

**HUDDLE PARK DEVELOPMENT
Ecological Verification Study**

SEF Reference No. 504342

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I, **Karin van der Walt**, in my capacity as a specialist consultant, hereby declare that I -

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- Will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement;
- Reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field; and
- Undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study for which I am registered.



31 May 2013

Karin van der Walt *Cert. Sci. Nat.*
Terrestrial Ecologist
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Date

Declaration of Independence

I, **Robyn Phillips**, in my capacity as a specialist consultant, hereby declare that I –

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- Have and will not have vested interest in the proposed activity proceeding;
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- Undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study for which I am registered.



31 May 2013

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Date

EXECUTIVE SUMMARY

Strategic Environmental Focus (Pty) Ltd, as independent environmental practitioners and ecological specialists, was appointed by Huddle Investments (Pty) Ltd to undertake an ecological verification study, following the ecological assessment carried out by SEF in 2005, of the areas that will be affected by the proposed Huddle Park Development. The site of the proposed development is located in Linksfield, Gauteng, within the City of Johannesburg Metropolitan Municipality.

The study area is situated within the Grassland Biome (Rutherford & Westfall, 1994) and within the Egoli Granite Grassland vegetation type which is also listed as an Endangered Ecosystem

Due to the small size of the study area as well as the level of transformation, only two vegetation communities namely transformed (old greens and fairways) and small pockets of Egoli Granite grassland were identified. Appendix B contains the species recorded during the field survey. Although the species diversity was in general fairly low, more than 100 individuals of *Hypoxis hemerocallidea* (African Potato) which is nationally classified as Declining and on GDARD's Orange List was identified within the study area and a permit should be obtained to relocate this species.

From a faunal perspective, the grassy areas attracted a few typical grassland bird species while the trees provided shelter, roosting and nesting habitat to many faunal species, especially birds. No wetland habitats were observed on site.

No areas of high ecological sensitivity were found on the site. The majority of the study area was classified as medium-low sensitivity as the entire site was found to be degraded, all natural habitats altered and large populations of exotic species were present throughout the area. Areas of low ecological sensitivity included roads, building rubble dumping sites as well as the old fairways.

It is the opinion of the ecologists that should the project proceed, impacts on the environment can be minimised through adherence to suggested mitigation measures.

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1. INTRODUCTION

Strategic Environmental Focus (Pty) Ltd, as independent environmental practitioners and ecological specialists, was appointed by Huddle Investments (Pty) Ltd to undertake an ecological (flora and fauna) verification study of the areas that will be affected by the proposed Huddle Park Development, based on the ecological assessment carried out by SEF in 2005. The site of the proposed project is located in Linksfield, Gauteng Province within the City of Johannesburg Metropolitan Municipality.

The proposed Huddle development will be located on Portion 84 (a portion of the remainder) of the Farm Bedford 68 IR and will be composed of business, residential and open space zoning. The development is approximately 53 hectares in extent and will be located on a portion of the old Huddle Park Golf Course, Linksfield, Gauteng. The proposed site is bordered by Linksfield Road and Club Street.

1.1 Terms of Reference

The terms of reference for the ecological verification study were as follows:

- Verify and update the ecological information contained in the ecological assessment report compiled by SEF in 2005;
- Provide a description of the dominant floral and faunal species occurring in the study area, including floral composition and structure;
- Describe the threatened, endemic, rare or protected plant and animal species, and/or potential habitats in the area under investigation;
- Map indicating the locality, extent and sensitivity of floral and faunal habitats;
- Provide a list of all plant species found during the survey;
- List the faunal species identified during the field survey as well as species expected to inhabit the study site;
- List the threatened, rare or protected plant and animal species that could occur on the site and GPS those confirmed to occur and indicate the confirmed localities on a map; and
- Recommend mitigation measures for faunal or floral species that may be affected by the proposed project.

1.2 Methodology

The field surveys were undertaken on the 6th and 7th of November 2012. The methodology entailed the following:

- Review of the existing ecological assessment conducted by SEF in 2005;
- Review of relevant literature, which included the vegetation unit(s) expected to occur on the site as well as the conservation status of the vegetation unit(s);
- Review of relevant literature which included the distribution data of fauna within the study area;
- Review of available information layers within the Geographical Information System (GIS); and

- Field surveys to confirm the ecological information contained in the report compiled by SEF (2005);
- Field surveys to confirm the presence or absence of threatened, endemic, rare or protected faunal and floral species on the study site and to identify suitable habitat for these species.

Further details regarding the methodology employed during the surveys are provided in Appendix A.

1.3 Limitations

According to GDARD the following minimum requirements were met during the surveys:

- Vegetation surveys should take place during the summer season (November to end of April);
- Surveys to determine the presence of any Red and Orange List species must take place during the flowering season of the species historically recorded on site or confirmed on site by the Directorate of Nature Conservation;
- Surveys for terrestrial and aquatic birds must be conducted in summer, but only once the vegetation layer has recovered sufficiently from winter fires and dormancy;

2. BACKGROUND

2.1 Location

The study area is situated within the Linksfield area of Gauteng Province, within the City of Johannesburg Metropolitan Municipality and falls within Quarter Degree Grid Cell (QDGC) 2528CC between 26°08'32.2" – 26°09'19.1 " south and 28°07'01.7 – 28°07'25.9" east (Figure 1).

2.2 Climate

Johannesburg receives approximately 604mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (0mm) in July and the highest (113mm) in January. The monthly average midday temperatures range from 16.6°C in June to 26.2°C in January, while the region is coldest in July when temperatures drop to 0.8°C on average during the night (Mucina & Rutherford, 2006).

2.3 Land use & Land cover

The land use of the study site is classified as public open space, sport and recreational (although now disused) while the land cover consists of abandoned grass fairways lined with stands of exotic trees and shrubs. The site is not classified within a green network and is isolated from an ecological perspective (Figure 2).



