



G E M
science

(No. 2002/007510/23)

Biodiversity Report

Development of a new filling station with
convenience store R25 Route on the farm

Vlakfontein 529 JR
On a portion of the
Remaining area of Portion 25

Prepared for:
I-CAT International Consulting & Trading
(Pty) Ltd

Date:
01 September 2016

Author:

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Prepared by GEM Science cc

Declaration

I, Stephan Veldsman, declare that -

- I act as the independent specialist;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of specialist

GEM-SCIENCE CC

Name of company

01 September 2016

Date

Executive summary

The proposed development of a new filling station with convenience store is a project initiated by JCJ Developments and is located on a portion of the remainder of Portion 24 of the farm Vlakfontein 529 JR. The site is approximately 6km south-west of Bronkhorstpruit (along the R25).

GEM-Science CC was appointed by I-CAT International Consulting & Trading (Pty) Ltd to conduct a baseline ecological assessment for the proposed area where the development is planned; further referred to as 'the study area or site' for the purpose of Basic Assessment.

The main objective of this survey was to determine which species are still present with special attention given to Red and Orange listed species, which may be present in the area. The following sub objectives were however also identified for the survey:

- To conduct a vegetation/ecology assessment. The specialist vegetation study includes the classification, description and mapping of different vegetation units within a proposed study area.
- To provide a floristic overview of the vegetation present on site in terms of species present, which species are dominant and whether species are red/ orange listed, alien, invasive etc.
- The sensitivity and conservation priority of the different vegetation units are evaluated and recommendations on the proposed activity may be given accordingly.
- To provide a basic faunal assessment with particular reference to the mammalian and avifaunal communities.
- To conduct a survey of threatened, near-threatened and conservation important species;
- To assess the habitat in which these species find themselves and link a sensitivity value to each habitat present.
- To provide an indication of the relative conservation importance and ecological function of the study area (to be incorporated into a sensitivity map); and
- Emphasize the potential influence of the proposed development
- Propose recommendations and mitigation measures for the proposed development, if ecologically viable.
- To provide a basic wetland delineation determining the water course area.

The ecological survey was conducted in August 2016.

The vegetation survey revealed six main areas on the study area:

Plant communities

1. Cleared area
 2. Alien bush area
 3. *Cynodon dactylon*- *Pogonarthria squarrosa* disturbed grassland
 4. *Eragrostis plana* - *Seriphium plumosum* disturbed grassland
 5. *Aristida congesta* – *Perotis patens* disturbed grassland
 6. Disturbed wetland area and stream
-

The classification leads to the identification of six major areas. The vegetation classification can primarily be attributed to the level of anthropogenic disturbance ranging from high to low. All the grassland areas are very disturbed and hosts very few species. The stream and directly surrounding area were found to be an important ecosystem, while the rest of the plant communities have a low sensitivity value.

No vegetation or fauna of major importance (red data species) were identified on the site.

It is assumed that due to the high level of disturbance already visible, that no species of major importance would occur on the site, even if the survey is conducted in different seasons.

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1 Introduction

The proposed development of a new filling station with convenience store is a project initiated by JCJ Developments and is located on a portion of the remainder of Portion 24 of the farm Vlakfontein 529 JR. The site is approximately 6km south-west of Bronkhorstpruit (along the R25).

GEM-Science CC was appointed by I-CAT International Consulting & Trading (Pty) Ltd to conduct a baseline ecological assessment for the proposed area where the development is planned; further referred to as 'the study area or site' for the purpose of Basic Assessment.

The main objective of this survey was to determine areas of importance regarding vegetation and fauna along with the ecological corridors, which species are present and pay special attention to red and orange listed species.

1.1 Objectives

The main objective of this survey was to determine which species are still present with special attention given to Red and Orange listed species, which may be present in the area. The following sub objectives were however also identified for the survey:

- To conduct a vegetation/ecology assessment. The specialist vegetation study includes the classification, description and mapping of different vegetation units within a proposed study area.
- To provide a floristic overview of the vegetation present on site in terms of species present, which species are dominant and whether species are red/ orange listed, alien, invasive etc.
- The sensitivity and conservation priority of the different vegetation units are evaluated and recommendations on the proposed activity may be given accordingly.
- To provide a basic faunal assessment with particular reference to the mammalian and avifaunal communities.
- To conduct a survey of threatened, near-threatened and conservation important species;
- To assess the habitat in which these species find themselves and link a sensitivity value to each habitat present.
- To provide an indication of the relative conservation importance and ecological function of the study area (to be incorporated into a sensitivity map); and
- Emphasize the potential influence of the proposed development
- Propose recommendations and mitigation measures for the proposed development, if ecologically viable.
- To provide a basic wetland vegetation delineation.

1.2 Project location

The proposed development of a new filling station with convenience store is located on a portion of the remainder of Portion 24 of the farm Vlakkfontein 529 JR. The site is approximately 6km south-west of Bronkhorstspuit (along the R25).

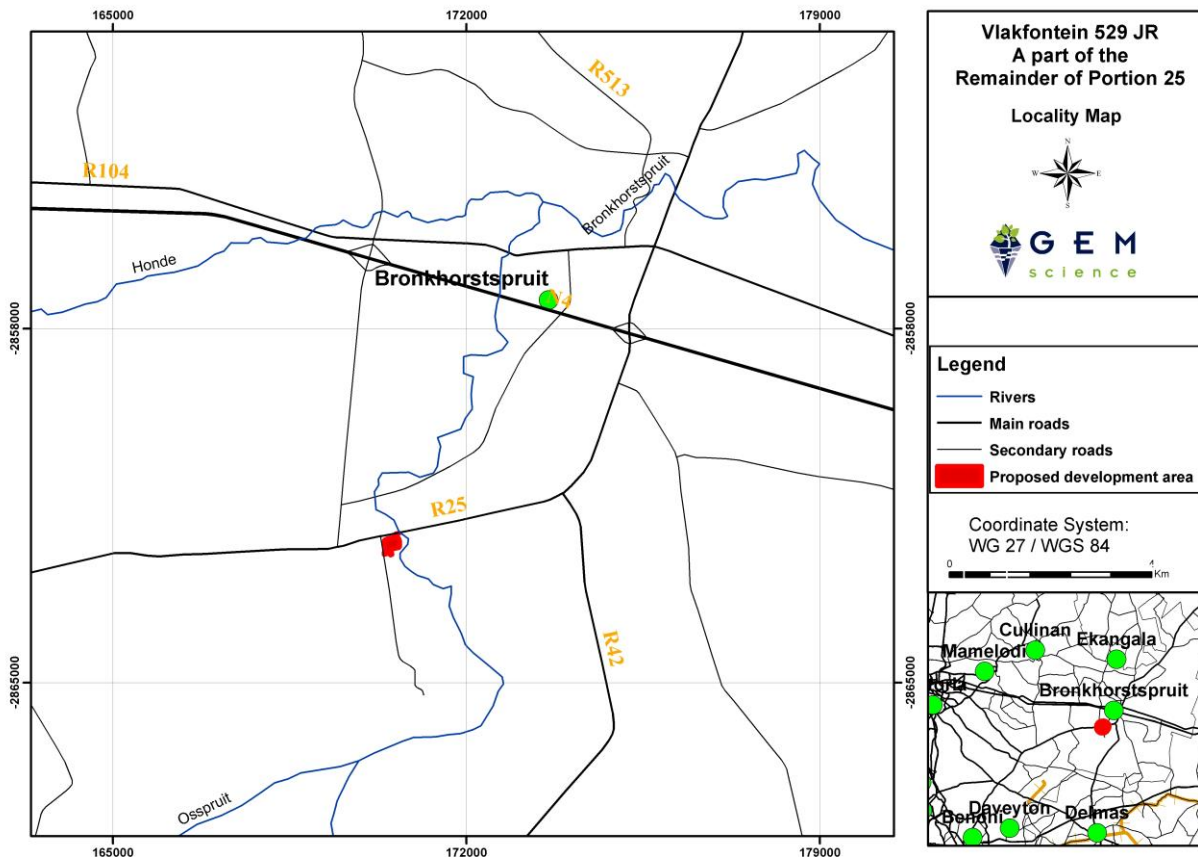


Figure 1.1 Locality of the study area

2 Description of the baseline environment

A brief description of the physical and biological environment of the site and surrounding areas, which is likely to be affected by the proposed development, is provided in the following sections. This information is largely based on desktop studies.

2.1 Physical environment

2.1.1 Climate

The climate is typical of the Highveld, with warm summers (November to February) and cold winters (June to August). Rainfall typically occurs as thunderstorms of high intensity and short duration.

The mean annual precipitation is 654mm, ranging between 570mm and 730mm. The coefficient of variation of the mean annual precipitation is around 28%. The incidence of frost is 30-40 days (Mucina and Rutherford 2006).

2.1.2 Topography

The topography of the area is reasonably flat lying, gently undulating farmland, between elevations of about 1440 to 1400 metre above sea level (Figure 2.1). The drainage pattern of the site is in an easterly direction to a perennial stream (Bronkhorstspuit) flowing directly east of the site in a northern direction. The Bronkhorstspuit eventually drains into the Wilge River that flows in a northern-eastern direction.

2.1.3 Land use

The site consists of degraded grassland areas that seems to been grazed in the past, and portions are currently being grazed by horses (Figure 2.2). There are a cleared area within the site with no vegetation on it. Further to this patches of alien tree species occur with no specific land use.

The R25, south of Bronkhorstspuit town, is bordering the site on the northern boundary. A secondary tar road borders the site on the west.

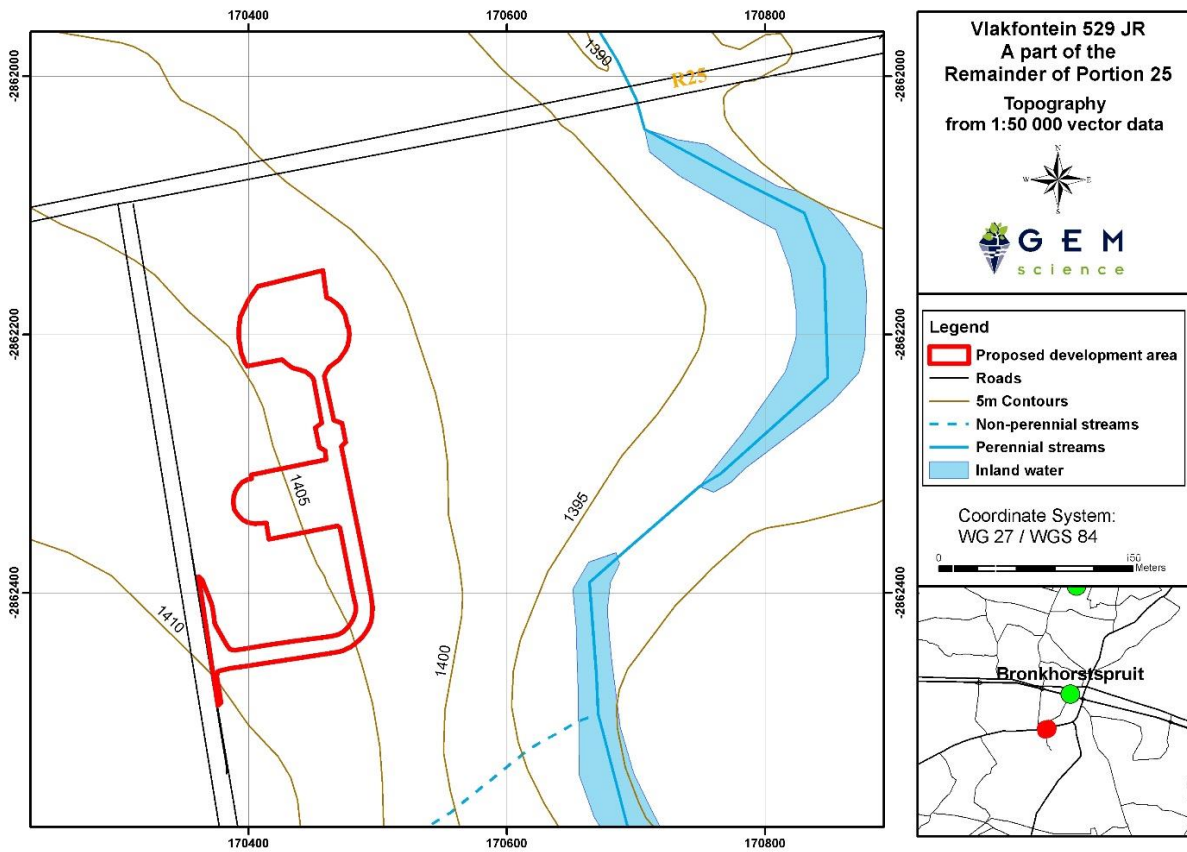


Figure 2.1 Topographical map of the study area

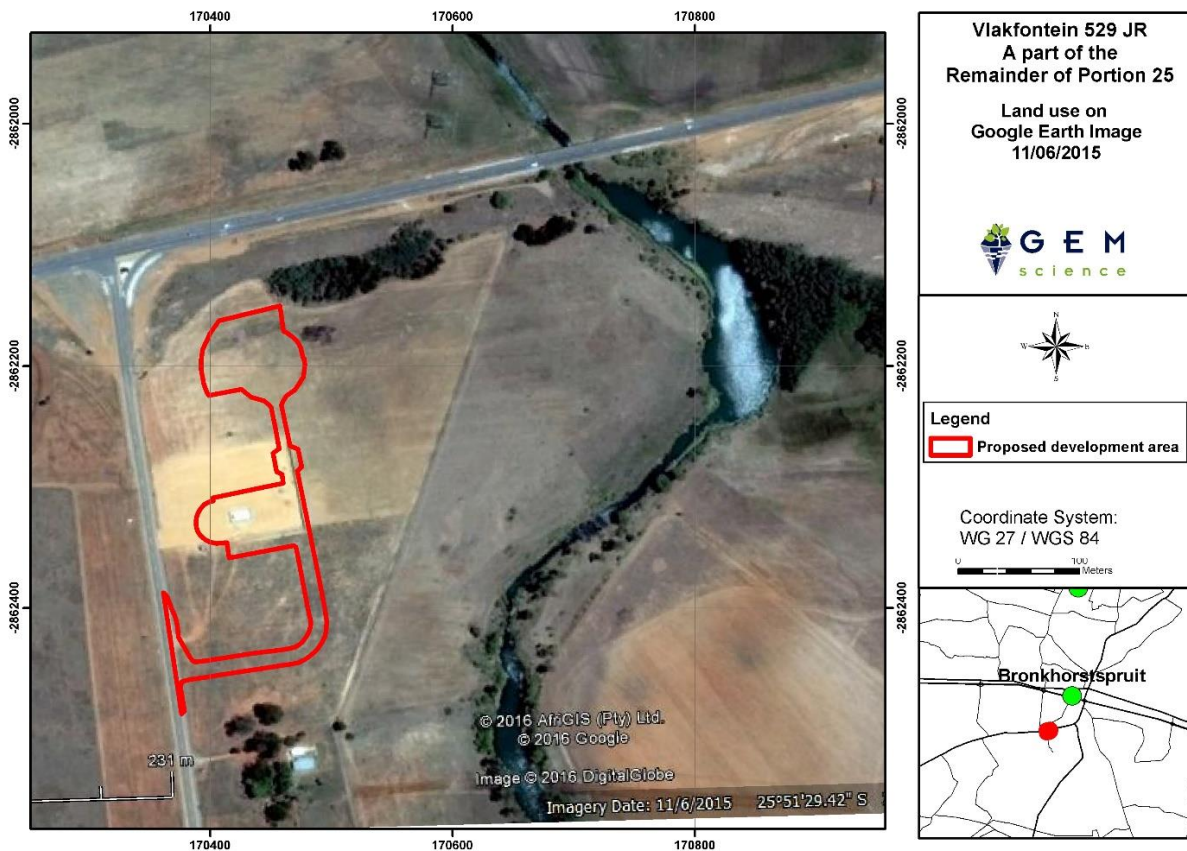


Figure 2.2 Google Earth image 2015 to indicate land use

2.1.4 **Surface water**

2.1.4.1 *Catchment*

The site falls within the Wilge River catchment and more specifically the B20D quaternary catchment.

2.1.4.2 *Rivers*

A perennial stream (Bronkhorstspuit) flows directly east of the site in a northern direction (Figure 2.3). The Bronkhorstspuit eventually drains into the Wilge River that flows in a northern-eastern direction.

2.1.4.3 *Aquatic biodiversity sub-catchments*

The Mpumalanga Biodiversity Conservation Plan (MBCP) maps the distribution of the province's known aquatic biodiversity sub-catchments into five categories. These are ranked according to ecological and biodiversity importance and their contribution to meeting the quantitative targets set for each biodiversity feature (Ferrar and Lötter 2007). The categories are:

1. *Protected areas* – already protected and managed for conservation
2. *Irreplaceable areas* – protection crucial, no other options available to meet targets
3. *Highly Significant areas* – protection needed, very limited choice for meeting targets
4. *Important and Necessary areas* – protection needed, greater choice in meeting targets
5. *Ecosystem maintenance* – transformed/modified areas

According to the MBCP the subcatchments of the site falls within the “ecosystem maintenance” category (Figure 2.4).

2.1.4.4 *Freshwater Ecosystem Priority Areas*

Freshwater Ecosystem Priority Areas (FEPAs) are strategic spatial priorities for conserving freshwater ecosystems and supporting sustainable use of water resources (Driver *et al.* 2011). FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for conserving ecosystems and associated biodiversity of rivers, wetlands and estuaries.

FEPAs are often tributaries and wetlands that support hard-working large rivers, and are an essential part of an equitable and sustainable water resource strategy. FEPAs need to stay in good

condition to manage and conserve freshwater ecosystems, and to protect water resources for human use.

The river conditions used for the FEPA maps were investigated. The Bronkhorstspuit has been classified as Category C (moderately modified).

