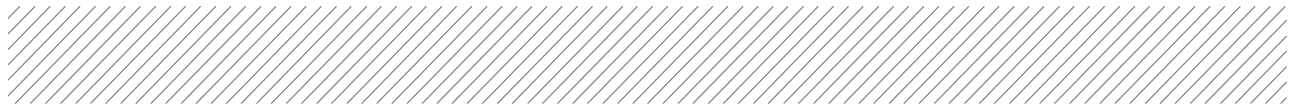
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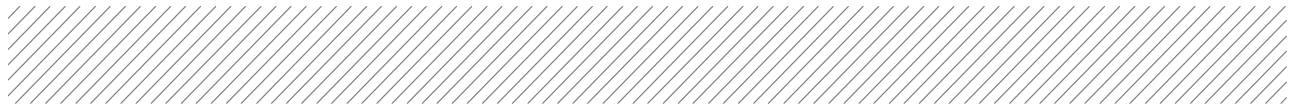
Appendix A

Specialist details

General details



Declaration of independence



Appendix B

Geo-photos



Pic. 01



Pic. 02



Pic. 03



Pic. 04



Pic. 05



Pic. 06



Pic. 07



Pic. 08



Pic. 09



Pic. 10



Pic. 11



Pic. 12



Pic. 13



Pic. 14



Pic. 15



Pic. 16



Pic. 17



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