Figure 1: Location of the study site

2.4 Regional Vegetation

The study area is situated within the Grassland Biome (Rutherford & Westfall, 1994). The Grassland Biome comprises mainly of 'sweet' and 'sour' grasses and plants with perennial underground storage organs, for example bulbs and tubers, while trees are restricted to specialised habitats such as rocky outcrops or kloofs. The majority of Rare and Threatened plant species in the summer rainfall regions of South Africa are restricted to high-rainfall grasslands, making this the biome in most urgent need of conservation. It is not generally acknowledged that the majority of plant species in grasslands are non-grassy herbs (forbs), most of which are perennial plants with large underground storage structures. Rare and Endangered species in grasslands are mostly small, very localised and visible for only a few weeks in the year when they flower (Ferrar & Lötter, 2007).

The Grassland Biome is divided into smaller units known as vegetation types. According to Mucina & Rutherford (2006), the study area is situated within the Egoli Granite Grassland vegetation type which is restricted to the Gauteng Province from the Johannesburg Dome to Lanseria Airport and Centurion as well as westwards to Muldersdrift and to Tembisa in the east (Figure 2).

Egoli Granite Grassland consists of undulating plains and low hills with dense stands of *Hyparrhenia hirta* while woody plants are restricted to rocky areas. The grass layer has a rich diversity and include species such as *Aristida canescens*, *A.congesta*, *Cynodon dactylon*, *Eragrostis* species, *Heteropogon contortus*, *Melinis repens* and *Tristachya leucothrix* while the herbaceous layer include species such as *Acalypha angustata*, *Becium obovatum*, *Berkheya insignis*, *Crabbea hirsute*, *Cyanotis speciosa*, *Dicoma anomala* and *Pentanisia prunelloides*. Trees and shrubs are limited but include *Vangueria infausta*, *Searsia pyroides*, *Ziziphus zeyheriana* and *Lopholaena coriifolia*.

Egoli Granite Grassland is classified as Endangered with only 3% conserved in statutory reserves and private conservation areas. More than two thirds of the vegetation type has already been transformed by urbanisation, infrastructure and agriculture (Mucina & Rutherford, 2006).

2.5 Listed Ecosystems and Centres of Endemism

Nationally, each vegetation unit has been assigned a conservation status in order to identify those ecosystems in critical need of conservation. In addition, the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) provides for the listing of threatened or protected ecosystems. These ecosystems are grouped into Critically Endangered-, Endangered-, Vulnerable- and Protected-Ecosystems (Government Gazette, 2009). The purpose of listing ecosystems is primarily to reduce the rate of ecosystem and species extinction, including the prevention of further degradation and loss of structure, function and composition of threatened ecosystems. Due to irreversible loss of natural habitat, Egoli Granite Grassland is currently listed as an Endangered ecosystem in terms of Section 52 of NEMBA (Government Gazette, 2009).



Figure 2: Regional vegetation and green network in relation to the study site

2.7 Gauteng Conservation Plan

The Gauteng Conservation Plan (C-Plan) was started in 2000 and the aim was to revise this plan at least every five years. The small size of Gauteng province made it feasible to conduct extensive biodiversity surveys which aimed to provide the information on spatial occurrence of biodiversity which was necessary for conservation planning.

C-Plan 3 is based on the principles of complementarity, efficiency, defensibility and flexibility, irreplaceability, retention, persistence and accountability (GDARD, 2012).

Knowledge of the distribution of biodiversity, the conservation status of species, approaches for dealing with aspects such as climate change, methods of data analysis, and the nature of threats to biodiversity within the planning region are constantly changing, especially in Gauteng Province, where development is taking place at a rapid rate. The main purposes of the C-Plan 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 within the province; and
- To serve as a basis for development of Bioregional Plans in municipalities within the Province.

The C-Plan 3 considers the following biodiversity features:

- Plants (Including priority ranking of species of conservation concern in Gauteng);
- Bird habitat models;
- Invertebrates (includes species of conservation concern and known localities with buffers);
- Fish;
- Herpetofauna;
- Pan clusters;
- Near pristine quaternary catchments;
- Bioclimatic zones;
- Carbon sequestration; and
- Primary vegetation.

The C-Plan furthermore makes provision for Critical Biodiversity Areas (CBA's) and Ecological Support Areas (ESA's). According to the C-Plan, there is no CBA or ESA within the study area although an ESA is located on the north eastern boundary of the study area on the opposite side of Club Street (Figure 3).