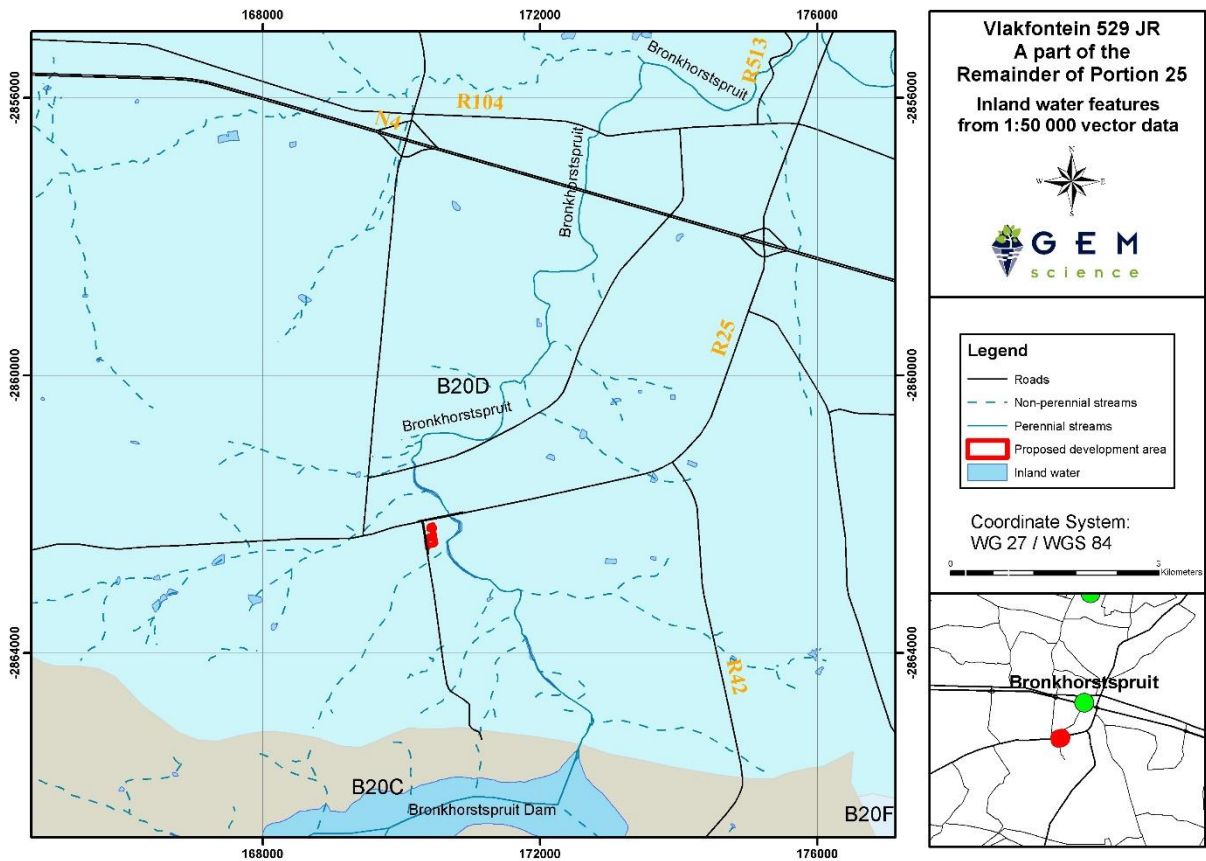


Figure 2.3 Inland water features within the study area

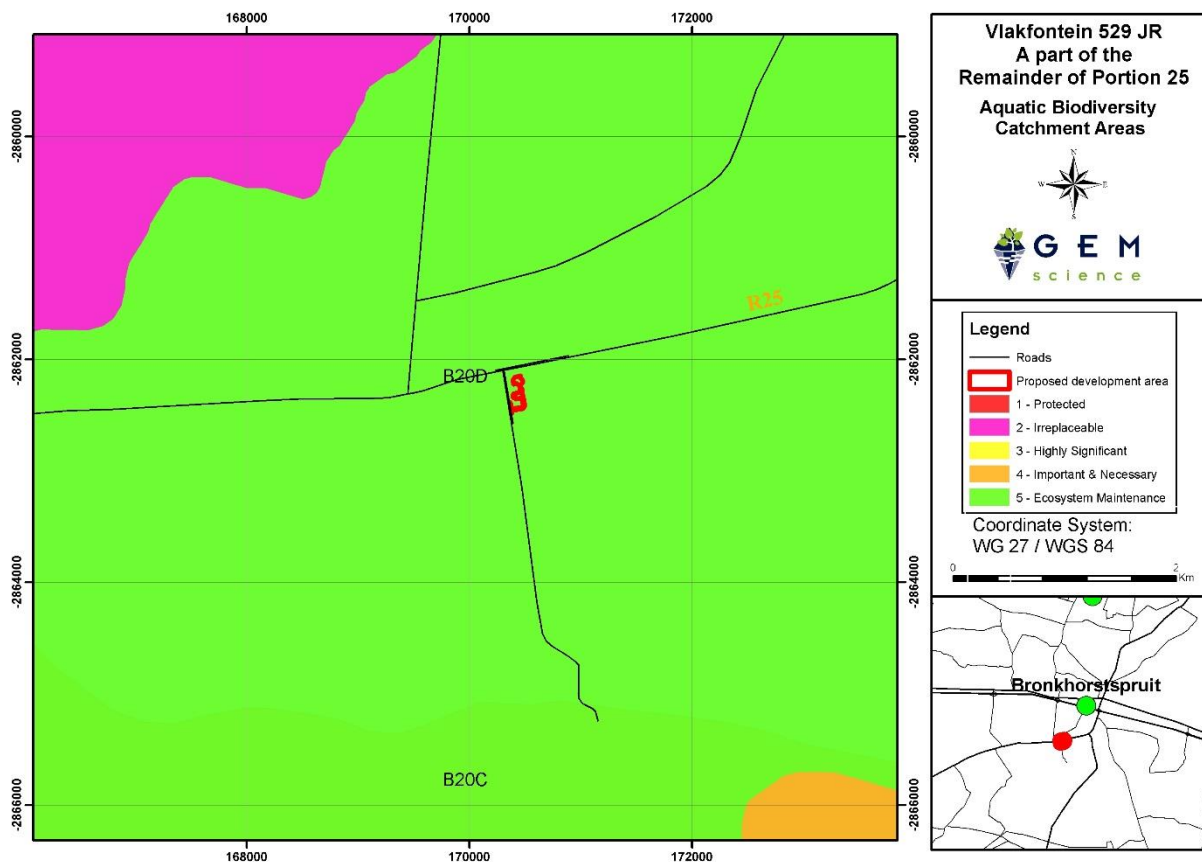


Figure 2.4 Aquatic biodiversity subcatchments (Lötter and Ferrar 2006)

2.2 Biological environment

2.2.1 Flora

The site is situated within the Grassland Biome and more specifically the Mesic Highveld Grassland Bioregion. Furthermore, as Figure 2.5 indicates, the site falls within Rand Highveld Grassland (Gm11) vegetation unit (Mucina and Rutherford 2006).

The typical landscape features of this vegetation unit are highly variable, including some extensive sloping plains and a series of ridges surrounded with undulating planes. The typical vegetation which occurs in the area is best described as wiry, sour grassland alternating with low sour shrubland on rocky outcrops and steeper slopes. The vegetation is short and dominated by graminoid species of the genera *Themeda*, *Eragrostis*, *Heteropogon* and *Elionurus* and herbs of which many belong to the Asteraceae (Mucina and Rutherford 2006).

The vegetation unit is seen as Endangered on a large scale. Only a small portion of the vegetation unit has been conserved in statutory reserves (Kwaggavoetpad, Van Riebeeck Park, Bronkhorstpruit, Boskop Dan Nature Reserve) and several private reserves (Mucina and Rutherford 2006).

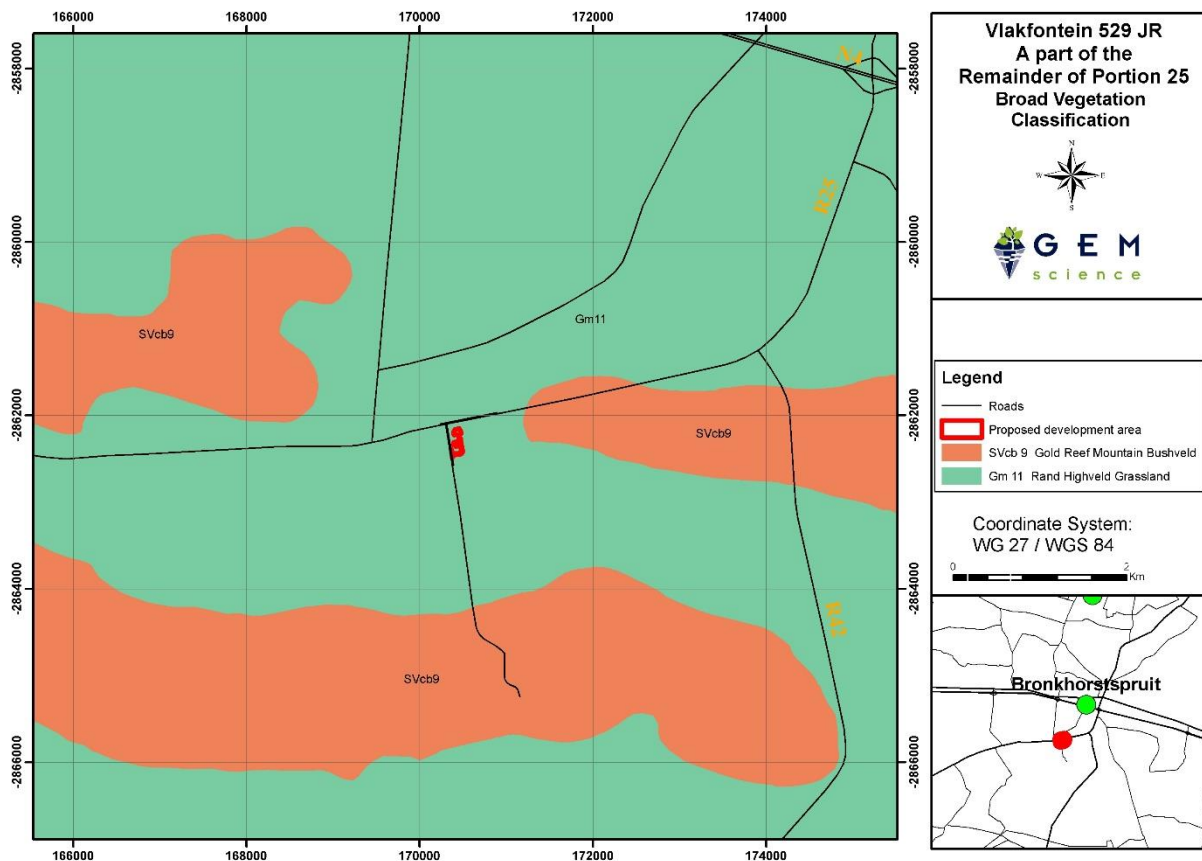


Figure 2.5 Vegetation classification (Mucina and Rutherford 2006)

2.2.1.1 Plant species list

According to POSA (2016) there are 200 plant species that may occur in or around the site (2528DC grid). There are no red data listed species that occur within the grid according to POSA (Annexure 1).

2.2.1.2 Terrestrial biodiversity assessment

The MBCP was consulted in order to assign conservation priority values to all of the vegetation communities identified. The MBPC is the framework for the conservation of biodiversity and conservation planning compiled for Mpumalanga and parts of Gauteng (Ferrar and Lötter 2007).

The MBCP identifies six categories for conservation priority in terms of terrestrial biodiversity. The categories are:

1. *Protected areas* – already managed for biodiversity protection

2. *Irreplaceable* – 100% irreplaceable – no other options available to meet targets
3. *Highly Significant* – 50 – 99% irreplaceable – very limited option available to meet targets
4. *Important and Necessary* – lower irreplaceability value, less than 50% but still required to meet targets
5. *Least concern* – areas of natural habitat that could be used to meet some targets but not needed now, as long as other areas are not lost
6. *No natural habitat remaining* – virtually all natural habitat has been irreversibly lost as a result of cultivation, timber, plantations, mining and urban development

According to the MBCP the site falls “no natural habitat remaining” category (Figure 2.6). There are areas classified as “least concern” near the site (Lötter & Ferrar 2006).

The grasslands of Mpumalanga once covered 66% of Mpumalanga’s surface area. Of these grasslands 44% have been transformed by agriculture, mining and urbanisation. The conservation target for the Rand Highveld Grassland (Gm11) is 24%.

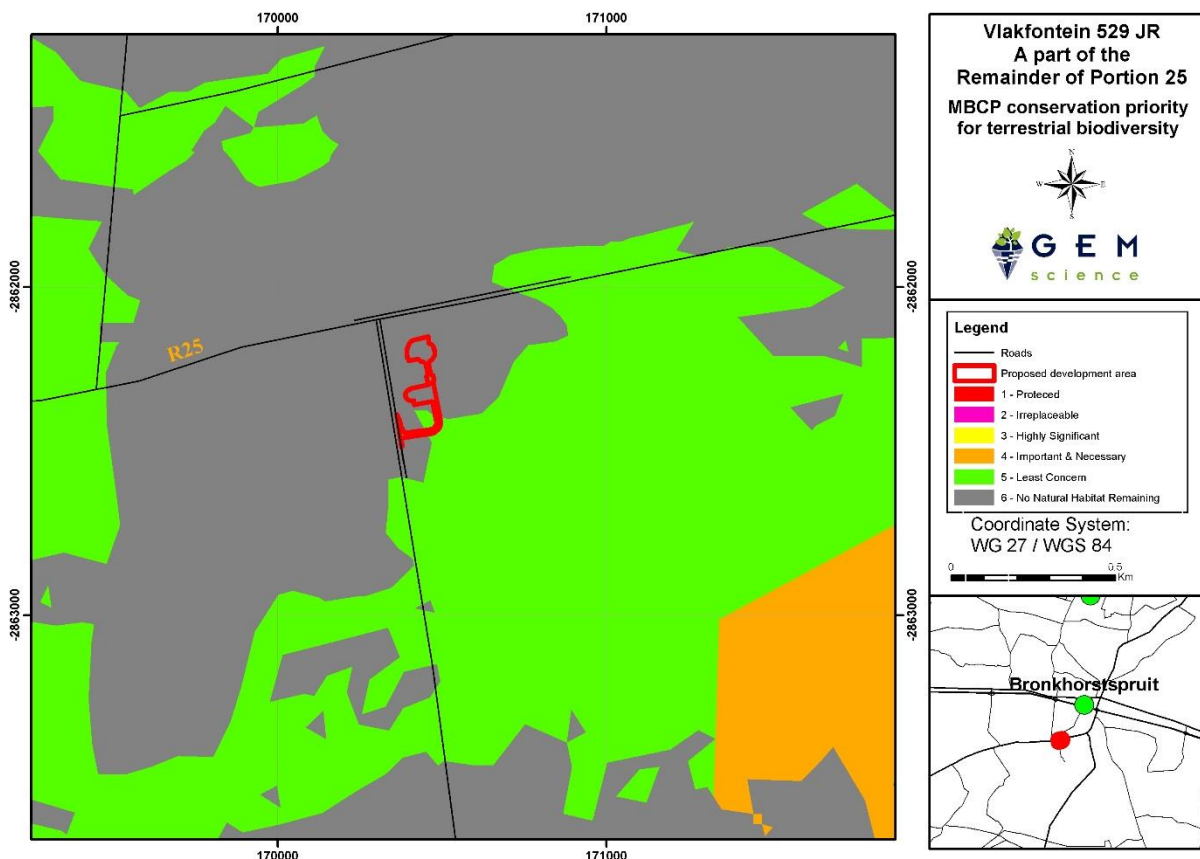


Figure 2.6 Conservation priority based on terrestrial biodiversity assessment according to the Mpumalanga Biodiversity Conservation Plan (Lötter and Ferrar 2006)

2.2.1.3 Historical activities

From the satellite images (Google Earth 2014 – Figure 2.7 and Google Earth 2012 – Figure 2.8) it was evident that there has been anthropogenic disturbance for numerous years.

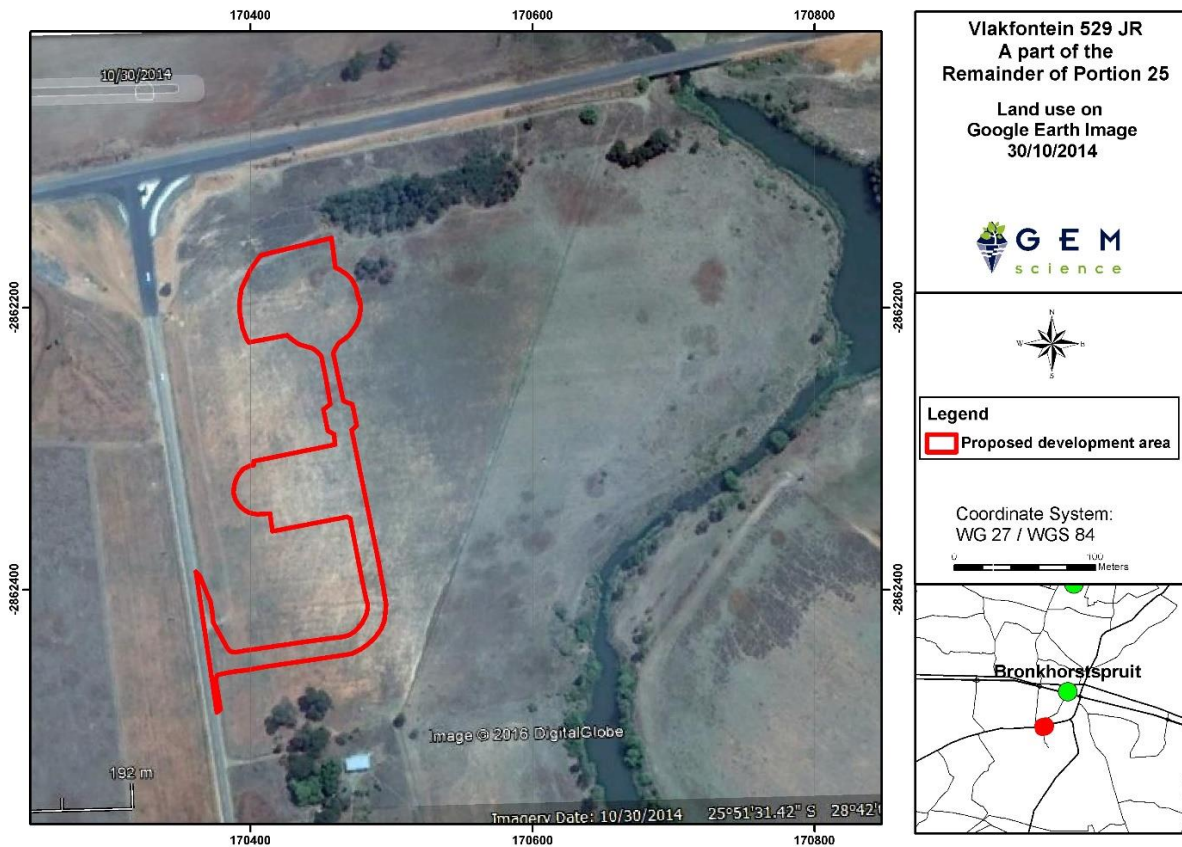


Figure 2.7 Google Earth image 2014 to indicate land use

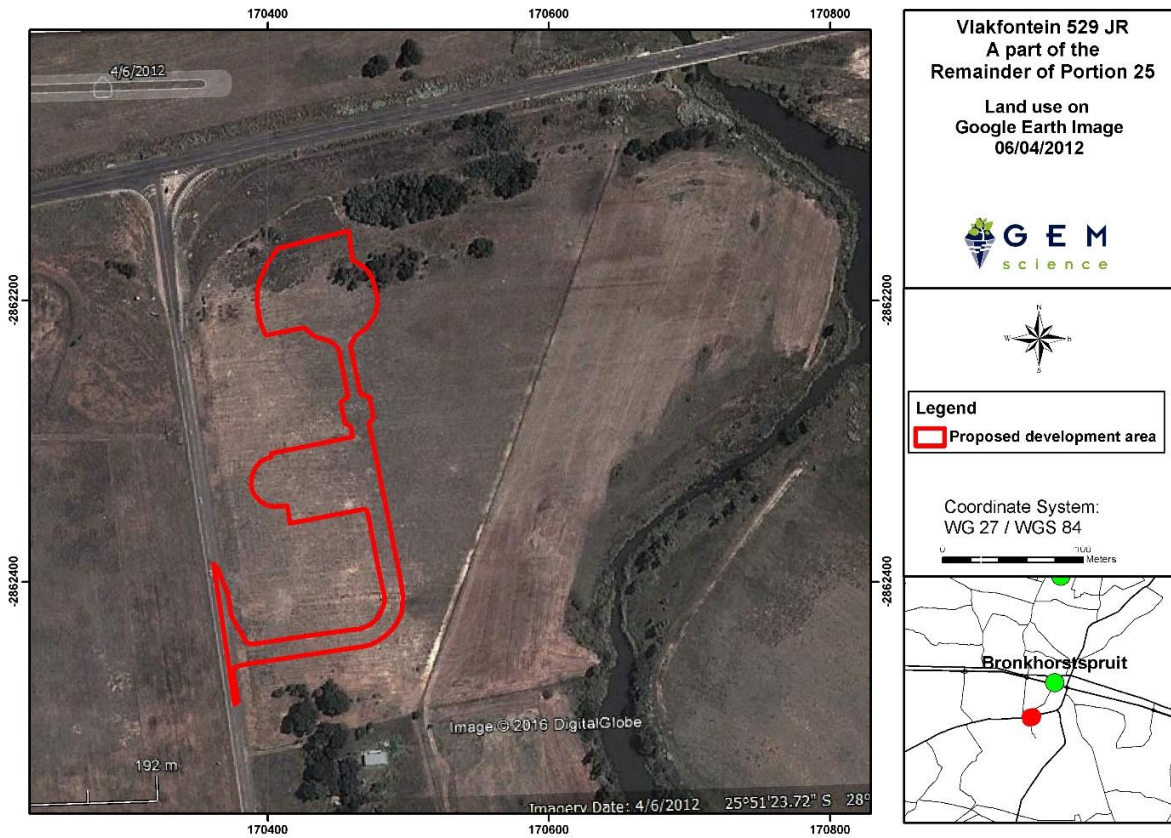


Figure 2.8 Google Earth image 2012 to indicate land use

2.2.1.4 Gauteng Conservation Plan

The Gauteng Conservation Plan Version 3.3 (C-Plan 3.3) (October 2011) a component of the Gauteng Department of Agriculture and Rural Development (GDARD).

The main purposes of C-Plan 3.3 are:

- to serve as the primary decision support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process;
- to inform protected area expansion and biodiversity stewardship programmes in the province;
- to serve as a basis for development of Bioregional Plans in municipalities within the province.

The C-Plan 3.3 identifies four main categories for conservation priority. The categories are:

1. *Protected areas*
2. *Irreplaceable*
3. *Important*
4. *Ecological Support*

According to the C-Plan 3.3 parts of the site falls within “Ecological Support and Irreplaceable” categories (Figure 2.9). There are areas classified as “least concern” near the site (Lötter & Ferrar 2006).

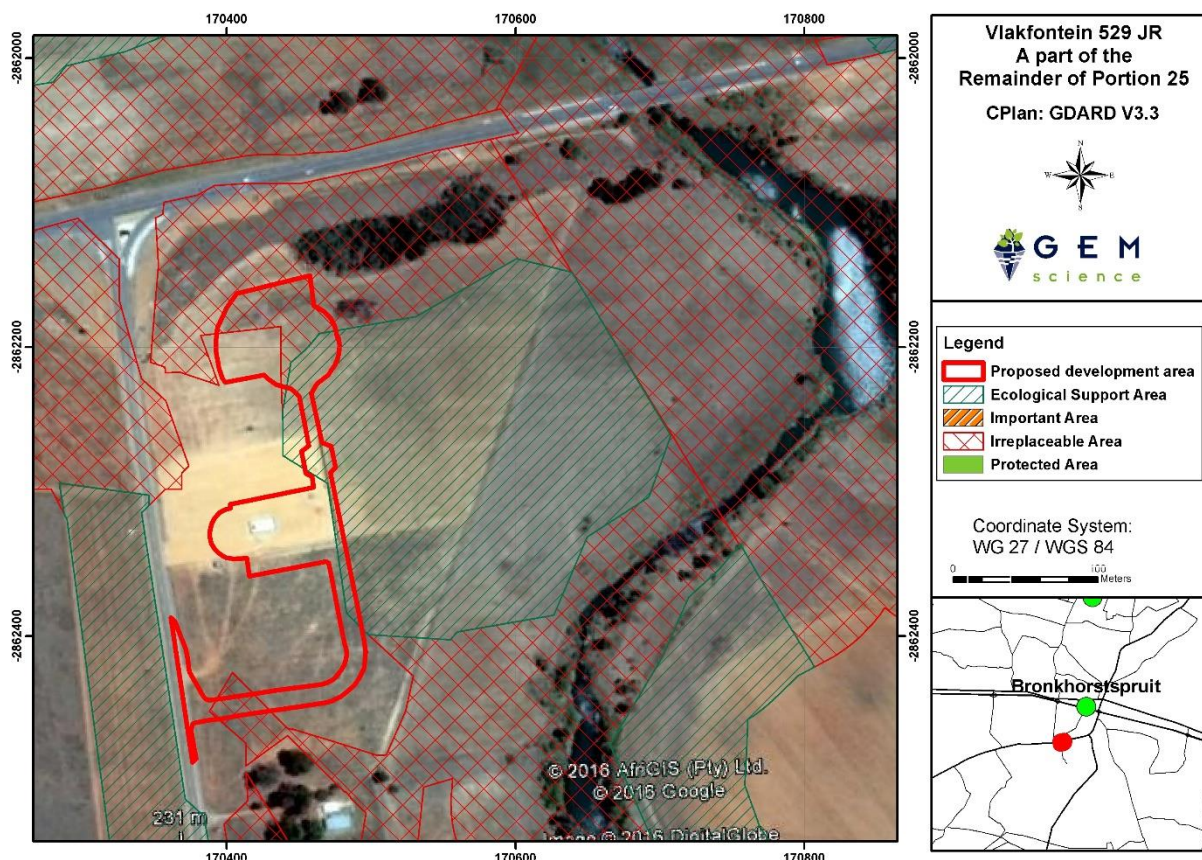


Figure 2.9 Conservation priority according to the GDARD C-Plan 3.3

2.2.2 **Fauna**

2.2.2.1 *Mammals*

Approximately 15 species could occur within the vicinity of the site. The expected mammalian richness within the site is relatively low and is best explained by the low variety of habitat types present and the grassland condition.

Species of concern that may occur within the site include:

- Rough-haired Golden Mole (*Chrysospalax villosus*) – Critically Endangered
- Makwassie Musk Shrew (*Crocidura maquassiensis*) – Vulnerable
- Welwitsch's Myotis (*Myotis welwitschii*) – Near Threatened

2.2.2.2 *Amphibians*

Thirteen taxa could occur within the site or surrounding area of the site. A list of frog species that may occur within the vicinity of the site was sourced from the Frog Atlas (Animal Demography Unit 2016) for the 2528DC grid (Annexure 3).

Species of concern that may occur within the vicinity of the site include:

- Giant Bull Frog – Near Threatened

2.2.2.3 *Reptiles*

Fifteen taxa could occur within the site (Annexure 4) (Animal Demography Unit 2016; South African Reptile Conservation Assessment (SARCA) 2014).

The expected richness represents an underestimation of the reptile diversity likely to occur. Therefore, it is highly possible that many more species could exist within the vicinity of the site although current spatial data is lacking in this regard.

All the species listed in Annexure 4 are currently classified as Least Concern.

2.2.2.4 Birds

According to the South African Bird Atlas Project (SABAP2 2016), a total of 306 bird species might occur in the vicinity of the site.

Thirteen bird species of concern may occur within the site (Table 2.4) according to SABAP1.

Table 2.1 Bird species of concern that may occur within the vicinity of study area (SABAP1)

Common name	Conservation Status
Black Stork	Near Threatened
Greater Flamingo	Near Threatened
Lesser Flamingo	Near Threatened
Secretary Bird	Near Threatened
African Marsh-Harrier	Vulnerable
Lesser Kestrel	Vulnerable
Wattled Crane	Critical
Blue Crane	Vulnerable
White-bellied Korhaan	Vulnerable
Blue Korhaan	Near Threatened
Greater Painted-snipe	Near Threatened
Caspian Tern	Near Threatened
African Grass-Owl	Vulnerable

2.2.3 Conservation areas

The Bronkhorstpruit Nature Reserve is approximately 4km south west of the site.

2.2.4 Wetlands

Wetlands are extremely important habitats but are extremely threatened and impacted upon. According to the data used for the FEPA maps there are both natural and artificial wetlands surrounding the site (Figure 2.10). There are no dams of natural wetlands within the site.

2.2.5 Ecological sensitivity

The ecological sensitivity of the area is discussed further on in this report.

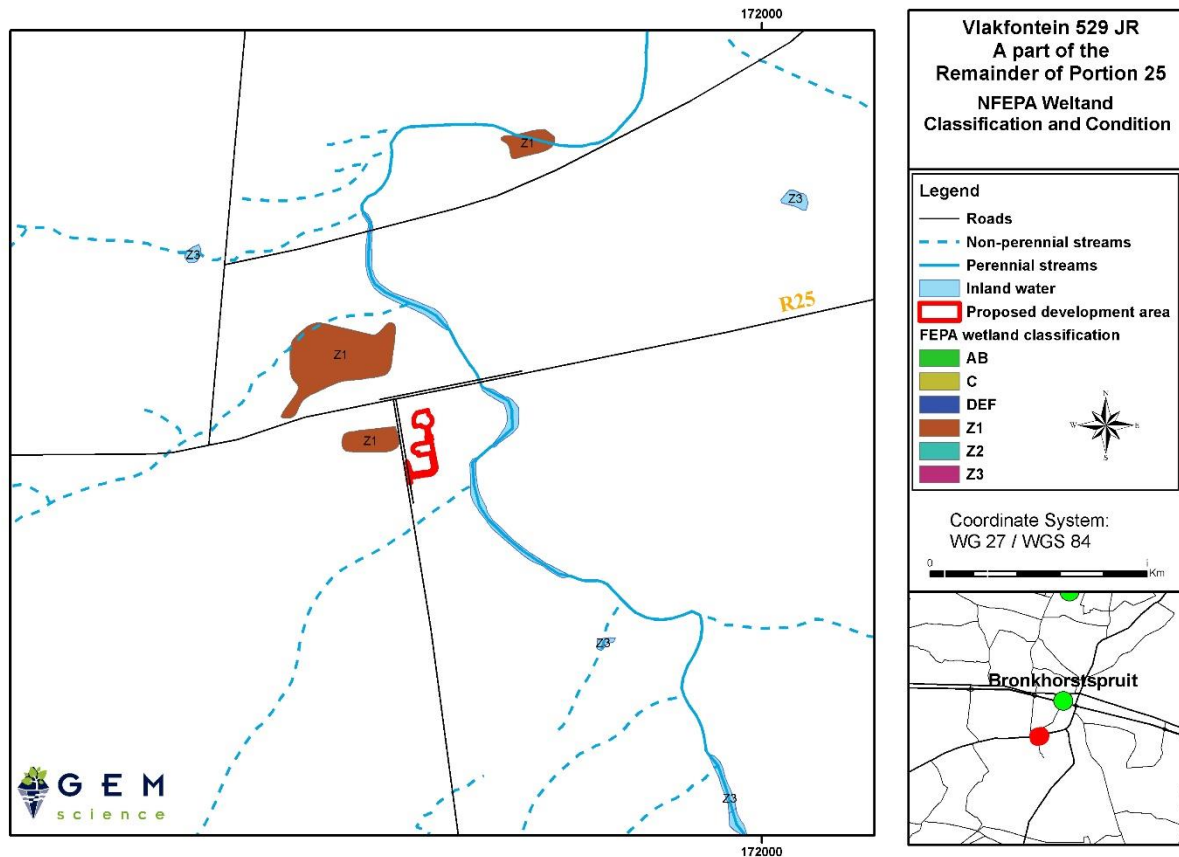


Figure 2.10 Classification and condition of wetlands within and surrounding the study area

3 Methods

A literature review was done sourcing information from various internet websites, publications and books.

The site was visited on 24 August by Stephan Veldsman (Pr.Sci.Nat; MSc Plant Ecology, UP).

3.1 Faunal assessment

Mammals were identified through visual sightings in the field, along with identification of animal tracks, droppings, and likely habitat sights.

Amphibian and Reptiles were identified through visual sightings in the field, along with identification of likely habitat sights.

Birds were identified from visual sightings and verified using several identification books. The bird data were collected by means of point counts. During each point count, the number of bird species was recorded, including their abundance. Each point count lasted approximately 10 minutes.

3.2 Vegetation assessment

Prior to the site visit the vegetation was delineated into homogenous units on a recent aerial photograph, this was included in the desktop survey. At several sites within each homogeneous unit a description of the dominant and characteristic species was made. These descriptions were based on total floristic composition, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978). During the flora survey a species list was compiled. The term plant species refers to trees, shrubs, grasses and forbs/herbs. Comprehensive species lists were therefore derived for each plant community / ecosystem present on the site. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al.* 2000) and are considered to be an efficient method of describing vegetation and capturing species information. Any other features that might have an ecological influence were noted during the site visit.

The identified systems are not only described in terms of their plant species composition, but also evaluated in terms of the potential habitat for red data plant species.

A species list from POSA (<http://posa.sanbi.org>, August 2016, Grid reference: 2528DC) containing the species that might occur in the area are listed in Appendix A. Red data species with updated threatened status according to the book Red list of South African Plants 2009 published by SANBI in *Strelitzia* 25 (Raimondo *et al.* 2009). These lists were then evaluated in terms of habitat available on the site, and also in terms of the present development and presence of man in the area.

Alien invasive species, according to the Conservation of Agricultural Resources Act (Act No.43 of 1983) as listed in Henderson (2001), are indicated. Medicinal plants are indicated according to Van Wyk and Van Oudtshoorn & Gericke (1997)

Plant species recorded in each plant community with an indication of the status of the species by using the following symbols:

A = Alien woody species

W = Weed

G = Planted in Garden (Garden Escape)

P = Protected trees species

D = Dominant

d = subdominant

M = Medicinal plant species

p = Provincial protected species

RD = Red data listed plant

3.3 Conservation Priority

The following **conservation priority** categories were used for each plant community (Bredenkamp 2010):

- **High:** Ecologically sensitive and valuable land with high species richness and/or sensitive ecosystems that should be conserved and no development should be allowed.
- **Medium-high:** Land where smaller sections are disturbed but which is in general ecologically sensitive to development/disturbances.
- **Medium:** Land that should be conserved but on which low impact development could be considered under exceptional circumstances.
- **Medium-low:** Land of which small sections could be considered to conserve but where the area in general has little conservation value.
- **Low:** Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation.

3.4 Sensitivity

According to the GDARD (2009) minimum requirement only High and Low sensitivity must be indicated. No development will be allowed on High sensitive areas.

In terms of sensitivity the following criteria applies:

- **High:** High and Medium-High conservation priority categories mentioned above are considered to have a High sensitivity and development should not be supported.
- **Low:** Medium, Medium-Low and Low conservation priority categories mentioned above are considered to have a Low sensitivity and development may be supported. Portions of vegetation with a Medium conservation priority should be conserved.

Sensitivity mapping was done based on the conservation priority and sensitivity value. Areas with a high sensitive value are mapped with a 30 m buffer.

3.5 Species Richness

Four different categories of species richness have been identified namely low, medium, high and very high. Species richness was interpreted as the number of indigenous species recorded in the sample plots representing the plant community. Alien woody species and weeds were not included in the calculation of species richness. The categories were assigned as follows:

- A low level of species richness is allocated to communities which contain one to twenty four indigenous species.
- Medium level of species richness is allocated to communities which contain more than twenty five but less than forty indigenous species.

- High allocated to communities which contain more than forty but less than sixty indigenous species
- Very high, is allocated only to communities which contain more than sixty indigenous species (Bredenkamp & Kemp 2010)

3.6 Wetland vegetation delineation

In order to determine the existence and extent of a wetland in the proposed site the legal framework on what classifies as a wetland should be applied. The NWA (Act 36 of 1998) includes a wetland in the definition of a watercourse. A watercourse is:

- *“a river or spring;*
- *a natural channel in which water flows regularly or intermittently;*
- *a wetland, lake or dam into which, or from which, water flows, and*
- *any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.”*

A wetland is then further defined by the NWA as *“land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil”*.

Based on the above definition DWAF, now the DWA, published a set of guidelines describing field indicators and methods for determining whether an area is a wetland or riparian area, and for finding its boundaries (DWAF 2005). These guidelines state that wetlands must have one or more of the following attributes:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation;
- The presence, at least occasionally, of water loving plants (hydrophytes); and
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50cm of the soil.

Use was made of 1:50 000 topographical maps and aerial photography to create digital base maps of the study area onto which the wetland boundaries could be delineated using ArcMap 10. A

desktop delineation of suspected wetland areas was undertaken by identifying rivers and wetness signatures on the digital base maps. All identified areas suspected to be wetlands were then further investigated in the field.

The wetland areas were identified and delineated by using Vegetation Indicators.

4 Results

4.1 Vegetation Classification and habitat types

The Vlakfontein study area is situated within an area in which anthropogenic disturbance. The vegetation classification can primarily be attributed to the level of anthropogenic disturbance ranging from high to low. Other abiotic factors also contribute to the classification but disturbance is the main underlying driving force of the vegetation classification. The cleared area is not classed along with the plant communities. The first level of division separated the alien bush area from the rest of the plant communities. Secondly the wetland area was split from the rest of the plant communities. The third and fourth levels of division separated the grassland communities (Table 4.1).

Table 4.1 Plant communities present and their sensitivity level

Plant communities	Sensitivity
1. Cleared area	Low
2. Alien bush area	Low
3. <i>Cynodon dactylon</i> - <i>Pogonarthria squarrosa</i> disturbed grassland	Low
4. <i>Eragrostis plana</i> - <i>Seriphium plumosum</i> disturbed grassland	Low
5. <i>Aristida congesta</i> – <i>Perotis patens</i> disturbed grassland	Low
6. Disturbed wetland area	Low
<i>Stream</i>	High

The plant communities were mapped (Figure 4.1). Each plant community was then assigned a conservation priority value and a sensitivity value based on their floristic composition as well as ecological significance. Figures 4.2 and 4.3 illustrate the conservation priority as well as sensitivity values of the area.