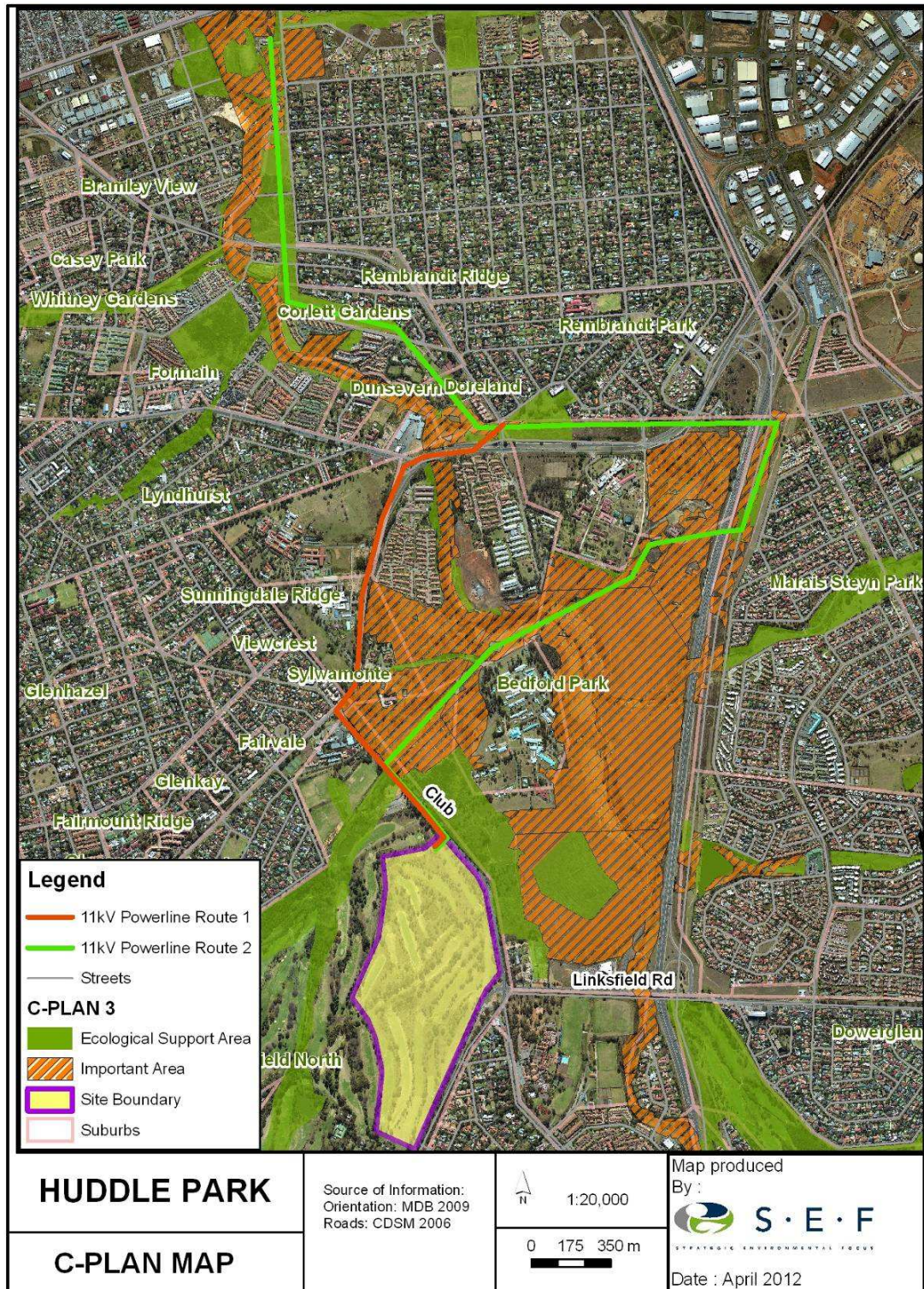


Figure 3: Gauteng Conservation Plan in relation to the study area

3. RESULTS: FLORA

3.1 Overview

Due to the small size of the study area as well as the level of transformation, only two vegetation communities were identified, namely transformed (old greens and fairways) and small pockets of Egoli Granite Grassland. Appendix B contains the species recorded during the field survey.

3.1.1 Egoli Granite Grassland pockets

Small, isolated pockets of vegetation representative of Egoli Grassland were recorded in the northern section of the study area (Photograph 1). Although these areas were generally very small (less than 20m²), they supported a fairly high species diversity including species such as *Cyperus sphaerocephalus* (Yellow Sedge), *Hypoxis iridifolia*, *Gerbera ambigua* (Pink and White Gerbera), *Raphionacme hirsuta* (False Gentian), *Delosperma herbeum* (Highveld White Vygie) and *Albuca setosa* (Small White Albuca) (Photograph 2). A summary of the vegetation, including threatened or protected species is provided in Table 1.



Photograph 1: Isolated pockets of Egoli Granite Grassland supporting fairly high species diversity



Photograph 2: *Delosperma herbeum* (Highveld White Vygie) and *Albuca setosa* (Small White Albuca) in Egoli Granite Grassland pockets

Table 1: Plant species recorded in pockets of vegetation representative of Egoli Granite Grassland

Dominant species at the time of the survey:	<u>Grasses:</u> <i>Brachiaria serrata</i> <i>Themeda triandra</i> <i>Tristachya leucothrix</i> <i>Eragrostis curvula</i> <i>Eragrostis capensis</i> <u>Trees and shrubs:</u> <i>Searsia lancea</i>
Plants of conservation concern confirmed to occur:	<i>Hypoxis hemerocallidea</i>
Plants of conservation concern for which suitable habitat was observed:	<i>Callilepis leptophylla</i>
Provincially protected plants confirmed to occur:	<i>Hypoxis hemerocallidea</i>
Provincially protected plants for which suitable habitat was found:	<i>Callilepis leptophylla</i>
Nationally protected tree species confirmed:	None
Alien species:	None (within the pockets)

3.1.2 Transformed areas

The majority of the area consisted of transformed areas which included old fairways and greens as well as old dumping areas dominated by alien vegetation (Photograph 3). The old fairways and greens were dominated by mostly exotic ornamental trees such as *Tipuana tipu* (Tipu Tree), *Pinus pulata* (Paluta Pine), *Quercus* species (Oak Trees) and *Jacaranda mimosifolia* (Jacaranda), two indigenous species, *Acacia sieberiana* (Paperbark Thorn) and *Searsia lancea* (Karee) were also recorded. The grass layer was dominated by *Pennisetum cladestinum* (Kikuyu) but the nationally declining *Hypoxis hemerocallidea* (African Potato) was also recorded under some of the trees (Photograph 4). A large burrow pit or dumping area was located towards the centre of the study area and included alien species such as *Eucalyptus* (Blue Gum Trees), *Melia azedarach* (Syringa). Species recorded in the transformed areas are summarized in table 2.



Photograph 3: Transformed areas included old fairways and greens (left) as well as dumping areas dominated by alien vegetation (right)



Photograph 4: Indigenous trees such as *Acacia sieberiana* (Paper Bark) (left) and *Hypoxis hemerocallidea* (African Potato) indicated by arrows (right) located within the transformed areas

Table 2: Plant species recorded in Transformed areas

Dominant species at the time of the survey:	<u>Grasses:</u> <i>Pennisetum clandestinum</i> <u>Herbs:</u> <i>Felicia muricata</i> <i>Hypoxis hemerocallidea</i> <u>Trees and shrubs</u> <i>Acacia sieberiana</i> <i>Searsia lancea</i>
Plants of conservation concern confirmed to occur:	<i>Hypoxis hemerocallidea</i>
Plants of conservation concern for which suitable habitat was observed:	None
Provincially protected plants confirmed to occur:	<i>Hypoxis hemerocallidea</i>
Provincially protected plants for which suitable habitat was found:	None
Nationally protected tree species confirmed:	None
Alien species:	<i>Eucalyptus</i> species <i>Melia azedarach</i> <i>Pinus patula</i> <i>Tipuana tipu</i>

3.2 Plants of Conservation Concern

Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes. A plant taxon is of conservation concern when it is considered to be threatened, or close to becoming threatened with extinction and therefore classified as Critically Endangered, Endangered, Vulnerable or Near Threatened. These plants are nationally protected by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Within the context of this report, plants that are Declining, Rare and Data Deficient (Taxonomic and Distribution) are also referenced under this heading.

Rare and Endangered species are mostly small, very localized and visible for only a few weeks in the year when they flower (Ferrar & Lötter, 2007). As these plants might

not have been visible at the time of the field survey, the probabilities of occurrence for these plants were based on distribution data and information gathered concerning the area.

Fourteen (14) plant species of conservation concern have been recorded from the QDGC (Raimondo *et al.*, 2009; POSA, 2011) and of these; one was confirmed to occur while one other species is considered “Likely” to occur within the study area based on the presence of suitable habitat (Table 3). Rescue and relocation of these plants will require a permit and should be accompanied by either a rehabilitation plan where the plants will be re-established or the plants should be rescued and replanted at a suitable, dry grassland, site.

Table 3: Species of conservation concern that could potentially occur in the study area

Species	Conservation Status	Habitat requirements	Likelihood of occurring in study area
<i>Acalypha caperoides</i> var. <i>Caperonioides</i>	Data Deficient (Taxonomic)	Unknown	Unknown
<i>Alepidea peduncularis</i>	Data deficient	Unknown	Unlikely
<i>Andromischus umbraticola</i> subsp. <i>Umbraticola</i>	Near Threatened	South facing rock crevices and ridges, restricted to Gold Reef Mountain Bushveld	Highly Unlikely
<i>Callilepis leptophylla</i>	Declining	Grassland or open woodland	Likely
<i>Cineraria austrotransvaalensis</i>	Near Threatened	Amongst rocks on steep slopes of hills and ridges or edge of thick bush under trees on all aspects and various soil types	Highly Unlikely
<i>Cineraria longipes</i>	Vulnerable	Grassland, on koppies, amongst rocks and along seepage lines, exclusively on basalt on south-facing slopes	Highly Unlikely
<i>Drimia elata</i>	Data Deficient (Taxonomic)	Unknown	Unknown
<i>Gunnera perpensa</i>	Declining	Usually in wetlands, marshes or along streambanks	Highly Unlikely
<i>Holothrix randii</i>	Near Threatened	Grassy slopes and rock ledges, usually southern aspects	Unlikely
<i>Hypoxis hemerocallidea</i>	Declining	Wide range of habitats	Confirmed
<i>Myrothamnus flabellifolius</i>	Data deficient	Unknown	Unknown
<i>Salvia schlechteri</i>	Data Deficient (Distribution)	Unknown	Unknown
<i>Stenostelma umbelluliferum</i>	Near Threatened	Deep black turf in open woodland mainly in the vicinity of drainage lines. Has been recorded in Pretoria North and adjacent areas in the North West Province.	Highly Unlikely
<i>Trachyandra erythrorrhiza</i>	Near Threatened	Marshy areas, grassland, usually in black turf marshes	Unlikely

3.3 Provincially Protected Plants

A number of plants that were identified within the study area are not threatened, but are listed as red or orange species by GDARD and these are listed in Table 4.

Table 4: Protected plants identified and which could occur within the study area (species in bold was confirmed in the study area)

Family / Species	Conservation Status	Habitat requirements	Occurrence in study area
<i>Alepeidea attenuata</i>	Near Threatened	Wetlands in grassland	Unlikely
<i>Argyrobium campicola</i>	Near Threatened	Highveld grassland	Unlikely
<i>Boophone disticha</i>	Declining	Dry grassland and rocky areas	Possible, although this is a conspicuous species but was not observed during the field survey.
<i>Callilepis leptophylla</i>	Declining	Grassland or open woodland	Likely
<i>Drimia sanbuinea</i>	Near Threatened	Open veld and scrubby woodland in a variety of soil types	Unlikely
<i>Hypoxis hemerocallidea</i>	Declining	Wide range of habitats	Confirmed
<i>Habenaria bicolor</i>	Near Threatened	Grasslands above 1600m	Unlikely
<i>Melolobium subspicatum</i>	Vulnerable	Grassland	Unlikely

A large number of *Hypoxis hemerocallidea* (African Potato) was recorded throughout the northern section of the study area with numbers at each locality ranging from 1 to 70 individuals (Photograph 5; Figure 4). According to GDARD (2012), the entire area which is occupied by populations of Red List and Orange List species must be mapped and buffered by 200m in urban areas. However, since the area is largely transformed, it is recommended that a permit is obtained from GDARD to relocate the plants to a suitable, grassland area in the near vicinity.