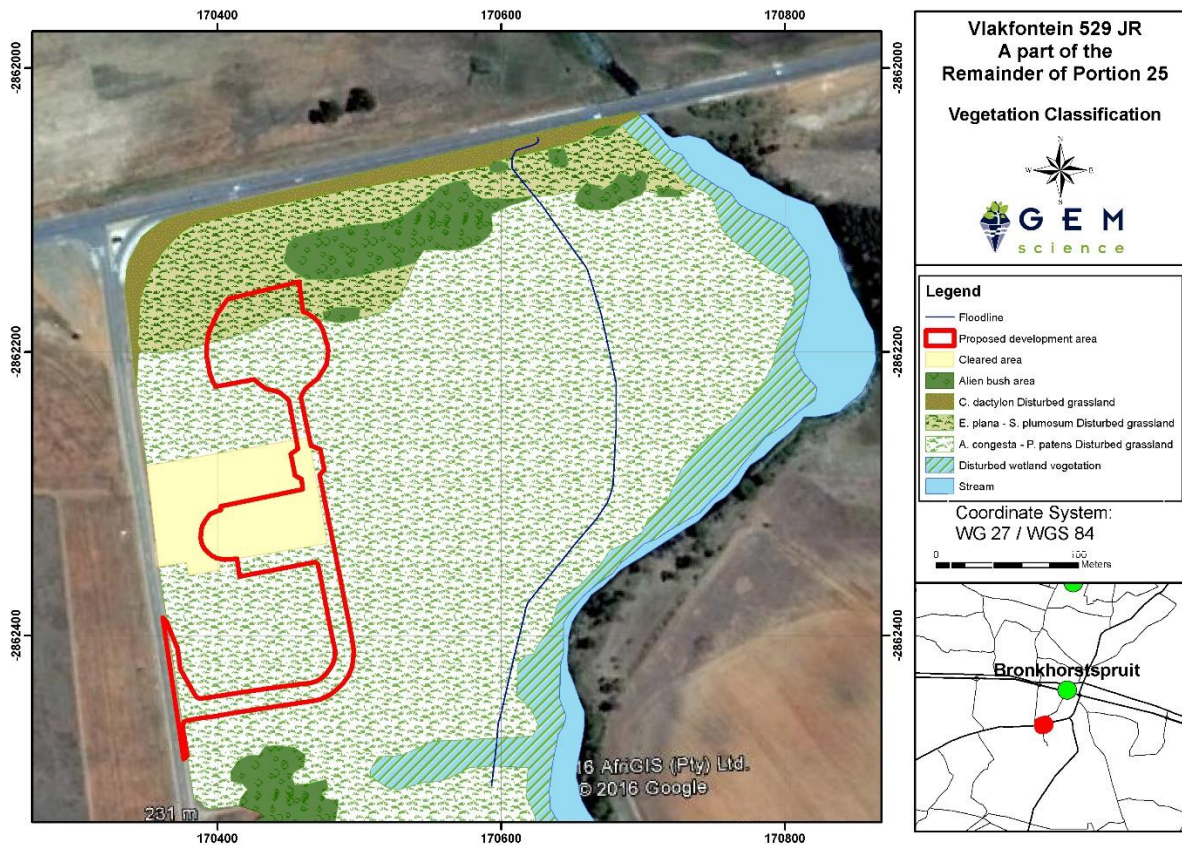


Figure 4.1 Map of delineated vegetation communities of the study area

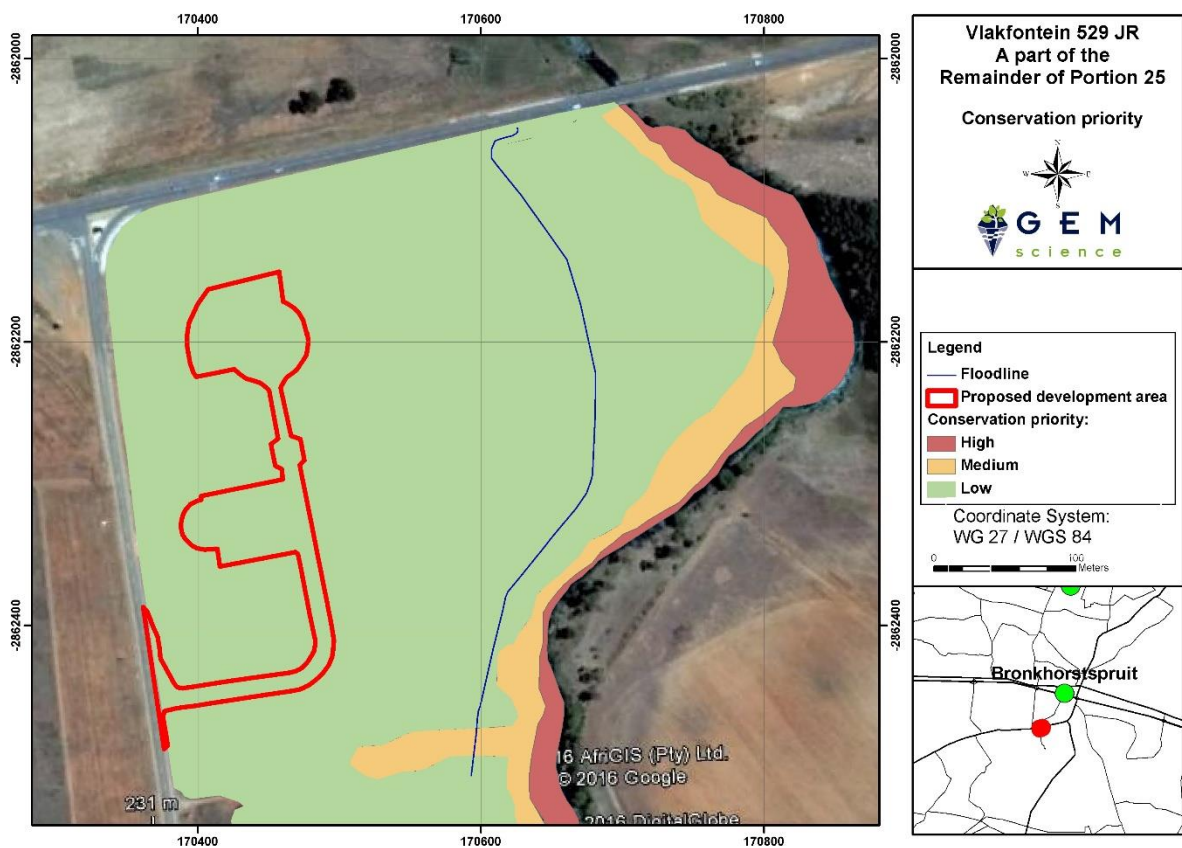


Figure 4.2 Conservation priority of the study area

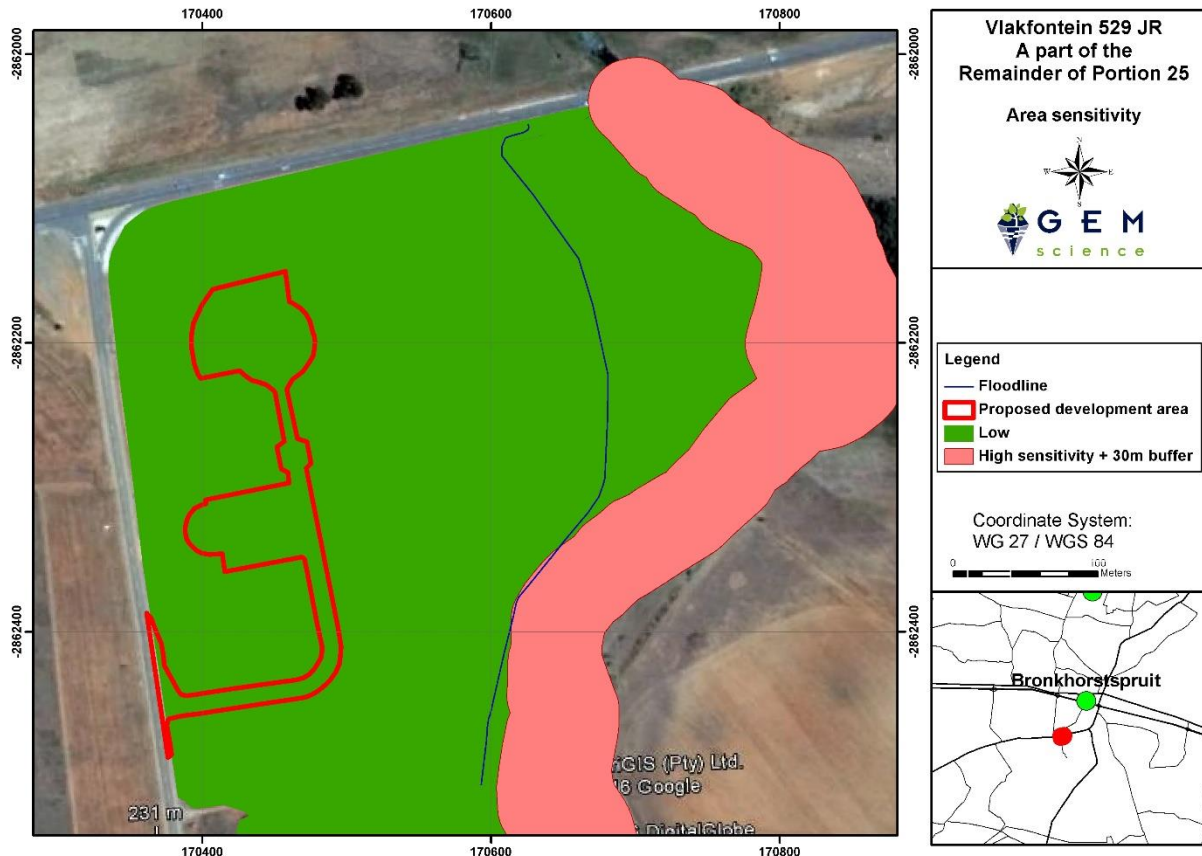


Figure 4.3 Sensitivity map of the study area

4.2 Description of the plant communities

Each plant community is described in terms of dominant species, diagnostic species, vegetation structure, floristic composition as well as conservation priority and sensitivity value.

4.2.1 *Eragrostis plana* - *Seriphium plumosum* disturbed grassland

The *Eragrostis plana* - *Seriphium plumosum* disturbed grassland vegetation community show a medium to high level of anthropogenic disturbance. It covers a small portion in the northern area of the site. Over-grazing and bush encroachment might have been the main influence on this community. The dominant species is *Eragrostis plana* and the subdominant species include *Eragrostis curvula* and *Seriphium plumosum* (Figure 4.4 and Table 4.2). The grass layer is the dominant layer in this plant community (Table 4.3). The plant community has a low species richness containing only **seven** indigenous plant species. The plant community has been assigned a low conservation priority and a low sensitivity.

Table 4-2 Floristic composition of plant community two

Forbs and Shrubs		Grasses	
Species Name	Status	Species Name	Status
<i>Seriphium plumosum</i>	d	<i>Eragrostis plana</i>	
		<i>Cynodon dactylon</i>	D
		<i>Eragrostis curvula</i>	d
<i>Tagetes minuta</i>	W	<i>Aristida congesta</i>	
<i>Senecio</i> sp.	W	<i>Schizachyrium sanguineum</i>	
<i>Asclepias fruticosa</i>	W		
<i>Conyza bonariensis</i>	W		
Trees			
Species Name	Status		
<i>Acacia mearnsii</i> (young plants)	A		

Table 4-3 Vegetative description of plant community one

1. <i>Eragrostis plana</i> - <i>Seriphium plumosum</i> disturbed grassland				Vegetation structure		
Status	Secondary vegetation			Layer	Height (m)	Cover (%)
Soil	Sandy	Rockiness	0%	Trees	1.5	2
Conservation priority:	Low	Sensitivity:	Low	Shrubs	0.3	10
Agricultural potential:	Not evaluated	Need for rehabilitation	Not evaluated	Grass	0.3 – 1.0	60
Dominant spp.	<i>Eragrostis plana</i> , <i>Eragrostis curvula</i> and <i>Seriphium plumosum</i>			Forbs	0.5 – 1.2	10

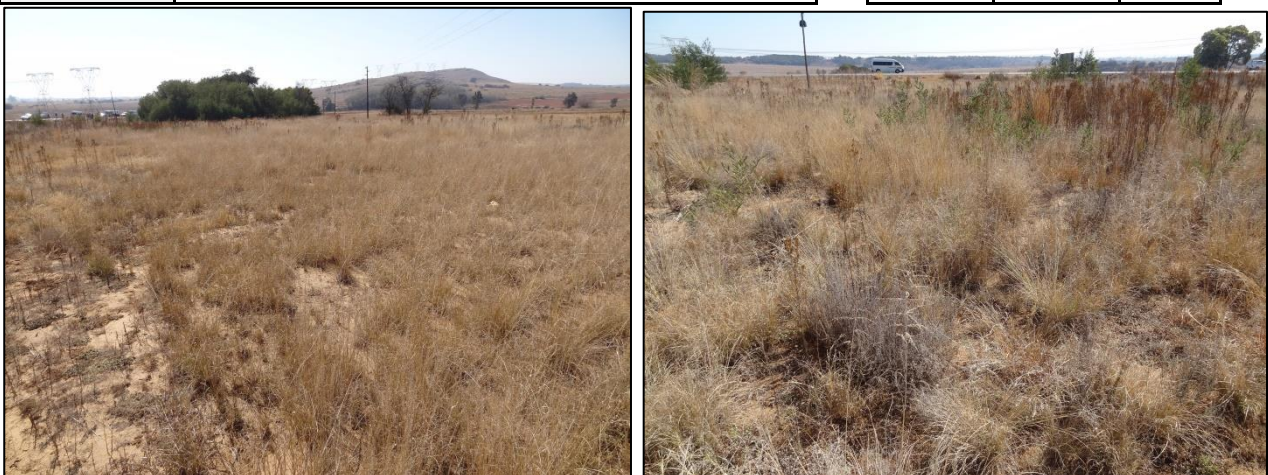


Figure 4.4 *Eragrostis plana* - *Seriphium plumosum* disturbed grassland

4.2.2 *Cynodon dactylon* - *Pogonarthria squarrosa* disturbed grassland

The *Cynodon dactylon* - *Pogonarthria squarrosa* disturbed grassland is found along the northern boundary outside of the fence within the road servitude. The area has been highly disturbed in the past (Figure 4.5). Dominant plant species include *Cynodon dactylon* and *Pogonarthria squarrosa* with subdominant plant species *Seriphium plumosum* and *Hypparrhenia hirta* (Table 4-4). The plant community has a low species richness with only **13** indigenous plant species. The grass layer is the dominant layer in this plant community (Table 4-5). The plant community has been assigned a low conservation priority and a low sensitivity (Figure 4.2 and Figure 4.3).

Table 4-4 Floristic composition of plant community two

Forbs and Shrubs		Grasses	
Species Name	Status	Species Name	Status
<i>Conyza bonariensis</i>	W	<i>Cynodon dactylon</i>	D
<i>Seriphium plumosum</i>	d	<i>Pogonarthria squarrosa</i>	D
<i>Indigofera</i> sp.		<i>Eragrostis plana</i>	
<i>Helichrysum</i> sp.		<i>Aristida congesta</i>	
		<i>Schizachyrium sanguineum</i>	
		<i>Hypparrhenia hirta</i>	d
		<i>Hyperthelia dissoluta</i>	
		<i>Eragrostis gummiflua</i>	
		<i>Pterotis patens</i>	
		<i>Melinis repens</i>	

Table 4-5 Vegetative description of plant community two

2. <i>Cynodon dactylon</i> - <i>Pogonarthria squarrosa</i> disturbed grassland				Vegetation structure		
Status	Secondary vegetation			Layer	Height (m)	Cover (%)
Soil	Sandy	Rockiness	1%	Trees	0	0
Conservation priority:	Low	Sensitivity:	Low	Shrubs	0.3	2
Agricultural potential:	Not evaluated	Need for rehabilitation	Not evaluated	Grass	0.5 - 2	65
Dominant spp.	<i>Cynodon dactylon</i> , <i>Pogonarthria squarrosa</i> , <i>Seriphium plumosum</i> , <i>Hypparrhenia hirta</i>			Forbs	0.5 – 1.0	5



Figure 4.5 *Cynodon dactylon* - *Pogonarthria squarrosa* disturbed grassland

4.2.3 *Aristida congesta* – *Perotis patens* disturbed grassland

The plant community has clear anthropogenic disturbance, seems to be overgrazed or highly degraded over many years. This community makes out most of the site. The dominant species is *Aristida congesta* and *Perotis patens* and subdominant species include *Cynodon dactylon* (Figure 4.5 and Table 4.6). In some areas small patches of *Imperata cylindrica* occur, this is only due to possible surface water (normal drainage) during wet seasons. Although this species is sometimes associated with wetlands, do they occur naturally in patches in grass dominated vegetation communities without having any reference to specific wetlands. Thus these patches will not be classified as wetlands as no wetland indicators were present. The grass layer is the dominant layer in this plant community (Table 4.7). The plant community has a low species richness containing only **seven** indigenous plant species. The plant community has been assigned a low conservation priority and a low sensitivity (Figure 4.2 and Figure 4.3).

Table 4-6 Floristic composition of plant community three

Forbs and Shrubs		Grasses	
Species Name	Status	Species Name	Status
<i>Indigofera</i> sp.		<i>Aristida congesta</i>	D
<i>Asclepias fruticosa</i>	W	<i>Pterotis patens</i>	D
		<i>Eragrostis gummiflua</i>	
		<i>Eragrostis curvula</i>	
		<i>Cynodon dactylon</i>	d
		<i>Eragrostis plana</i>	

Table 4-7 Vegetative description of plant community three

3. <i>Acacia mearnsii</i> – <i>Bidens pilosa</i> woodland			
Status	Secondary vegetation		
Soil	Sandy	Rockiness	0%
Conservation priority:	Low	Sensitivity:	Low
Agricultural potential:	Not evaluated	Need for rehabilitation	Not evaluated
Dominant spp.	<i>Aristida congesta</i> , <i>Perotis patens</i> , <i>Cynodon dactylon</i>		

Vegetation structure		
Layer	Height (m)	Cover (%)
Trees	0	0
Shrubs	0	0
Grass	1.5	55
Forbs	0.3-0.5	2



Figure 4.5 Photos indicating the overgrazed (disturbed grassland) vegetation community

4.2.4 Alien bush area

Small to large patches of alien tree species occur on the site. *Acacia mearnsii* is the dominant species in this plant community (Figure 4.5). The tree layer is the dominant layer in this plant

community (Table 4.9). The plant community has a low species richness. The plant community has been assigned a low conservation priority and a low sensitivity (Figure 4.2 and Figure 4.3).

Table 4-8 Floristic composition of plant community four

Trees	
Species Name	Status
<i>Acacia mearnsii</i>	D, A

Table 4-9 Vegetative description of plant community four

4. Alien bush area				Vegetation structure		
Status	Secondary vegetation			Layer	Height (m)	Cover (%)
Soil	Sandy	Rockiness	0%	Trees	2-10	85
Conservation priority:	Low	Sensitivity:	Low	Shrubs	0	0
Agricultural potential:	Not evaluated	Need for rehabilitation	Not evaluated	Grass	0	0
Dominant spp.	<i>Acacia mearnsii</i>			Forbs	0	0



Figure 4.6 Plant community four indicating the dominance of *Acacia mearnsii*

4.2.5 Disturbed wetland vegetation

The disturbed wetland area is only mapped and not described in detail, as it falls well outside the proposed development area (Figure 4.7). The area consists mainly of several grass species and enchrouched by alien vegetation. The stream banks also have been taken over by several alien plant species.