Photograph 5: Large numbers of *Hypoxis hemerocallidea* (African Potato) recorded in the study area

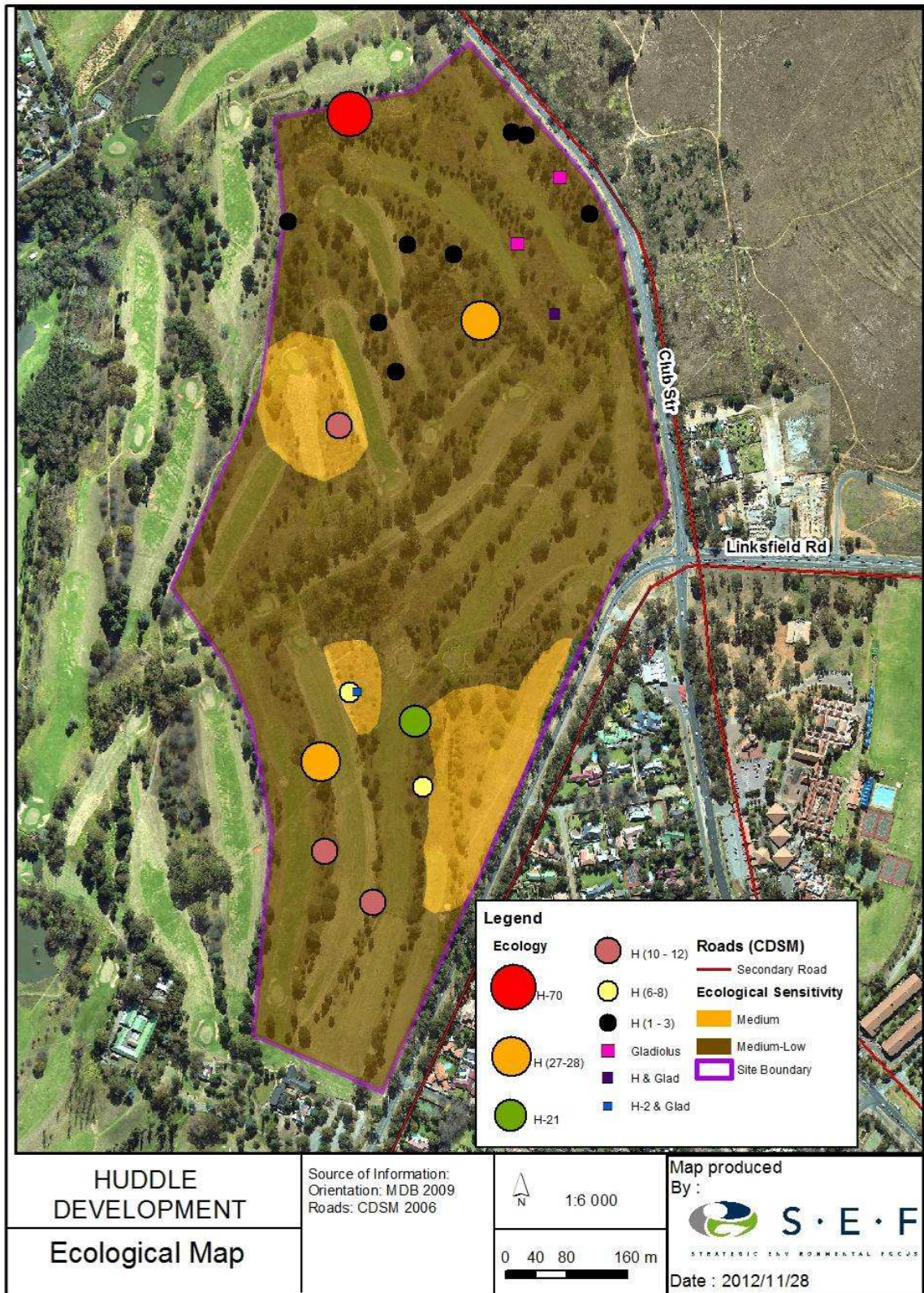


Figure 4: Ecological sensitivity as well as *Hypoxis hemerocallidea* localities within the study area. Numbers in the legend indicate the number of individuals recorded at each locality

3.4 Alien and Invasive Plants

Declared weeds and invaders have the tendency to dominate or replace the herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that all these transformers (as defined above) be eradicated and controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species (Henderson, 2001).

The amended Regulations (Regulation 15) of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) identifies three categories of problem plants:

- **Category 1** plants may not occur on any land other than a biological control reserve and must be controlled or eradicated. Therefore, no person shall establish, plant, maintain, propagate or sell/import any category 1 plant species;
- **Category 2** plants are plants with commercial application and may only be cultivated in demarcated areas (such as biological control reserves) otherwise they must be controlled; and
- **Category 3** plants are ornamentally used plants and may no longer be planted, except those species already in existence at the time of the commencement of the regulations (30 March 2001), unless they occur within 30m of a 1:50 year flood line and must be prevented from spreading.

The following categories are proposed on the revised Conservation of Agriculture Resource act (CARA) and the National Environmental Management Biodiversity Act (NEMBA).

- **Category 1a:** Plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned.
- **Category 1b:** Plants are widespread invasive species controlled by a management programme.
- **Category 2:** Plants are invasive species controlled by area. Can be grown under permit conditions in demarcated areas. All breeding, growing, moving, and selling are banned without a permit.
- **Category 3:** Plants are ornamental and other species that are permitted on a property but may no longer be planted or sold.

Since the study area was located on an old golf course, the fairways and boundaries were landscaped with exotic ornamental species such as *Tipuana tipu* (Tipu Tree), *Pinus patula* (Patula Pine), *Jacaranda mimosifolia* (Jacaranda), *Quercus* spp. (Oak Trees) and various *Eucalyptus* spp. (Blue-gum Trees) (Photograph 6). Invasive species recorded from the study area, was mostly confined to the burrow pit / dumping area and included species such as *Melia azedarach* (Syringa), *Solanum mauritianum* (Bugweed), various *Eucalyptus* species and *Acacia dealbata*.