Figure 4.7 Disturbed wetland area

4.2.6 Cleared area

The block of cleared area seems to be used by trucks along with a diesel tank on site (Figure 8). No vegetation occur on this area.



Figure 4.8 Cleared area

4.3 Faunal assessment

4.3.1 *Mammals*

Species richness and composition

Approximately 15 species could occur within the vicinity of the site. Only three mammalian species were recorded: Yellow mongoose near the site, a mole species near the site (mainly recorded in the disturbed wetland area and possibly a rodent or mouse species (many holes were found on the site indicating their presence). The rodent or mouse is common to the area, as these specific holes and tracks were recorded all around the site on the neighbouring farms as well as it seems they prefer the loos sandy soil that occur widely across the area.

None of the species of concern were recorded on the site.

Very little signs of mammal movement were observed on the site, this might be due to the large disturbance and agricultural activities within the surrounding area of the site. The site is further fenced of in one area that can prevent movement of larger mammal species. The mammal richness and diversity on the study site is *relatively low* and is best explained by the low variety of habitat types present and the grassland condition.

Biodiversity value and ecological considerations

1. The study site is not capable of sustaining a high diversity of mammal taxa.
2. The area along the stream are important and can be used as dispersal corridors for foraging mammal taxa, and can provide essential foraging habitat for aquatic taxa (otters, marsh mongoose).

4.3.2 *Amphibians*

Species richness and composition

Of the 13 taxa that could occur within the site or surrounding area of the site was none recorded within the site. Several species are expected and likely to occur along the stream.

4.3.3 *Reptiles*

Of the 15 taxa that could occur within the site, none were recorded. It does not mean that some species might move through the site from time to time.

The expected richness represents an underestimation of the reptile diversity likely to occur. Therefore, it is highly possible that many more species could exist within the vicinity of the site although current spatial data is lacking in this regard.

4.3.4 *Avifauna*

Species richness and composition

According to the South African Bird Atlas Project (SABAP2 2016), a total of 306 bird species might occur in the vicinity of the site.

None of the bird species of concern were recorded during the site visit. However, five species were observed during the current survey which clearly shows that the area is poorly sampled when compared to the SABAP2 statistic. On a national scale, the species richness on the study site (and its immediate surroundings) is low.

Table 4.2 Bird species identified in the surrounding area during the site visit

Common name
Cape weaver
Cape trutle dove
Laughing dove
Cape wagtail
Levaillant's cristiclola

An analysis based on bird data generated from 5 point counts showed that all the birds identified confined themselves near the stream and not to the site. The site is too disturbed to host suitable habitats for birds to breed.

(Table 4.4 summarises the 12 typical species observed on the study site).

4.4 Ecological Importance of the study site (Figures 4.2 and Figure 4.3)

4.4.1 *Areas of high ecological importance and sensitivity*

The stream and directly adjacent area are important movement corridors for a variety of bird and mammal species. Therefore, these linear systems will assist animals moving across the landscape, thereby facilitating gene exchange among different populations of the same species. Nevertheless, they are important short-term (daily) foraging networks for bird taxa flying between their foraging and roosting grounds.

4.4.2 *Areas of medium ecological importance*

These areas are represented by the disturbed wetland area near and along the stream. However, their composite compositions are composed of widespread species and probably a limited number of specialized species. These units are therefore regarded as functional entities that contribute mainly to short-term faunal dispersal, hence included within the corridor area (high sensitivity area 30m buffer cover fall over this area).

4.4.3 *Areas of Low Ecological importance and sensitivity*

All of the identified grassland areas fall within this class.

- These areas are not considered to be pristine and occurred on areas where severe disturbances took place;
- Many of these areas have alien and invader taxa, thus contributing little towards local biodiversity; and
- The vegetation assemblages are at an advanced state of degradation and will seldom (if ever) revert back to that of a late-successional unit that typifies the regional vegetation types.

4.4.3.1 *Gauteng Conservation Plan*

According to the C-Plan 3.3 parts of the site falls within “Ecological Support and Irreplaceable” categories (Figure 2.9). There are areas classified as “least concern” near the site (Lötter & Ferrar 2006). During this survey it is found that the classification by GDARD is incorrect, hence changes are made to the map:

- The area along the stream previously fell within the “Irreplaceable Area” – due to the high disturbance, high alien vegetation encroachment and little endemic species it cannot be classified as “Irreplaceable”. However, it does have a high ecological function and is a valuable corridor, the area can be classified as: Ecological Support (Figure 4.9).
- The rest of the area previously classified as “Irreplaceable” is very disturbed with little ecological function: thus is not classified at all (Figure 4.9).
- The area previously classified as “Ecological Support” is very disturbed with little ecological function: thus is not classified at all (Figure 4.9).

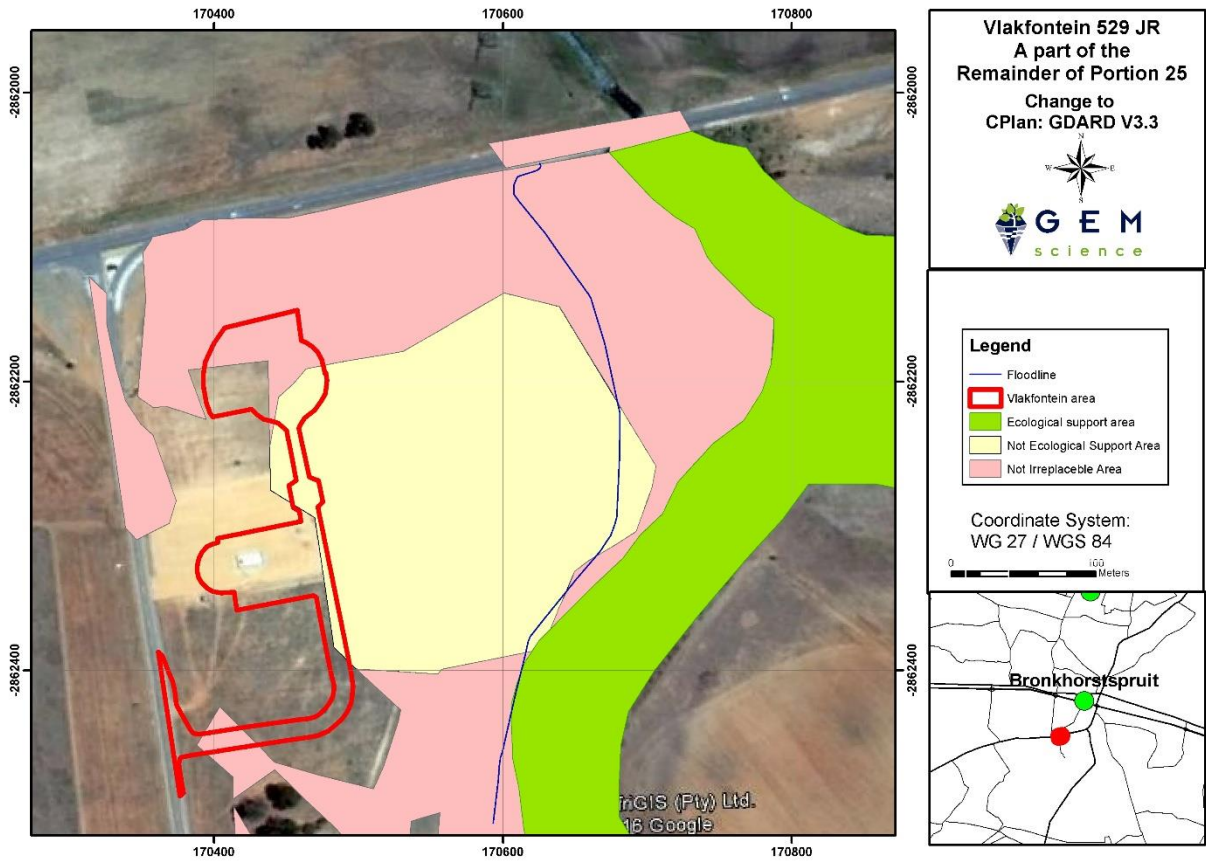


Figure 4.9 Changes to the C-Plan 3.3 of GDARD

5 Detailed description of potential impacts on the biodiversity and proposed mitigation measures

The area within the planned development area is highly disturbed and degraded, it is not expected that the proposed development will have an impact on the biodiversity within the proposed area.

The potential impacts for the construction have been identified with specific reference to the biodiversity.

The potential impacts were each described and assessed using the criteria drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism in terms of NEMA (Table 5.1).

Table 5.1 Explanation of impact assessment criteria

Probability		
<i>Provides a description of the likelihood / probability of the impact occurring</i>		
None:	N	The possibility of the impact occurring in none, due either to the circumstances, design or experience (0%).
Possible:	P	The possibility of the impact occurring is very low, due either to the circumstances, design or experience (25%).
Likely:	L	There is a possibility that the impact will occur to the extent that provisions must therefore be made (50%).
Highly likely:	H	It is most likely that the impacts will occur at some stage of the development and plans must be drawn up before carrying out the activity (75%).
Definite	D	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on (100%).
Extent		
<i>Describes the spatial scale over which the impact will be experienced</i>		
Footprint:	F	The impact area extends only as far as the activity which occurs within the total site area.
Site:	S	The impact could affect the whole site or a significant portion of the site.
Regional:	R	The impact could affect the area including the neighbouring farms, the transport route and/or the adjoining towns.
National:	N	The impact could have an effect that expands throughout the country.
International:	I	Where the impact has international ramifications that extend beyond the boundaries of the country.

Duration		
<i>The period over which the impact will be experienced</i>		
Temporary:	T	0 – 3 years (or confined to the construction period).
Short term:	S	3 – 10 years (or confined to the construction and part of the operational period).
Medium term:	M	10 – 15 years (or confined to the construction and whole operational period).
Long term:	L	For the whole life of mine (including closure and rehabilitation period).
Permanent:	P	Beyond the anticipated lifetime of the project.
Intensity		
<i>The degree / order of magnitude / severity to which the impact affects the health and welfare of humans and the environment</i>		
Insignificant:	I	Will have a no or very little impact on the health and welfare of humans and environment
Low:	L	Will have a slight impact on the health and welfare of humans and environment
Moderate:	M	Will have a moderate impact on the health and welfare of humans and environment
High:	H	Will have a significant impact on the health and welfare of humans and the environment
Very high/ don't know:	V	Will have a severe impact on the health and welfare of humans and the environment

5.1 Impacts on vegetation identified for the construction phase

During the construction phase, several activities exist that might have a detrimental effect on the vegetation present in the study area. The construction phase includes the planning and implementation phases. The impacts associated with these activities in particular on vegetation were identified as well as the probability, extent, duration and intensity of each impact (Table 5.2). Brief descriptions of each impact identified as well as possible mitigation measures are described.

Table 5.2 Activities and their impacts on the biodiversity of the study area during the construction phase**Construction phase**

Activity	Impact Component	Probability	Extent	Duration	Intensity
Clearing of area for construction	Loss of vegetation	D	S	P	L
	Increase in dust generation	D	R	T	L
	Loss of vegetation and seed banks due to oil and diesel spillages	P	S	T	M
	Loss of seedbank due to soil disturbance	D	S	P	M
	Increase in alien and invasive species	H	S	P	H
	Increased erosion	P	S	L	M
	Loss of suitable rodent/mice habitat	D	S	P	M

5.1.1 *Loss of vegetation*

Any activity in which vegetation clearing is inevitable leads to the loss of plant species and the vegetation structure along with small animals living in the area. During any construction works the vegetation is likely to be trampled by people and or machinery. Cement and other chemicals, diesel, petrol etc., can lead to the loss of vegetation as well. The following mitigation measures are proposed:

- Ensure that workers do not unnecessarily trample vegetation whilst constructing the fences, trenches, and or other infrastructure.
- Any areas which are marked with a high sensitivity value should be avoided and no unnecessary movement in these areas should occur.
- Cement should only be mixed in designated areas.
- Any spillages whether cement or diesel should be reported to the environmental officer on site, cleared immediately. An oil spill kit should be kept on site and used.
- The areas chosen for the construction of infrastructure should be the minimum reasonably required and that which will involve the least disturbance to vegetation.

5.1.2 *Increased surface water run-off and velocities*

Clearing of vegetation or loss of vegetation in return results in the increase in clear surfaces which leads to an increase in surface water run-off and velocities. The use of heavy machinery, concrete foundations, compacted ground and impermeable surfaces will result in an increase in hardened surfaces. Hardened surfaces reduce infiltration rates and increase runoff volumes and velocities.

Mitigation measures which can be implemented are:

- All areas, not directly within the footprint of the area, where soil has been compacted should be ripped to break up the compacted soil surface. This will aid infiltration and decrease runoff.
- Re-vegetation should take place immediately according to the re-vegetation plan. The species utilised for re-vegetation should be species from the surrounding area. These areas should be monitored to ensure the successful re-establishment of vegetation and to ensure that no erosion gullies form around the site.
- Where possible, storm water should be conveyed through grassed swales rather than concrete channels to aid infiltration and reduce runoff volumes.

5.1.3 *Increased erosion*

The clearing of vegetation will cause an increase in surface flow as well as velocity; which will in turn result in erosion especially in periods of high rainfall. The increase in erosion and dust generation can result in increased sediment loads.

Proposed mitigation measures to decrease the impact of erosion are:

- Initiate catchment management to control and reduce erosive runoff containing suspended sediment.
- Immediate re-vegetation of all bare soil areas should be undertaken. The species utilised for re-vegetation should be determined by a suitably qualified specialist. These areas should be monitored to ensure the successful re-establishment of vegetation and to ensure that no erosion gullies form.
- Adequate drainage and erosion protection in the form of berms, contour humps and cut-offs should be provided where necessary.
- All infrastructure should be confined to the areas demarcated for such and no infrastructure should be permitted in areas not correctly prepared.

5.1.4 *Increase in dust generation*

Almost all activities of the construction phase will contribute to dust generation. Dust could have a negative impact on the surrounding biodiversity. Crops of surrounding farmers, remaining vegetation on site as well as surrounding “natural vegetation” will be affected. It is also likely that the vegetation as a result of excess dusts will become less palatable for wild or farm animals. Dust can be more of a nuisance factor to humans – not discussed in this report.

Mitigation measures proposed for decreasing the impact of dust on vegetation:

- The liberation of dust into the atmosphere should be controlled by spraying water or other non-toxic dust allaying agents or a suitable, tested polymere on a daily basis, where necessary.
- Dust and air quality monitoring should be conducted throughout construction. Dust suppression measures should be re-evaluated to ensure that dust suppression is effective.

5.1.5 *Loss of vegetation and seed banks due to oil and diesel spillages*

Oil and diesel spillages may occur during the construction phase which can contaminate soil and surface water. Other potential contaminants (e.g. from chemical toilets, domestic waste, fuel depots, storage facilities, etc.) can reduce surface water quality. The soil seed bank may become infertile and above ground vegetation may be lost if the above mentioned spillages occur.

Spillages of contaminants can also cause the fertility of the soil to decrease which will in return negatively affect the vegetation and seed bank. In this case prevention is better than cure. During the construction phase a number of wastes will be produced including sewerage, garbage, wash-water, used oils and grease, diesel or lubricant spills, etc. Wastes generally contain pollutants and present a potential risk to the water and surrounding environment if not managed effectively.

Possible mitigation measures to prevent loss of vegetation and seed banks due to oil and diesel spillages are:

- Proper handling and storage practices, as well as readily available oil-spill kits should minimise the risks associated with such spills.
- Spills should be cleaned up immediately by removing the spills together with the polluted soil and disposing thereof at a registered facility.
- Ensure that the diesel tanks are properly installed by a qualified person.
- Ensure that proper measures are in place to contain any oil and diesel leakages or spills.
- The storage area should be securely fenced and all hazardous substances and stocks such as diesel, oils, detergents, etc. should be stored therein. Drip pans, a thin concrete slab or a PVC lining should be installed in such storage areas/buildings viz. bunding area.
- Suitable covered containers should be provided and conveniently placed for waste disposal. All used oils, grease or hydraulic fluid should be placed therein and these containers should be removed from the site on a regular basis for disposal at a registered facility.

In order to mitigate the effect of the waste other than diesel and oil the following mitigation measures are suggested:

- The environmental control officer should be responsible for the development of systems and waste management procedures and the auditing of the implementation of these procedures. All employees and contractors should be trained on waste management procedures.
- Suitable areas should be designated for maintenance and the storage of waste as well as other equipment. Suitable management measures must be implemented in these designated areas.
- Prevent water containing waste or any other substance which causes or is likely to cause pollution of the surface water from entering any natural drainage line or watercourse.
- Retain or collect wastes or water containing waste for use, reuse, evaporation, or for purification and disposal in terms of the National Water Act.

- Biodegradable and Non-biodegradable refuse should be stored in containers at a collecting point and collected on a regular basis and disposed of at a registered disposal facility.
- Suitable covered containers should be provided and conveniently placed for waste disposal. All used oils, grease or hydraulic fluid should be placed therein and these containers should be removed from the site on a regular basis for disposal at a registered facility.
- A waste skip should be placed within the footprint of the mine area and will be used for the collection of domestic waste which will be disposed of offsite at a registered facility.
- Avoid using toxic chemicals as there are other safer alternatives.
- Cement and concrete should be mixed in a designated area.
- Only domestic type water should be allowed to enter the chemical drain system and any effluents containing oil, grease or other industrial substances should be collected in a suitable container and removed from the site, either for resale or for appropriate disposal at a registered facility.
- Spills should be cleaned up immediately by removing the spills together with the polluted soil and disposing thereof at a registered facility.
- Do not place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource.

5.1.6 *Increase in alien and invasive species*

During the construction phase there will be numerous major disturbance events. Disturbance events lead to the destruction of the internal competition between the originally occurring plant species. Because of the removal of these plant species when the roads are cleared of vegetation a window of opportunity exist for alien and invasive species to enter the ecosystem and successfully establish themselves. The construction vehicles will also ensure that seeds from other sites be transported to the study area from areas where construction materials are obtained. Construction workers clothes and shoes can also transport seeds from other sites to the study area. Although this might seem negligible it is important to identify all the possible and to realise all of the implications of the sudden influx of workers as well as vehicles so that these can be mitigated accordingly.

The following mitigation measures are suggested to minimalize the impact of the increase of alien and invasive species:

- Methods for the control of alien and invasive species include:

- Mechanical control methods. The removal of species by hand or with appropriate tools, instruments and machines.
- Chemical control methods. The optimal use of herbicides to control target species.
- Biological control. This involves the intentional use of populations of natural enemies of the target alien or invasive species or other methods that adversely affect the biological integrity of the target species.
- Habitat management uses measures such as prescribed burning, grazing and other activities.
- Integrated pest management (IPM). IPM involves a combination of methods above based on ecological research regular monitoring and careful co-ordination (WESSA – KZN, 2008).
- The best mitigation measure for alien and invasive species is the early detection and eradication of these species which will be ensured with the use of a monitoring programme.
- The environmental officer on site will have to establish a monitoring program. The monitoring program should also be implemented to enforce continual eradication of alien and invasive species. A suggested method of establishing a continual eradication program is:
 - The extent of the problem should be assessed and a clearing plan should be established.
 - Resources and funds should be allocated to rehabilitate the areas in which alien and invasive species have been removed in order to prevent further destruction to the ecosystem.
 - Decide where control should start and how much you can cope with.
 - Remove weeds in the least affected areas and work outwards the heavier weed infestations thus rapidly safeguarding relatively large areas.
 - Identify areas where vigorous indigenous bush meets weedy areas and carefully work outwards from the “Goodies” to the “Baddies”.
 - Remove weeds carefully and try to cover exposed soil with cut vegetation or leaf litter that is free of weeds, seeds and that will not regrow if in contact with the soil.