Photograph 6: Eucalyptus spp. (left) along the boundaries as well as Quercus spp. (Oak Trees) next to the old fairways

Table 5: Alien species recorded in the study area

Scientific name	Common name	Category	Proposed CARA/NEMBA	Occurrence in study area
<i>Acacia dealbata</i>	Silver Wattle	Invader: 2	1b	Recorded in western section of study area
<i>Bidens species</i>	Black Jack	Weed	None	Recorded throughout the study area especially in disturbed areas
<i>Centella asiatica</i>	Marsh Pennywort	No category	None	Recorded throughout the study area
<i>Eucalyptus species</i>	Blue Gum Trees	Invader: 2	2	Recorded throughout the study area
<i>Jacaranda mimosifolia</i>	Jacaranda	Invader: 3	3	Sporadically in the old fairway areas
<i>Melia azedarach</i>	Syringa	Invader: 3	1b in Gauteng	Recorded in large numbers at the dumping area
<i>Paspalum dilatatum</i>	Common Paspalum	No category	None	Sporadically in the northern section of the study area
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Proposed invader: 2	None	Used for landscaping of the fairways and greens throughout the study area
<i>Pinus patula</i>	Patula Pine	Invader: 2	2	Throughout the study area
<i>Quercus species</i>	Oak Trees	No category	None	Used for landscaping of the fairways
<i>Solanum mauritianum</i>	Bugweed	Weed: 2	1b	Recorded in the dumping area
<i>Tipuana tipu</i>	Tipu Tree	Potential invader	3	Used for landscaping of the old fairways
<i>Verbena aristigera</i>	Fine-leaved Verbena	No category	None	Recorded throughout the study area
<i>Verbena bonariensis</i>	Wild Verbena	No category	1b	Recorded throughout the study area

3.5 Medicinal plants recorded within the study area

The demand for medicinal plants is on the increase while the frequently used species and the communal land that it is harvested from, are on the decline. With an increase in the country's population and the high rate of infectious diseases, this will put an even higher strain on the already scarce natural medicinal resources (Emery *et al.*, 2002). Areas of high biodiversity are thus important for the conservation and sustainable use of these resources and should be protected.

The indigenous flora recorded associated with the study area was heavily impacted on by harvesters (wood & medicinal) as well as frequent fires and overgrazing. A traditional healer was observed harvesting plant material in the study area during the field survey. Table 6 lists the most common medicinal plant species which were recorded in the study area.

Table 6: Medicinal plant species recorded in the study area (species in red are nationally classified as Declining)

Scientific name	Common name	Conservation status (where applicable)
<i>Cyanotis speciosa</i>	Powderpuff Flower	None
<i>Ledebouria revoluta</i>		None
<i>Ziziphus zeyheriana</i>	Dwarf Buffalo Thorn	None
<i>Hypoxis hemerocallidea</i>	African Potato	Declining
<i>Hypoxis rigidula</i>	Silver-leaved Star-flower	None
<i>Vigna vexillata</i>	Narrow-leaved Wild Sweetpea	None
<i>Vernonia oligocephala</i>	Bicoloured-leaved Vernonia	None

4. RESULTS: FAUNA

4.1 Faunal Habitats

The study site was found to be degraded by the past golf-related activities and all natural habitat altered. Faunal habitat on the study site included grassy areas (old fairways and greens) and stands of predominantly exotic trees which lined the fairways. The grassy areas attracted a few typical grassland bird species such as Spotted Thick-knee (*Burhinus capensis*) and Crowned Lapwing (*Vanellus coronatus*), as well as a few small mammal species while the trees provided shelter, roosting and nesting habitat to many faunal species, especially birds.



Photograph 7: Grassy abandoned fairways lined with stands of mostly exotic trees

As stated in the previous ecological assessment (SEF, 2005), golf courses usually encompass large areas of green space and can potentially provide unique opportunities for creating faunal habitat in urbanised landscapes. These are mostly associated with water hazards (ponds and dams) which create wetland and riparian habitat for faunal and floral species. In the previous assessment, where a larger study area was investigated, the only sensitive habitats (rated as medium importance) were located in the aquatic environments. The present study investigated a revised, smaller area that excluded all wetland areas, and no aquatic environments were found on the site.

4.2 Faunal Species Occurrence

4.2.1 Avifauna

A total of 24 bird species were observed during the field survey (none of which are of conservation concern) and are listed in Appendix C along with their national (Barnes, 2000) and global (IUCN, 2012) conservation status.

Approximately 407 bird species occur within QDGC 2628AA and the region of the study site. The region holds a high level of avifaunal endemism with approximately 59 of the total species found in the QDGC being endemic to southern Africa. Furthermore, 32 bird species of conservation concern (species having a Red Data Status higher than Least Concern) are found within the QDGC, five of which are also endemic to southern Africa. All bird species of conservation concern (including endemics) occurring within the QDGC are listed in Appendix D along with their national and global conservation status, probability of occurring on site and habitat preference.

Two species endemic to southern Africa, Bokmakierie (*Telophorus zeylonus*) and Cape White-eye (*Zosterops capensis*) were observed in the area of the study site during the field survey (see Appendix C and Appendix D). A further 11 endemic species were given a high probability of occurring on the site due to the presence of suitable habitat. No species of conservation concern were given a high probability of occurring on site (Appendix D).

4.2.2 Mammals

The region includes a relatively high diversity of mammals with approximately 90 species expected to occur within QDGC 2628AA according to the IUCN. These species are listed in Appendix E along with the probability of each species occurring in the study area as well as their national (Friedmann & Daly, 2004; DEAT, 2007) and global (IUCN, 2012) conservation status. Two mammal species were identified on the study site during the field survey and include the Common Mole-rat (*Cryptomys hottentotus*) and feral cats. Two additional species were given a high probability of occurring on the site and do not include any species of conservation concern (Appendix E). A further 27 species were given a medium probability of occurring on the site, including two species of conservation concern. However, these are unlikely to occur there due to the urban surrounds and the fragmented nature of the site.

4.2.3 Herpetofauna

Reptiles

According to ReptileMAP, a continuation of the Southern African Reptile Conservation Assessment (SARCA) (ADU, 2012), 47 reptile species have been confirmed to occur within QDGC 2628AA (Appendix F) including the Near Threatened Striped Harlequin Snake (*Homoroselaps dorsalis*). While 14 of the total are endemic to southern Africa, the majority have not had their conservation status adequately evaluated. No reptile species of conservation concern are likely to occur on the study site.

Amphibians

According to FrogMAP, a continuation of the Southern African Frog Atlas Project (SAFAP) (ADU, 2012), which is based on Minter *et al.* (2004), 13 amphibian species have been confirmed to occur within QDGC 2628AA, while a further seven possibly occur in the QDGC according to IUCN species distribution ranges (Appendix F). This includes the nationally protected Giant Bullfrog (*Pyxicephalus adspersus*). No amphibian species were identified during the field survey and no species of conservation concern are likely to occur on the study site.

4.2.4 Lepidoptera (Butterflies)

South Africa is home to about 666 species of butterflies (Woodhall, 2005). Butterflies, like most invertebrates, are highly sensitive to environmental change making them more vulnerable to the presence of toxins in the ecosystem. The most significant causes of habitat loss for butterflies include invasive alien vegetation, changing fire regimes, agricultural activities, urbanisation, plantation forestry, increased grazing and road construction (Henning *et al.*, 2009).

According to the South African Butterfly Conservation Assessment (SABCA), 144 butterfly species occur within QDGC 2628AA, including the Endangered Highveld Blue (*Lepidochrysops praeterita*), and the Vulnerable Marsh Sylph (*Metisella meninx*) (Appendix G). Due to the lack of suitable habitat it is unlikely that these species will occur within the study area.

5. ECOLOGICAL SENSITIVITY

Based on the findings of the ecological assessments and the following criteria, ecologically sensitive habitats or areas of conservation importance were mapped for flora and fauna (Figure 4).

Ecological Function: The ecological function describes the intactness of the structure and function of the vegetation communities which in turn support faunal communities. It also refers to the degree of ecological connectivity between the identified vegetation communities and other systems within the landscape. Therefore, systems with a high degree of landscape connectivity among each other are perceived to be more sensitive.

High – Sensitive vegetation communities with either low inherent resistance or resilience towards disturbance factors or vegetation that are considered important for the maintenance of ecosystem integrity. Most of these vegetation communities represent late succession ecosystems with high connectivity with other important ecological systems.

Medium – Vegetation communities that occur at disturbances of low-medium intensity and representative of secondary succession stages with some degree of connectivity with other ecological systems.

Low – Degraded and highly disturbed vegetation with little ecological function.

Conservation Importance: The conservation importance of the site gives an indication of the necessity to conserve areas based on factors such as the importance of the site on a national and/or provincial scale and on the ecological state of the area (degraded or pristine). This is determined by the presence of a high diversity, rare or endemic species and areas that are protected by legislation. The criteria are defined as follows:

High – Ecosystems with high species diversity and usually provide suitable habitat for a number of threatened species. These areas should be protected.

Medium – Ecosystems with intermediate levels of species diversity without any threatened species.

Low – Areas with little or no conservation potential and usually species poor (most species are usually exotic).

5.1 Areas of High Sensitivity

No areas of high ecological sensitivity were identified in the study area.

5.2 Areas of Medium Sensitivity

The pockets of remnant Egoli Granite Grassland contained a fairly high species diversity including the Nationally Declining, *Hypoxis hemerocallidea* and were therefore classified as Medium sensitivity.

5.3 Areas of Low Sensitivity

Areas of low ecological sensitivity in the study area included unofficial roads, and building rubble dumping sites.

6. IMPACT ASSESSMENT AND MITIGATION

Any developmental activities in a natural system will impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify and assess the significance of the impacts caused by the proposed activity and to provide a description of the mitigation required so as to limit the perceived impacts on the natural environment.

6.1 Assessment Criteria

The environmental impacts are assessed with mitigation measures (WMM) and without mitigation measures (WOMM) and the results presented in impact tables which summarise the assessment. Mitigation and management actions are also recommended with the aim of enhancing positive impacts and minimising negative impacts.

The criteria against which these activities were assessed are discussed below.

Nature of the Impact

This is an appraisal of the type of effect the project would have on the environment. This description includes what would be affected and how and whether the impact is expected to be positive or negative.

Extent of the Impact

A description of whether the impact will be local, limited to the study area and its immediate surroundings, regional, or on a national scale.

Duration of the Impact

This provides an indication of whether the lifespan of the impact would be short term (0-5 years), medium term (6-10 years), long term (>10 years) or permanent.

Intensity

This indicates the degree to which the impact would change the conditions or quality of the environment. This was qualified as low, medium or high.

Probability of Occurrence

This describes the probability of the impact actually occurring. This is rated as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

Degree of Confidence

This describes the degree of confidence for the predicted impact based on the available information and level of knowledge and expertise. It has been divided into low, medium or high.

6.2 Impact Assessment

Possible impacts and their sources associated with the proposed housing development are provided in Table 7 and since the impacts are similar during the construction and operational phases, these are discussed together.