- Press any loosened soil down lightly taking care not to damage native plants and mulch with plant material where possible. This will help stop alien weeds from filling gaps left by weeding.
- Wherever possible try to prevent weeds from producing seeds or fruit by controlling before they flower.
- Do not transport seeds, fruits, bulbs, tuber or stems that root easily away from the areas. It is advisable to burn the pieces “on site” if at all possible.
- Often the most time/cost effective way of dealing with heavy infestations is to arrange for the correct use of herbicides e.g. use a spot spray or foliar spray correctly applied to the target plants, thus ensuring minimum soil disturbance and so reducing the chance of invader seeds germinating in the “seed bed” created by “weeding”. In other instances, slash the plant down and return in a few months to foliar spray the re-growth e.g. reeds. Paint or spray the cut stumps of the larger and more difficult plants. Paint the lower stem or frill without disturbing the plant of really “difficult to kill” species like *Lantana camara* (WESSA – KZN, 2008).
- Follow up control is essential and it requires a regular monitoring programme done on a regular basis to ensure early detection and removal of alien seedlings until the viable invasive seed bank is exhausted and indigenous plants once again are naturally re-established (WESSA – KZN, 2008).
- The ultimate goal in the control and eradication of alien invasive plants must be the restoration and rehabilitation of the land. Once time money and effort have been spent on the control and eradication strategies the next step must be the restoration of the area (WESSA – KZN, 2008).

5.1.7 *Loss of fauna species*

During the construction phase, there might be a loss of fauna species, especially the area of disturbance. The following mitigation measures are suggested:

- All mitigation measures pertaining to “increased ambient noise levels” must be adhered to.
- Any form of hunting, poaching, snaring and trapping in the surrounding area must be discouraged.
- Ensure that all machinery used is maintained and in good working condition.
- Muffles for soundproofing of the machinery must be used at the mine, where possible.
- The fence surrounding the proposed area must be checked regularly to ensure that no animal is trapped in it or inside the area.

- Relocation of those faunal species which may be captured must be considered whenever possible.

5.1.8 ***Deterioration of water quality due to the release of storm water and subsequent loss of vegetation***

Storm water management planning is crucial for the development and should apply for the entire life cycle of the development and over different hydrological cycles (rainfall patterns). The deterioration of surface water may lead to the contamination of soil and subsequently the loss of plants. The following mitigation measures are suggested for storm water management to be implemented.

- Detailed catchment hydrological modelling is required to define runoff characteristics, model extreme event discharge and design storm water management facilities.
- Clean water (e.g. rainwater) must be kept clean and be routed to a natural watercourse by a system separate from the dirty water system.
- Dirty water must be collected and contained in a system separate from the clean water system. Dirty water must be prevented from running or spilling into clean water systems.
- Do not discharge water unless treated to the standard prescribed and the relevant licences for the Department of Water Affairs.

6 Conclusion

Six main plant communities were identified, one of which was assigned a medium sensitivity value. The overall area has been disturbed and degraded in the past. No vegetation or fauna of major importance (red data species) were identified on the site.

The classification leads to the identification of six major areas. The vegetation classification can primarily be attributed to the level of anthropogenic disturbance ranging from high to low. All the grassland areas are very disturbed and hosts very few species. The stream and directly surrounding area were found to be an important ecosystem, while the rest of the plant communities have a low sensitivity value.

No important vegetation or fauna species were recorded on the site.

It is suggested that even in the event that the development does not commence on the study area, the eradication of exotic trees, alien and invasive species, a decrease in the grazing pressure, better veld management as well as the general rehabilitation of the study area should be conducted.

7 Limitations

The site visit was conducted in August 2016. Although several grass and herb species could be identified, several grasses present could not be identified. The floristic list provided is an accurate account of the plant observed during the plant survey that could be identified at the points visited therefore it is more than likely that the floristic list does not include all of the species that could occur on the study area.

In order to obtain a comprehensive understanding of the dynamics of the vegetative communities in the project area, ecological assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints such long-term studies were not feasible.

8 Assumptions

It is assumed that due to the high level of disturbance already visible, that no species of major importance would occur on the site, even if the survey is conducted in different seasons.

It is therefore not necessary to redo a biodiversity assessment in more seasons.

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Annexure 1: According to POSA (2016) there are 200 plant species that may occur in or around the site (2528DC grid). There are no red data listed species that occur within the grid according to POSA.

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
ACANTHACEAE		<i>Crossandra greenstockii</i> S.Moore	LC	No	Perennial	Dwarf shrub, herb
ACANTHACEAE		<i>Justicia anagalloides</i> (Nees) T.Anderson	LC	No	Perennial	Herb
ACANTHACEAE		<i>Thunbergia atriplicifolia</i> E.Mey. ex Nees	LC	No	Perennial	Dwarf shrub, herb
ACAROSPORACEAE		<i>Acarospora tenuis</i> H.Magn.		No	[No lifecycle defined]	Lichen
ALLIACEAE		<i>Tulbaghia acutiloba</i> Harv.	LC	No	Perennial	Herb
AMARANTHACEAE	*	<i>Gomphrena globosa</i> L.	Not Evaluated	No	Annual	Herb
AMARYLLIDACEAE		<i>Haemanthus humilis</i> Jacq. subsp. <i>humilis</i>	LC	No	Perennial	Geophyte
AMARYLLIDACEAE		<i>Nerine rehmannii</i> (Baker) L.Bolus	LC	No	Perennial	Geophyte
ANACARDIACEAE		<i>Searsia gracillima</i> (Engl.) Moffett var. <i>glaberrima</i> (Schönland) Moffett	LC	No	Perennial	Dwarf shrub
ANTHERICACEAE		<i>Chlorophytum fasciculatum</i> (Baker) Kativu	LC	No	Perennial	Herb
ANTHERICACEAE		<i>Chlorophytum recurvifolium</i> (Baker) C.Archer & Kativu	LC	No	Perennial	Herb
APIACEAE		<i>Conium chaerophylloides</i> (Thunb.) Sond.	LC	No	Biennial	Herb
APOCYNACEAE		<i>Ancylobotrys capensis</i> (Oliv.) Pichon	LC	No	Perennial	Climber, shrub
APOCYNACEAE		<i>Asclepias aurea</i> (Schltr.) Schltr.	LC	No	Perennial	Herb
APOCYNACEAE		<i>Asclepias gibba</i> (E.Mey.) Schltr. var. <i>gibba</i>	LC	No	Perennial	Herb
APOCYNACEAE		<i>Aspidoglossum restioides</i> (Schltr.) Kupicha	LC	No	Perennial	Herb, succulent
APOCYNACEAE		<i>Brachystelma burchellii</i> (Decne.) Peckover var. <i>grandiflorum</i> (N.E.Br.) Meve	LC	No	Perennial	Geophyte
APOCYNACEAE		<i>Brachystelma oianthum</i> Schltr.	LC	No	Perennial	Geophyte, succulent
APOCYNACEAE		<i>Brachystelma rubellum</i> (E.Mey.) Peckover	LC	No	Perennial	Geophyte, succulent
APOCYNACEAE		<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>fruticosus</i>	LC	No	Annual (occ. perennial)	Herb, shrub
APOCYNACEAE		<i>Pachycarpus schinzianus</i> (Schltr.) N.E.Br.	LC	No	Perennial	Herb, succulent

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
APOCYNACEAE		<i>Pentarrhinum insipidum</i> E.Mey.	LC	No	Perennial	Climber
APOCYNACEAE		<i>Raphionacme velutina</i> Schltr.	LC	No	Perennial	Geophyte, herb, succulent
APOCYNACEAE		<i>Xysmalobium undulatum</i> (L.) Aiton f. var. <i>ensifolium</i> Burch. ex Scott-Elliot	LC	No	Perennial	Herb, succulent
APOCYNACEAE		<i>Xysmalobium undulatum</i> (L.) Aiton f. var. <i>undulatum</i>	LC	No	Perennial	Herb, succulent
APONOGETONACEAE		<i>Aponogeton junceus</i> Lehm.	LC	No	Perennial	Geophyte, herb, hydrophyte, tenagophyte
APONOGETONACEAE		<i>Aponogeton natalensis</i> Oliv.	LC	No	Perennial	Epihydate, geophyte, herb, hydrophyte, hyperhydate
APONOGETONACEAE		<i>Aponogeton stuhlmannii</i> Engl.	LC	No	Perennial	Epihydate, geophyte, herb, hydrophyte, hyperhydate
ASPHODELACEAE		<i>Bulbine abyssinica</i> A.Rich.	LC	No	Perennial	Geophyte, herb, succulent
ASPHODELACEAE		<i>Bulbine capitata</i> Poelln.	LC	No	Perennial	Geophyte, herb, succulent
ASPHODELACEAE		<i>Kniphofia ensifolia</i> Baker subsp. <i>ensifolia</i>	LC	No	Perennial	Herb
ASPHODELACEAE		<i>Kniphofia porphyrantha</i> Baker	LC	No	Perennial	Herb
ASPHODELACEAE		<i>Trachyandra saltii</i> (Baker) Oberm. var. <i>saltii</i>	LC	No	Perennial	Geophyte, succulent
ASPLENIACEAE		<i>Asplenium capense</i> (Kunze) Bir, Fraser-Jenk. & Lovis	LC	No	[No lifecycle defined]	[No lifeform defined]
ASTERACEAE	*	<i>Acanthospermum australe</i> (Loefl.) Kuntze	Not Evaluated	No	Annual (occ. perennial)	Herb
ASTERACEAE		<i>Berkheya radula</i> (Harv.) De Wild.	LC	No	Perennial	Herb
ASTERACEAE	*	<i>Conyza canadensis</i> (L.) Cronquist	Not Evaluated	No	Annual	Herb
ASTERACEAE		<i>Conyza obscura</i> DC.	LC	No	Perennial	Herb
ASTERACEAE		<i>Geigeria aspera</i> Harv. var. <i>aspera</i>	LC	No	Perennial	Herb
ASTERACEAE		<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>elata</i> Merxm.	LC	No	Perennial	Herb
ASTERACEAE		<i>Gerbera viridifolia</i> (DC.) Sch.Bip.	LC	No	Perennial	Herb
ASTERACEAE		<i>Gnaphalium filagopsis</i> Hilliard & B.L.Burtt	LC	No	Perennial	Herb
ASTERACEAE	*	<i>Guizotia abyssinica</i> (L.f.) Cass.	Not	No	Annual	Herb

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
			Evaluated			
ASTERACEAE		<i>Haplocarpha scaposa</i> Harv.	LC	No	Perennial	Herb
ASTERACEAE		<i>Helichrysum acutatum</i> DC.	LC	No	Perennial	Herb
ASTERACEAE		<i>Helichrysum aureonitens</i> Sch.Bip.	LC	No	Perennial	Herb
ASTERACEAE		<i>Helichrysum chionosphaerum</i> DC.	LC	No	Perennial	Herb
ASTERACEAE		<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC	No	Perennial	Herb
ASTERACEAE		<i>Helichrysum rugulosum</i> Less.	LC	No	Perennial	Herb
ASTERACEAE		<i>Nidorella hottentotica</i> DC.	LC	No	Annual	Herb
ASTERACEAE		<i>Nolletia arenosa</i> O.Hoffm.	LC	No	Perennial	Dwarf shrub
ASTERACEAE		<i>Schistostephium crataegifolium</i> (DC.) Fenzl ex Harv.	LC	No	Perennial	Herb, suffrutex
ASTERACEAE		<i>Senecio coronatus</i> (Thunb.) Harv.	LC	No	Perennial	Herb
ASTERACEAE		<i>Senecio erubescens</i> Aiton var. <i>erubescens</i>	LC	No	Perennial	Herb
ASTERACEAE		<i>Senecio inaequidens</i> DC.	LC	No	Perennial	Herb
ASTERACEAE		<i>Senecio laevigatus</i> Thunb. var. <i>laevigatus</i>	LC	No	Annual	Herb
ASTERACEAE		<i>Ursinia nana</i> DC. subsp. <i>leptophylla</i> Prassler	LC	No	Perennial	Herb
BARTRAMIACEAE		<i>Philonotis africana</i> (Müll.Hal.) Rehmann ex Paris		No	Perennial	Bryophyte
BORAGINACEAE		<i>Trichodesma physaloides</i> (Fenzl) A.DC.	LC	No	Perennial	Herb
BRASSICACEAE	*	<i>Nasturtium officinale</i> R.Br.	Not Evaluated	No	Perennial	Herb
BRYACEAE		<i>Bryum argenteum</i> Hedw.		No	Perennial	Bryophyte
BRYACEAE		<i>Bryum pycnophyllum</i> (Dixon) Mohamed		No	Perennial	Bryophyte, epiphyte
CAPPARACEAE		<i>Cleome maculata</i> (Sond.) Szyszyl.	LC	No	Annual	Herb
CAPPARACEAE		<i>Cleome monophylla</i> L.	LC	No	Annual	Herb
CARYOPHYLLACEAE		<i>Dianthus zeyheri</i> Sond. subsp. <i>zeyheri</i>	Not Evaluated	No	Perennial	Herb
COMMELINACEAE		<i>Cyanotis lapidosa</i> E.Phillips	LC	No	Perennial	Herb, succulent
COMMELINACEAE		<i>Cyanotis speciosa</i> (L.f.) Hassk.	LC	No	Perennial	Herb, succulent
CONVOLVULACEAE		<i>Convolvulus sagittatus</i> Thunb.	LC	No	Perennial	Herb

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
CONVOLVULACEAE		<i>Ipomoea bathycolpos</i> Hallier f.	LC	No	Perennial	Herb
CONVOLVULACEAE		<i>Ipomoea bolusiana</i> Schinz	LC	No	Perennial	Dwarf shrub, herb, succulent
CONVOLVULACEAE		<i>Ipomoea crassipes</i> Hook. var. <i>crassipes</i>	LC	No	Perennial	Herb, succulent
CONVOLVULACEAE		<i>Ipomoea gracilisejala</i> Rendle	LC	No	Annual	Herb
CONVOLVULACEAE		<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	LC	No	Perennial	Herb
CRASSULACEAE		<i>Crassula capitella</i> Thunb. subsp. <i>nodulosa</i> (Schönland) Toelken	LC	No	Perennial	Herb, succulent
CRASSULACEAE		<i>Crassula setulosa</i> Harv. var. <i>setulosa forma setulosa</i>	Not Evaluated	No	Perennial	Herb, succulent
CUCURBITACEAE		<i>Cucumis myriocarpus</i> Naudin subsp. <i>myriocarpus</i>	LC	No	Annual	Herb
CUCURBITACEAE		<i>Cucumis zeyheri</i> Sond.	LC	No	Perennial	Herb
CYPERACEAE		<i>Bulbostylis burchellii</i> (Ficalho & Hiern) C.B. Clarke	LC	No	Perennial	Cyperoid, herb, mesophyte
CYPERACEAE		<i>Cyperus congestus</i> Vahl	LC	No	Perennial	Cyperoid, helophyte, herb
CYPERACEAE		<i>Cyperus margaritaceus</i> Vahl var. <i>margaritaceus</i>	LC	No	Perennial	Cyperoid, herb, mesophyte
CYPERACEAE		<i>Cyperus obtusiflorus</i> Vahl var. <i>flavissimus</i> (Schrud.) Boeck.	LC	No	Perennial	Cyperoid, herb, mesophyte
CYPERACEAE		<i>Cyperus turrillii</i> Kük.	LC	No	Perennial	Cyperoid, herb, mesophyte
CYPERACEAE		<i>Isolepis cernua</i> (Vahl) Roem. & Schult. var. <i>cernua</i>	LC	No	Annual	Cyperoid, helophyte, herb
CYPERACEAE		<i>Kyllinga alba</i> Nees	LC	No	Perennial	Cyperoid, herb, mesophyte
CYPERACEAE		<i>Kyllinga melanosperma</i> Nees	LC	No	Perennial	Cyperoid, helophyte, herb
CYPERACEAE		<i>Scirpoides burkei</i> (C.B. Clarke) Goetgh., Muasya & D.A. Simpson	LC	No	Perennial	Cyperoid, herb, mesophyte
DICHAPETALACEAE		<i>Dichapetalum cymosum</i> (Hook.) Engl.	LC	No	Perennial	Dwarf shrub
DICRANACEAE		<i>Campylopus introflexus</i> (Hedw.) Brid.		No	Perennial	Bryophyte
DICRANACEAE		<i>Campylopus pilifer</i> Brid. var. <i>pilifer</i>		No	Perennial	Bryophyte
DICRANACEAE		<i>Campylopus robillardei</i> Besch.		No	Perennial	Bryophyte
DIPSACACEAE		<i>Scabiosa columbaria</i> L.	LC	No	Perennial	Herb
DITRICHACEAE		<i>Eccremidium exiguum</i> (Hook.f. & Wilson) Wilson		No	Annual (occ. perennial)	Bryophyte

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
EBENACEAE		<i>Diospyros lycioides</i> Desf. subsp. <i>guerkei</i> (Kuntze) De Winter	LC	No	Perennial	Shrub, tree
EBENACEAE		<i>Diospyros whyteana</i> (Hiern) F.White	LC	No	Perennial	Shrub, tree
ELATINACEAE		<i>Bergia decumbens</i> Planch. ex Harv.	LC	No	Perennial	Dwarf shrub
ERICACEAE		<i>Erica drakensbergensis</i> Guthrie & Bolus	LC	No	Perennial	Shrub
ERIOCAULACEAE		<i>Eriocaulon sonderianum</i> Körn.	LC	No	Perennial	Herb, hydrophyte, tenagophyte
EUPHORBIACEAE		<i>Euphorbia striata</i> Thunb. var. <i>striata</i>	LC	No	Perennial	Dwarf shrub, herb
EXORMOTHECACEAE		<i>Exormotheca holstii</i> Steph.		No	Perennial	Bryophyte
FABACEAE	*	<i>Acacia decurrens</i> Willd.	Not Evaluated	No	Perennial	Tree
FABACEAE		<i>Chamaecrista biensis</i> (Steyaert) Lock	LC	No	Perennial	Herb
FABACEAE		<i>Crotalaria distans</i> Benth. subsp. <i>distans</i>	LC	No	Annual	Herb
FABACEAE		<i>Eriosema burkei</i> Benth. ex Harv. var. <i>burkei</i>	LC	No	Perennial	Herb
FABACEAE		<i>Eriosema cordatum</i> E.Mey.	LC	No	Perennial	Herb
FABACEAE		<i>Eriosema psoraleoides</i> (Lam.) G.Don	LC	No	Perennial	Dwarf shrub, shrub
FABACEAE		<i>Eriosema squarrosum</i> (Thunb.) Walp.	LC	No	Perennial	Herb
FABACEAE		<i>Indigofera oxalidea</i> Welw. ex Baker	LC	No	Perennial	Herb
FABACEAE		<i>Indigofera oxytropis</i> Benth. ex Harv.	LC	No	Perennial	Herb
FABACEAE		<i>Listia solitudinis</i> (Dummer) B.-E.van Wyk & Boatwr.	LC	No	[No lifecycle defined]	[No lifeform defined]
FABACEAE		<i>Neorautanenia ficifolia</i> (Benth. ex Harv.) C.A.Sm.	LC	No	Perennial	Climber, herb, succulent
FABACEAE		<i>Rhynchosia crassifolia</i> Benth. ex Harv.	LC	No	Perennial	Climber, herb
FABACEAE		<i>Rhynchosia minima</i> (L.) DC. var. <i>prostrata</i> (Harv.) Meikle	LC	No	Perennial	Climber, herb
FABACEAE		<i>Sphenostylis angustifolia</i> Sond.	LC	No	Perennial	Dwarf shrub, herb
FABACEAE		<i>Tephrosia elongata</i> E.Mey. var. <i>elongata</i>	LC	No	Perennial	Dwarf shrub, herb, shrub
FABACEAE		<i>Tephrosia longipes</i> Meisn. subsp. <i>longipes</i> var. <i>longipes</i>	LC	No	Annual (occ. perennial)	Dwarf shrub, herb, shrub

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
FABACEAE		<i>Tephrosia lupinifolia</i> DC.	LC	No	Annual (occ. perennial)	Herb
FABACEAE		<i>Tephrosia polystachya</i> E.Mey. var. <i>polystachya</i>	LC	No	Perennial	Dwarf shrub, herb, shrub
FABACEAE		<i>Zornia milneana</i> Mohlenbr.	LC	No	Perennial	Herb
FISSIDENTACEAE		<i>Fissidens sciophyllus</i> Mitt.		No	Perennial	Bryophyte
GENTIANACEAE		<i>Chironia palustris</i> Burch. subsp. <i>transvaalensis</i> (Gilg) I.Verd.	LC	No	Annual	Herb
GERANIACEAE		<i>Monsonia angustifolia</i> E.Mey. ex A.Rich.	LC	No	Annual	Herb
GERANIACEAE		<i>Monsonia burkeana</i> Planch. ex Harv.	LC	No	Annual	Herb
GRIMMIACEAE		<i>Schistidium apocarpum</i> (Hedw.) Bruch & Schimp.		No	Perennial	Bryophyte
HALORAGACEAE		<i>Myriophyllum spicatum</i> L.	Not Evaluated	No	Perennial	Herb, hydrophyte
HYACINTHACEAE		<i>Drimia calcarata</i> (Baker) Stedje	LC	No	Perennial	Geophyte
HYACINTHACEAE		<i>Drimia depressa</i> (Baker) Jessop	LC	No	Perennial	Geophyte
HYACINTHACEAE		<i>Eucomis autumnalis</i> (Mill.) Chitt. subsp. <i>clavata</i> (Baker) Reyneke	Not Evaluated	No	Perennial	Geophyte
HYACINTHACEAE		<i>Ledebouria cooperi</i> (Hook.f.) Jessop	LC	No	Perennial	Geophyte
HYACINTHACEAE		<i>Ledebouria leptophylla</i> (Baker) S.Venter	LC	No	[No lifecycle defined]	[No lifeform defined]
HYACINTHACEAE		<i>Ledebouria luteola</i> Jessop	LC	No	Perennial	Geophyte
HYACINTHACEAE		<i>Ledebouria marginata</i> (Baker) Jessop	LC	No	Perennial	Geophyte
HYACINTHACEAE		<i>Ledebouria ovatifolia</i> (Baker) Jessop	LC	No	Perennial	Geophyte
HYPOXIDACEAE		<i>Hypoxis filiformis</i> Baker	LC	No	Perennial	Geophyte
IRIDACEAE		<i>Dierama mossii</i> (N.E.Br.) Hilliard	LC	No	Perennial	Geophyte, herb
IRIDACEAE		<i>Gladiolus crassifolius</i> Baker	LC	No	Perennial	Geophyte, herb
IRIDACEAE		<i>Gladiolus elliotii</i> Baker	LC	No	Perennial	Geophyte, herb
IRIDACEAE		<i>Lapeirousia sandersonii</i> Baker	LC	No	Perennial	Geophyte, herb
IRIDACEAE		<i>Moraea pallida</i> (Baker) Goldblatt	LC	No	Perennial	Geophyte, herb
IRIDACEAE		<i>Moraea stricta</i> Baker	LC	No	Perennial	Geophyte, herb

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
JUNCACEAE		<i>Juncus lomatophyllus</i> Spreng.	LC	No	Perennial	Herb, hydrophyte, hyperhydate
JUNCACEAE		<i>Juncus oxycarpus</i> E.Mey. ex Kunth	LC	No	Perennial	Helophyte, herb
LAMIACEAE		<i>Acrotome hispida</i> Benth.	LC	No	Perennial	Herb
LAMIACEAE		<i>Ocimum angustifolium</i> Benth.	LC	No	Perennial	Herb, shrub
LAMIACEAE		<i>Ocimum obovatum</i> E.Mey. ex Benth. subsp. <i>obovatum</i> var. <i>obovatum</i>	LC	No	Perennial	Herb
LAMIACEAE		<i>Orthosiphon suffrutescens</i> (Thonn.) J.K.Morton	LC	No	Perennial	Herb
LAMIACEAE		<i>Rothea hirsuta</i> (Hochst.) R.Fern.	LC	No	Perennial	Herb
LAMIACEAE		<i>Salvia runcinata</i> L.f.	LC	No	Perennial	Herb
LAMIACEAE		<i>Stachys erectiuscula</i> Gürke	LC	No	Perennial	Herb
LAMIACEAE		<i>Syncolostemon pretoriae</i> (Gürke) D.F.Otieno	LC	No	[No lifecycle defined]	Herb
LECIDEACEAE		<i>Lecidea sarcogynoides</i> Körb.		No	[No lifecycle defined]	Lichen
LOBELIACEAE		<i>Monopsis decipiens</i> (Sond.) Thulin	LC	No	Perennial	Herb
LYTHRACEAE		<i>Nesaea schinzii</i> Koehne	LC	No	Perennial	Dwarf shrub
MALVACEAE		<i>Corchorus asplenifolius</i> Burch.	LC	No	Perennial	Herb
MALVACEAE		<i>Hermannia cordata</i> (E.Mey. ex E.Phillips) De Winter	LC	No	Annual (occ. perennial)	Herb
MALVACEAE		<i>Hermannia lancifolia</i> Szyszyl.	LC	No	Perennial	Herb
MALVACEAE		<i>Hermannia transvaalensis</i> Schinz	LC	No	Perennial	Herb
MALVACEAE		<i>Sida rhombifolia</i> L. subsp. <i>rhombifolia</i>	LC	No	Annual or biennial	Dwarf shrub, herb, shrub
MALVACEAE		<i>Triumfetta obtusicornis</i> Sprague & Hutch.	LC	No	Perennial	Shrub
MALVACEAE		<i>Triumfetta sonderi</i> Ficalho & Hiern	LC	No	Perennial	Dwarf shrub
MOLLUGINACEAE		<i>Psammotropha myriantha</i> Sond.	LC	No	Perennial	Herb
NEURADACEAE		<i>Grielum cuneifolium</i> Schinz	LC	No	Annual	Herb
ONAGRACEAE	*	<i>Oenothera biennis</i> L.	Not	No	Biennial	Herb

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
			Evaluated			
ONAGRACEAE	*	<i>Oenothera rosea</i> L'Hér. ex Aiton	Not Evaluated	No	Perennial	Herb
ORCHIDACEAE		<i>Eulophia hians</i> Spreng. var. <i>nutans</i> (Sond.) S. Thomas	LC	No	Perennial	Geophyte, herb
OROBANCHACEAE		<i>Buchnera ciliolata</i> Engl.	LC	No	Annual	Herb, parasite
OROBANCHACEAE		<i>Cycnium adonense</i> E.Mey. ex Benth.	LC	No	Perennial	Herb, parasite
OROBANCHACEAE		<i>Cycnium tubulosum</i> (L.f.) Engl. subsp. <i>tubulosum</i>	LC	No	Perennial	Herb
OROBANCHACEAE		<i>Graderia subintegra</i> Mast.	LC	No	Perennial	Herb, parasite, suffrutex
OROBANCHACEAE		<i>Sopubia cana</i> Harv. var. <i>cana</i>	LC	No	Perennial	Herb, parasite
OROBANCHACEAE		<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC	No	Annual (occ. perennial)	Herb, parasite
OROBANCHACEAE		<i>Striga elegans</i> Benth.	LC	No	Annual	Herb, parasite
PARMELIACEAE		<i>Karowia adligans</i> (Brusse) Hale		No	[No lifecycle defined]	Lichen
PHYLLANTHACEAE		<i>Bridelia mollis</i> Hutch.	LC	No	Perennial	Shrub, tree
PHYSICIACEAE		<i>Dimelaena australiensis</i> H.Mayrhofer & Sheard		No	[No lifecycle defined]	Lichen
PITOSPORACEAE		<i>Pittosporum viridiflorum</i> Sims	LC	No	Perennial	Shrub, tree
POACEAE		<i>Andropogon appendiculatus</i> Nees	LC	No	Perennial	Graminoid
POACEAE		<i>Andropogon eucomus</i> Nees	LC	No	Perennial	Graminoid
POACEAE		<i>Aristida aequiglumis</i> Hack.	LC	No	Perennial	Graminoid
POACEAE		<i>Aristida recta</i> Franch.	LC	No	Perennial	Graminoid
POACEAE		<i>Bewsia biflora</i> (Hack.) Gooss.	LC	No	Perennial	Graminoid
POACEAE		<i>Brachiaria subulifolia</i> (Mez) Clayton	LC	No	Perennial	Graminoid
POACEAE		<i>Elionurus muticus</i> (Spreng.) Kunth	LC	No	Perennial	Graminoid
POACEAE		<i>Eragrostis chloromelas</i> Steud.	LC	No	Perennial	Graminoid
POACEAE		<i>Eragrostis curvula</i> (Schrud.) Nees	LC	No	Perennial	Graminoid
POACEAE		<i>Eragrostis hierniana</i> Rendle	LC	No	Perennial	Graminoid

Family	Naturalised	Species	Threat status	SA Endemic	Lifecycle	Growth forms
POACEAE		<i>Eragrostis inamoena</i> K.Schum.	LC	No	Perennial	Graminoid
POACEAE		<i>Eragrostis racemosa</i> (Thunb.) Steud.	LC	No	Perennial	Graminoid
POACEAE		<i>Eragrostis viscosa</i> (Retz.) Trin.	LC	No	Annual	Graminoid
POACEAE		<i>Harpochloa falx</i> (L.f.) Kuntze	LC	No	Perennial	Graminoid
POACEAE		<i>Hyparrhenia anamesa</i> Clayton	LC	No	Perennial	Graminoid
POACEAE		<i>Imperata cylindrica</i> (L.) Raeusch.	LC	No	Perennial	Graminoid
POACEAE		<i>Ischaemum afrum</i> (J.F.Gmel.) Dandy	LC	No	Perennial	Graminoid
POACEAE		<i>Koeleria capensis</i> (Steud.) Nees	LC	No	Perennial	Graminoid
POACEAE		<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	LC	No	Annual (occ. perennial)	Graminoid
POACEAE	*	<i>Paspalum dilatatum</i> Poir.	Not Evaluated	No	Perennial	Graminoid
POACEAE		<i>Pennisetum thunbergii</i> Kunth	LC	No	Perennial	Graminoid
POACEAE		<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	LC	No	Perennial (occ. annual)	Graminoid
POACEAE	*	<i>Polypogon viridis</i> (Gouan) Breistr.	Not Evaluated	No	Annual	Graminoid
POACEAE		<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sericea</i> (Stapf) Clayton	LC	No	Perennial	Graminoid
POACEAE		<i>Stiburus conrathii</i> Hack.	LC	No	Perennial	Graminoid

Annexure 2: Mammal species likely to be found within the site (Animal Demography Unit 2016a).

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic
Chrysochloridae	<i>Chrysoxalax</i>	<i>villosus</i>		Rough-haired Golden Mole	Critically Endangered	18	Yes
Herpestidae	<i>Cynictis</i>	<i>penicillata</i>		Yellow Mongoose	Least Concern	4	Yes
Herpestidae	<i>Herpestes</i>	<i>sanguineus</i>		Slender Mongoose	Least Concern	1	Yes
Macroscelididae	<i>Elephantulus</i>	<i>myurus</i>		Eastern Rock Elephant Shrew	Least Concern	4	Yes
Muridae	<i>Aethomys</i>	<i>namaquensis</i>		Namaqua Rock Mouse	Least Concern	4	
Muridae	<i>Gerbilliscus</i>	<i>brantsii</i>		Highveld Gerbil	Least Concern	3	
Muridae	<i>Gerbilliscus</i>	<i>leucogaster</i>		Bushveld Gerbil	Data Deficient	10	
Muridae	<i>Mus</i>	<i>minutoides</i>		Southern African Pygmy Mouse	Least Concern	1	Yes
Muridae	<i>Otomys</i>	<i>auratus</i>		Southern African Vlei Rat	Not listed	2	Yes
Muridae	<i>Rhabdomys</i>	<i>pumilio</i>		Xeric Four-striped Grass Rat	Least Concern	1	Yes
Soricidae	<i>Crocidura</i>			Shrews	Not listed	1	
Soricidae	<i>Crocidura</i>	<i>maquassiensis</i>		Makwassie Musk Shrew	Vulnerable	1	Yes
Soricidae	<i>Suncus</i>	<i>infinitesimus</i>		Least Dwarf Shrew	Data Deficient	1	Yes
Vespertilionidae	<i>Myotis</i>	<i>welwitschii</i>		Welwitsch's Myotis	Near Threatened	1	Yes
Vespertilionidae	<i>Neoromicia</i>	<i>capensis</i>		Cape Serotine	Least Concern	1	Yes

Annexure 3: A list of amphibian species with distribution ranges that correspond to that of the study area and their probability of occurrence (Animal Demography Unit 2016b).

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic
Bufonidae	<i>Schismaderma</i>	<i>carens</i>		Red Toad	Least Concern	2	
Bufonidae	<i>Sclerophrys</i>	<i>capensis</i>		Raucous Toad	Least Concern	1	
Bufonidae	<i>Sclerophrys</i>	<i>gutturalis</i>		Guttural Toad	Least Concern	6	
Hyperoliidae	<i>Kassina</i>	<i>senegalensis</i>		Bubbling Kassina	Least Concern	5	
Phrynobatrachidae	<i>Phrynobatrachus</i>	<i>natalensis</i>		Snoring Puddle Frog	Least Concern	1	
Pipidae	<i>Xenopus</i>	<i>laevis</i>		Common Platanna	Least Concern	2	
Ptychadenidae	<i>Ptychadena</i>	<i>anchietae</i>		Plain Grass Frog	Least Concern	1	
Ptychadenidae	<i>Ptychadena</i>	<i>porosissima</i>		Striped Grass Frog	Least Concern	1	
Pyxicephalidae	<i>Amietia</i>	<i>quecketti</i>		Queckett's River Frog	Least Concern	2	Yes
Pyxicephalidae	<i>Cacosternum</i>	<i>boettgeri</i>		Common Caco	Least Concern	5	
Pyxicephalidae	<i>Pyxicephalus</i>	<i>adpersus</i>		Giant Bull Frog	Near Threatened	1	
Pyxicephalidae	<i>Strongylopus</i>	<i>fasciatus</i>		Striped Stream Frog	Least Concern	1	
Pyxicephalidae	<i>Tomopterna</i>	<i>cryptotis</i>		Tremelo Sand Frog	Least Concern	4	
Pyxicephalidae	<i>Tomopterna</i>	<i>natalensis</i>		Natal Sand Frog	Least Concern	2	
Total records						34	

Annexure 4: A list of reptile species with distribution ranges sympatric to study area and their probability of occurrence (Animal Demography Unit 2016c).

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic
Colubridae	<i>Crotaphopeltis</i>	<i>hotamboeia</i>		Red-lipped Snake	Least Concern (SARCA 2014)	1	
Cordylidae	<i>Cordylus</i>	<i>vittifer</i>		Common Girdled Lizard	Least Concern (SARCA 2014)	2	
Elapidae	<i>Hemachatus</i>	<i>haemachatus</i>		Rinkhals	Least Concern (SARCA 2014)	2	
Gerrhosauridae	<i>Gerrhosaurus</i>	<i>flavigularis</i>		Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	1	
Lacertidae	<i>Ichnotropis</i>	<i>capensis</i>		Ornate Rough-scaled Lizard	Least Concern (SARCA 2014)	2	
Lamprophiidae	<i>Boaedon</i>	<i>capensis</i>		Brown House Snake	Least Concern (SARCA 2014)	1	
Lamprophiidae	<i>Lamprophis</i>	<i>aurora</i>		Aurora House Snake	Least Concern (SARCA 2014)	2	Yes
Lamprophiidae	<i>Lycophidion</i>	<i>capense</i>	<i>capense</i>	Cape Wolf Snake	Least Concern (SARCA 2014)	1	
Lamprophiidae	<i>Prosymna</i>	<i>sundevallii</i>		Sundevall's Shovel-snout	Least Concern (SARCA 2014)	1	
Lamprophiidae	<i>Pseudaspis</i>	<i>cana</i>		Mole Snake	Least Concern (SARCA 2014)	1	
Pelomedusidae	<i>Pelomedusa</i>	<i>subrufa</i>		Central Marsh Terrapin	Least Concern (SARCA 2014)	1	
Scincidae	<i>Trachylepis</i>	<i>capensis</i>		Cape Skink	Least Concern (SARCA 2014)	2	
Scincidae	<i>Trachylepis</i>	<i>varia</i>		Variable Skink	Least Concern (SARCA 2014)	2	
Testudinidae	<i>Kinixys</i>	<i>lobatsiana</i>		Lobatse Hinged Tortoise	Least Concern (SARCA 2014)	1	
Viperidae	<i>Causus</i>	<i>rhombeatus</i>		Rhombic Night Adder	Least Concern SARCA)	3	

Appendix 5: A list of bird species (339 species for the 2528DC grid) that may occur within the site was sourced from the Southern African Bird Atlas Project 2 (SABAP2 20162) for the 2528DC grid.

Common_name	Taxon_name
Apalis, Bar-throated	<i>Apalis thoracica</i>
Avocet, Pied	<i>Recurvirostra avosetta</i>
Babbler, Arrow-marked	<i>Turdoides jardineii</i>
Barbet, Black-collared	<i>Lybius torquatus</i>
Barbet, Crested	<i>Trachyphonus vaillantii</i>
Batis, Chinspot	<i>Batis molitor</i>
Bee-eater, European	<i>Merops apiaster</i>
Bee-eater, Little	<i>Merops pusillus</i>
Bee-eater, Swallow-tailed	<i>Merops hirundineus</i>
Bee-eater, White-fronted	<i>Merops bullockoides</i>
Bishop, Southern Red	<i>Euplectes orix</i>
Bishop, Yellow	<i>Euplectes capensis</i>
Bishop, Yellow-crowned	<i>Euplectes afer</i>
Bittern, Little	<i>Ixobrychus minutus</i>
Bokmakierie, Bokmakierie	<i>Telophorus zeylonus</i>
Boubou, Southern	<i>Laniarius ferrugineus</i>
Brubru, Brubru	<i>Nilaus afer</i>
Bulbul, Dark-capped	<i>Pycnonotus tricolor</i>
Bunting, Cape	<i>Emberiza capensis</i>
Bunting, Cinnamon-breasted	<i>Emberiza tahapisi</i>
Bunting, Golden-breasted	<i>Emberiza flaviventris</i>
Bush-shrike, Grey-headed	<i>Malaconotus blanchoti</i>
Buttonquail, Kurrichane	<i>Turnix sylvaticus</i>
Buzzard, Jackal	<i>Buteo rufufuscus</i>
Buzzard, Steppe	<i>Buteo vulpinus</i>

Camaroptera, Grey-backed	<i>Camaroptera brevicaudata</i>
Canary, Black-throated	<i>Crithagra atrogularis</i>
Canary, Yellow-fronted	<i>Crithagra mozambicus</i>
Chat, Anteating	<i>Myrmecocichla formicivora</i>
Chat, Familiar	<i>Cercomela familiaris</i>
Cisticola, Cloud	<i>Cisticola textrix</i>
Cisticola, Desert	<i>Cisticola aridulus</i>
Cisticola, Lazy	<i>Cisticola aberrans</i>
Cisticola, Levallant's	<i>Cisticola tinniens</i>
Cisticola, Pale-crowned	<i>Cisticola cinnamomeus</i>
Cisticola, Rattling	<i>Cisticola chiniana</i>
Cisticola, Wailing	<i>Cisticola lais</i>
Cisticola, Wing-snapping	<i>Cisticola ayresii</i>
Cisticola, Zitting	<i>Cisticola juncidis</i>
Cliff-chat, Mocking	<i>Thamnolaea cinnamomeiventris</i>
Cliff-swallow, South African	<i>Hirundo spilodera</i>
Coot, Red-knobbed	<i>Fulica cristata</i>
Cormorant, Reed	<i>Phalacrocorax africanus</i>
Cormorant, White-breasted	<i>Phalacrocorax carbo</i>
Coucal, Burchell's	<i>Centropus burchellii</i>
Courser, Temminck's	<i>Cursorius temminckii</i>
Crake, African	<i>Crecopsis egregia</i>
Crake, Black	<i>Amaurornis flavirostris</i>
Crane, Blue	<i>Anthropoides paradiseus</i>
Crombec, Long-billed	<i>Sylvietta rufescens</i>
Crow, Cape	<i>Corvus capensis</i>
Crow, Pied	<i>Corvus albus</i>
Cuckoo, Black	<i>Cuculus clamosus</i>
Cuckoo, Diderick	<i>Chrysococcyx caprius</i>
Cuckoo, Jacobin	<i>Clamator jacobinus</i>

Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>
Cuckoo, Levillant's	<i>Clamator levillantii</i>
Cuckoo, Red-chested	<i>Cuculus solitarius</i>
Cuckoo-shrike, Black	<i>Campephaga flava</i>
Darter, African	<i>Anhinga rufa</i>
Dove, Laughing	<i>Streptopelia senegalensis</i>
Dove, Namaqua	<i>Oena capensis</i>
Dove, Red-eyed	<i>Streptopelia semitorquata</i>
Dove, Rock	<i>Columba livia</i>
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>
Duck, African Black	<i>Anas sparsa</i>
Duck, Comb	<i>Sarkidiornis melanotos</i>
Duck, Fulvous	<i>Dendrocygna bicolor</i>
Duck, Mallard	<i>Anas platyrhynchos</i>
Duck, White-faced	<i>Dendrocygna viduata</i>
Duck, Yellow-billed	<i>Anas undulata</i>
Eagle, Long-crested	<i>Lophaetus occipitalis</i>
Eagle, Martial	<i>Polemaetus bellicosus</i>
Eagle, Verreaux's	<i>Aquila verreauxii</i>
Eagle, Wahlberg's	<i>Aquila wahlbergi</i>
Eagle-owl, Spotted	<i>Bubo africanus</i>
Egret, Cattle	<i>Bubulcus ibis</i>
Egret, Great	<i>Egretta alba</i>
Egret, Little	<i>Egretta garzetta</i>
Egret, Yellow-billed	<i>Egretta intermedia</i>
Falcon, Amur	<i>Falco amurensis</i>
Falcon, Lanner	<i>Falco biarmicus</i>
Falcon, Peregrine	<i>Falco peregrinus</i>
Finch, Cut-throat	<i>Amadina fasciata</i>
Finch, Red-headed	<i>Amadina erythrocephala</i>

Finch, Scaly-feathered	<i>Sporopipes squamifrons</i>
Firefinch, African	<i>Lagonosticta rubricata</i>
Firefinch, Jameson's	<i>Lagonosticta rhodopareia</i>
Firefinch, Red-billed	<i>Lagonosticta senegala</i>
Fiscal, Common (Southern)	<i>Lanius collaris</i>
Fish-eagle, African	<i>Haliaeetus vocifer</i>
Flamingo, Greater	<i>Phoenicopterus ruber</i>
Flamingo, Lesser	<i>Phoenicopterus minor</i>
Flufftail, Red-chested	<i>Sarothrura rufa</i>
Flycatcher, Fiscal	<i>Sigelus silens</i>
Flycatcher, Marico	<i>Bradornis mariquensis</i>
Flycatcher, Southern Black	<i>Melaenornis pammelaina</i>
Flycatcher, Spotted	<i>Muscicapa striata</i>
Francolin, Coqui	<i>Peliperdix coqui</i>
Francolin, Orange River	<i>Scleroptila levillantoides</i>
Francolin, Red-winged	<i>Scleroptila levillantii</i>
Go-away-bird, Grey	<i>Corythaixoides concolor</i>
Goose, Domestic	<i>Anser anser</i>
Goose, Egyptian	<i>Alopochen aegyptiacus</i>
Goose, Spur-winged	<i>Plectropterus gambensis</i>
Goshawk, Gabar	<i>Melierax gabar</i>
Grassbird, Cape	<i>Sphenoeacus afer</i>
Grass-owl, African	<i>Tyto capensis</i>
Grebe, Black-necked	<i>Podiceps nigricollis</i>
Grebe, Great Crested	<i>Podiceps cristatus</i>
Grebe, Little	<i>Tachybaptus ruficollis</i>
Greenshank, Common	<i>Tringa nebularia</i>
Guineafowl, Helmeted	<i>Numida meleagris</i>
Gull, Grey-headed	<i>Larus cirrocephalus</i>
Hamerkop, Hamerkop	<i>Scopus umbretta</i>

Harrier, Montagu's	<i>Circus pygargus</i>
Harrier, Pallid	<i>Circus macrourus</i>
Harrier-Hawk, African	<i>Polyboroides typus</i>
Hawk, African Cuckoo	<i>Aviceda cuculoides</i>
Heron, Black	<i>Egretta ardesiaca</i>
Heron, Black-headed	<i>Ardea melanocephala</i>
Heron, Goliath	<i>Ardea goliath</i>
Heron, Green-backed	<i>Butorides striata</i>
Heron, Grey	<i>Ardea cinerea</i>
Heron, Purple	<i>Ardea purpurea</i>
Heron, Squacco	<i>Ardeola ralloides</i>
Honeybird, Brown-backed	<i>Prodotiscus regulus</i>
Honeyguide, Greater	<i>Indicator indicator</i>
Honeyguide, Lesser	<i>Indicator minor</i>
Hoopoe, African	<i>Upupa africana</i>
Hornbill, African Grey	<i>Tockus nasutus</i>
House-martin, Common	<i>Delichon urbicum</i>
Ibis, African Sacred	<i>Threskiornis aethiopicus</i>
Ibis, Glossy	<i>Plegadis falcinellus</i>
Ibis, Hadedda	<i>Bostrychia hagedash</i>
Jacana, African	<i>Actophilornis africanus</i>
Kestrel, Greater	<i>Falco rupicoloides</i>
Kestrel, Lesser	<i>Falco naumanni</i>
Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>
Kingfisher, Giant	<i>Megaceryle maximus</i>
Kingfisher, Half-collared	<i>Alcedo semitorquata</i>
Kingfisher, Malachite	<i>Alcedo cristata</i>
Kingfisher, Pied	<i>Ceryle rudis</i>
Kingfisher, Striped	<i>Halcyon chelicuti</i>
Kingfisher, Woodland	<i>Halcyon senegalensis</i>

Kite, Black-shouldered	<i>Elanus caeruleus</i>
Kite, Yellow-billed	<i>Milvus aegyptius</i>
Korhaan, Blue	<i>Eupodotis caerulescens</i>
Korhaan, Northern Black	<i>Afrotis afraoides</i>
Lapwing, African Wattled	<i>Vanellus senegallus</i>
Lapwing, Blacksmith	<i>Vanellus armatus</i>
Lapwing, Crowned	<i>Vanellus coronatus</i>
Lark, Eastern Clapper	<i>Mirafra fasciolata</i>
Lark, Eastern Long-billed	<i>Certhilauda semitorquata</i>
Lark, Fawn-coloured	<i>Calendulauda africanoides</i>
Lark, Melodious	<i>Mirafra cheniana</i>
Lark, Pink-billed	<i>Spizocorys conirostris</i>
Lark, Red-capped	<i>Calandrella cinerea</i>
Lark, Rufous-naped	<i>Mirafra africana</i>
Lark, Sabota	<i>Calendulauda sabota</i>
Lark, Spike-heeled	<i>Chersomanes albofasciata</i>
Longclaw, Cape	<i>Macronyx capensis</i>
Mannikin, Bronze	<i>Spermestes cucullatus</i>
Marsh-harrier, African	<i>Circus ranivorus</i>
Martin, Banded	<i>Riparia cincta</i>
Martin, Brown-throated	<i>Riparia paludicola</i>
Martin, Rock	<i>Hirundo fuligula</i>
Martin, Sand	<i>Riparia riparia</i>
Masked-weaver, Southern	<i>Ploceus velatus</i>
Moorhen, Common	<i>Gallinula chloropus</i>
Mousebird, Red-faced	<i>Urocolius indicus</i>
Mousebird, Speckled	<i>Colius striatus</i>
Myna, Common	<i>Acridotheres tristis</i>
Neddicky, Neddicky	<i>Cisticola fulvicapilla</i>
Night-Heron, Black-crowned	<i>Nycticorax nycticorax</i>

Oriole, Black-headed	<i>Oriolus larvatus</i>
Osprey, Osprey	<i>Pandion haliaetus</i>
Ostrich, Common	<i>Struthio camelus</i>
Owl, Barn	<i>Tyto alba</i>
Owl, Marsh	<i>Asio capensis</i>
Palm-swift, African	<i>Cypsiurus parvus</i>
Paradise-flycatcher, African	<i>Terpsiphone viridis</i>
Paradise-whydah, Long-tailed	<i>Vidua paradisaea</i>
Pigeon, Speckled	<i>Columba guinea</i>
Pipit, African	<i>Anthus cinnamomeus</i>
Pipit, Buffy	<i>Anthus vaalensis</i>
Pipit, Long-billed	<i>Anthus similis</i>
Pipit, Plain-backed	<i>Anthus leucophrys</i>
Pipit, Striped	<i>Anthus lineiventris</i>
Plover, Common Ringed	<i>Charadrius hiaticula</i>
Plover, Kittlitz's	<i>Charadrius pecuarius</i>
Plover, Three-banded	<i>Charadrius tricollaris</i>
Pochard, Southern	<i>Netta erythrophthalma</i>
Pratincole, Black-winged	<i>Glareola nordmanni</i>
Prinia, Black-chested	<i>Prinia flavicans</i>
Prinia, Tawny-flanked	<i>Prinia subflava</i>
Puffback, Black-backed	<i>Dryoscopus cubla</i>
Quail, Common	<i>Coturnix coturnix</i>
Quailfinch, African	<i>Ortygospiza atricollis</i>
Quelea, Red-billed	<i>Quelea quelea</i>
Rail, African	<i>Rallus caerulescens</i>
Reed-warbler, African	<i>Acrocephalus baeticatus</i>
Reed-warbler, Great	<i>Acrocephalus arundinaceus</i>
Robin-chat, Cape	<i>Cossypha caffra</i>
Robin-chat, White-throated	<i>Cossypha humeralis</i>

Rock-thrush, Cape	<i>Monticola rupestris</i>
Roller, European	<i>Coracias garrulus</i>
Roller, Lilac-breasted	<i>Coracias caudatus</i>
Ruff, Ruff	<i>Philomachus pugnax</i>
Rush-warbler, Little	<i>Bradypterus baboecala</i>
Sandpiper, Common	<i>Actitis hypoleucos</i>
Sandpiper, Curlew	<i>Calidris ferruginea</i>
Sandpiper, Marsh	<i>Tringa stagnatilis</i>
Sandpiper, Terek	<i>Xenus cinereus</i>
Sandpiper, Wood	<i>Tringa glareola</i>
Secretarybird, Secretarybird	<i>Sagittarius serpentarius</i>
Seedeater, Streaky-headed	<i>Crithagra gularis</i>
Shelduck, South African	<i>Tadorna cana</i>
Shoveler, Cape	<i>Anas smithii</i>
Shrike, Crimson-breasted	<i>Laniarius atrococcineus</i>
Shrike, Lesser Grey	<i>Lanius minor</i>
Shrike, Red-backed	<i>Lanius collurio</i>
Snake-eagle, Black-chested	<i>Circaetus pectoralis</i>
Snake-eagle, Brown	<i>Circaetus cinereus</i>
Snipe, African	<i>Gallinago nigripennis</i>
Sparrow, Cape	<i>Passer melanurus</i>
Sparrow, House	<i>Passer domesticus</i>
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>
Sparrowhawk, Black	<i>Accipiter melanoleucus</i>
Sparrowhawk, Little	<i>Accipiter minullus</i>
Sparrowhawk, Ovambo	<i>Accipiter ovampensis</i>
Sparrowlark, Chestnut-backed	<i>Eremopterix leucotis</i>
Sparrow-weaver, White-browed	<i>Plocepasser mahali</i>
Spoonbill, African	<i>Platalea alba</i>

Spurfowl, Natal	<i>Pternistis natalensis</i>
Spurfowl, Swainson's	<i>Pternistis swainsonii</i>
Starling, Cape Glossy	<i>Lamprotornis nitens</i>
Starling, Pied	<i>Spreo bicolor</i>
Starling, Red-winged	<i>Onychognathus morio</i>
Starling, Violet-backed	<i>Cinnyricinclus leucogaster</i>
Starling, Wattled	<i>Creatophora cinerea</i>
Stilt, Black-winged	<i>Himantopus himantopus</i>
Stint, Little	<i>Calidris minuta</i>
Stonechat, African	<i>Saxicola torquatus</i>
Stork, Abdim's	<i>Ciconia abdimii</i>
Stork, Black	<i>Ciconia nigra</i>
Stork, White	<i>Ciconia ciconia</i>
Stork, Yellow-billed	<i>Mycteria ibis</i>
Sunbird, Amethyst	<i>Chalcomitra amethystina</i>
Sunbird, Greater Double-collared	<i>Cinnyris afer</i>
Sunbird, White-bellied	<i>Cinnyris talatala</i>
Swallow, Barn	<i>Hirundo rustica</i>
Swallow, Greater Striped	<i>Hirundo cucullata</i>
Swallow, Lesser Striped	<i>Hirundo abyssinica</i>
Swallow, Pearl-breasted	<i>Hirundo dimidiata</i>
Swallow, Red-breasted	<i>Hirundo semirufa</i>
Swallow, White-throated	<i>Hirundo albigularis</i>
Swamphen, African Purple	<i>Porphyrio madagascariensis</i>
Swamp-warbler, Lesser	<i>Acrocephalus gracilirostris</i>
Swift, African Black	<i>Apus barbatus</i>
Swift, Alpine	<i>Tachymarptis melba</i>
Swift, Common	<i>Apus apus</i>
Swift, Horus	<i>Apus horus</i>
Swift, Little	<i>Apus affinis</i>

Swift, White-rumped	<i>Apus caffer</i>
Tchagra, Black-crowned	<i>Tchagra senegalus</i>
Tchagra, Brown-crowned	<i>Tchagra australis</i>
Teal, Cape	<i>Anas capensis</i>
Teal, Hottentot	<i>Anas hottentota</i>
Teal, Red-billed	<i>Anas erythrorhyncha</i>
Tern, Caspian	<i>Sterna caspia</i>
Tern, Whiskered	<i>Chlidonias hybrida</i>
Tern, White-winged	<i>Chlidonias leucopterus</i>
Thick-knee, Spotted	<i>Burhinus capensis</i>
Thick-knee, Water	<i>Burhinus vermiculatus</i>
Thrush, Groundscraper	<i>Psophocichla litsipsirupa</i>
Thrush, Karoo	<i>Turdus smithi</i>
Thrush, Kurrichane	<i>Turdus libonyanus</i>
Tit-babbler, Chestnut-vented	<i>Parisoma subcaeruleum</i>
Turtle-dove, Cape	<i>Streptopelia capicola</i>
Wagtail, African Pied	<i>Motacilla aguimp</i>
Wagtail, Cape	<i>Motacilla capensis</i>
Wagtail, Yellow	<i>Motacilla flava</i>
Warbler, Dark-capped Yellow	<i>Chloropeta natalensis</i>
Warbler, Garden	<i>Sylvia borin</i>
Warbler, Marsh	<i>Acrocephalus palustris</i>
Warbler, Sedge	<i>Acrocephalus schoenobaenus</i>
Warbler, Willow	<i>Phylloscopus trochilus</i>
Waxbill, Blue	<i>Uraeginthus angolensis</i>
Waxbill, Common	<i>Estrilda astrild</i>
Waxbill, Orange-breasted	<i>Amandava subflava</i>
Weaver, Cape	<i>Ploceus capensis</i>
Weaver, Thick-billed	<i>Amblyospiza albifrons</i>
Weaver, Village	<i>Ploceus cucullatus</i>

Wheatear, Capped	<i>Oenanthe pileata</i>
Wheatear, Mountain	<i>Oenanthe monticola</i>
White-eye, Cape	<i>Zosterops virens</i>
Whydah, Pin-tailed	<i>Vidua macroura</i>
Widowbird, Fan-tailed	<i>Euplectes axillaris</i>
Widowbird, Long-tailed	<i>Euplectes progne</i>
Widowbird, Red-collared	<i>Euplectes ardens</i>
Widowbird, White-winged	<i>Euplectes albonotatus</i>
Wood-hoopoe, Green	<i>Phoeniculus purpureus</i>
Woodpecker, Cardinal	<i>Dendropicus fuscescens</i>
Woodpecker, Golden-tailed	<i>Campethera abingoni</i>
Wryneck, Red-throated	<i>Jynx ruficollis</i>