Table 7: Possible impacts arising during the construction phase

Possible impact	Source of impact	Area to be affected
Destruction of faunal and floral habitat associated with housing development	Ground clearing and construction of infrastructure and roads	Access roads, development, infrastructure
Soil erosion	Heavy machines clearing vegetation for construction	Site and immediate surroundings along the boundaries and areas for any new infrastructure
Introduction and spread of invasive vegetation	Disturbance / destruction of indigenous vegetation making ecosystems vulnerable to invasions	Site and immediate surroundings
Introduction of alien and domesticated animals	Construction workers and residents	Site and immediate surroundings
Pollution by hazardous materials and rubbish	Construction workers and residents	Site and immediate surroundings
Interference with faunal breeding activities	Noise generated by vehicles and construction activity and human presence	Surrounding Green Belt areas containing the wetland and golf course

6.2.1 Destruction of natural habitat and vegetation

	Scale	Duration	Magnitude	Probability of occurrence	Significance	Confidence
WOMM	Site	Permanent	High	Definite	Medium	High
WMM	Site	Medium-term	Low	Definite	Low	Medium

Description of impact:

Although the area consists mostly of transformed vegetation, the construction of infrastructure and access roads will lead to destruction of remaining natural vegetation and faunal habitat resulting in the possible mortality of plants and animals.

Mitigation measures:

- If any plants of conservation concern or species which are provincially protected will be destroyed or damaged during construction activities, these plants should be removed by a qualified botanist and replanted in a suitable area;
- An independent Environmental Control Officer (ECO) should be appointed to oversee all construction activities;
- No open fires are be allowed; and
- Residential areas and internal roads should be landscaped with indigenous plant species that will be beneficial to faunal species, such as bats and birds thereby possibly contributing to increased faunal diversity within the urban environment.

6.2.2 *Exposure to erosion*

	Scale	Duration	Magnitude	Probability of occurrence	Significance	Confidence
WOMM	Local	Medium-term	Moderate	Medium	Medium	Medium
WMM	Site	Short term	Low	Low	Low	Medium

Description of Impact

During the construction phase the removal of surface vegetation can cause exposed soil conditions where rainfall and high winds can cause mechanical erosion. Rainfall and inadequate drainage systems would lead to sediments washing down into wetlands and low lying areas, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive trees can spread easily into these eroded soil.

Mitigation Measures

- An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place;
- Erosion must not be allowed to develop on a large scale before effecting repairs;
- No construction / activities may be undertaken within the wetland areas or within 500m from the edge of the wetlands until a Water Use License is granted by the Department of Water Affairs;
- Vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area (DWAF, 2005);

- Runoff from roads must be managed to avoid erosion and pollution problems;
- All areas susceptible to erosion must be protected and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas; and
- Areas exposed to erosion due to construction should be vegetated with species naturally occurring in the area.

6.2.3 Potential increase in invasive vegetation

	Scale	Duration	Magnitude	Probability of occurrence	Significance	Confidence
WOMM	Local	Medium-term	Moderate	Medium	Medium	Medium
WMM	Site	Short-term	Low	Low	Low	Medium

Description of Impact

During construction, vegetation will be removed and soil disturbed. The seed of alien invasive species that occur on and in the vicinity of the construction area could spread into the disturbed and surrounding areas.

Mitigation Measures

- During construction, the construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation;
- Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on surrounding vegetation including the wetlands;
- All alien seedlings and saplings must be removed as they become evident for the duration of construction and operational phase; and
- Manual / mechanical removal is preferred to chemical control.

6.2.4 Introduction and spread of alien and domesticated animals

	Scale	Duration	Magnitude	Probability of occurrence	Significance	Confidence
WOMM	Local	Long-term	Moderate	Medium	Low	Medium
WMM	Site	Medium-term	Low	Medium	Low	Medium

Description of Impact

Domesticated animals such as dogs and cats can have an impact on the local indigenous faunal species through direct competition, spread of diseases and hunting, while alien species often associated with human presence such as the Common Myna (*Acridotheres tristis*) and Black Rat (*Rattus rattus*) also have negative impacts on local biodiversity. Although these species are likely to be in the area

already, the following mitigations are recommended to limit the impact of these animals.

Mitigation measures

It is recommended that the Development's Home Owners Association guidelines should include clauses indicating that domestic animals must not be allowed to roam in areas containing natural vegetation and should also indicate that stray animals will be eradicated.

6.2.5 Contamination of the environment by hazardous materials and rubbish

	Scale	Duration	Magnitude	Probability of occurrence	Significance	Confidence
WOMM	Local	Long-term	High	Definite	Medium	Medium
WMM	Site	Short-term	Moderate	High	Low	Medium

Description of Impact

Hazardous materials such as fuel and oil for construction vehicles used have the potential to contaminate soils, watercourses and ground water while uncontrolled dumping of rubbish will lead to pollution of the natural environment as well as faunal injury and mortality.

Mitigation measures

- During the construction phase hazardous waste should be stored in compliance with regional, national and local legislation;
- Water passing through vehicle bays and workshops must pass through oil traps to ensure that all hazardous material is removed;
- All construction waste and rubble must be removed to an official landfill site.

6.2.6 Interference with fauna and faunal breeding activities

	Scale	Duration	Magnitude	Probability of occurrence	Significance	Confidence
WOMM	Local	Long-term	High	High	Medium	High
WMM	Local	Long-term	Moderate	High	Low	Medium

Description of impact

A number of bird species were observed utilising the stands of exotic trees for breeding purposes. The removal these trees will result in the loss of shelter, roosting and breeding habitat for many species and could possibly lead to mortality of individuals. Food and rubbish can attract wildlife to the area, increasing risk of negative interactions.

Mitigation Measures

- Construction should commence in the winter months in order to minimise the impacts on the breeding activities of faunal species especially avifauna utilising the exotic trees;
- No wild animal may under any circumstance be handled, removed or be interfered with by construction workers;
- No wild animal may be fed on site;
- No wild animal may under any circumstance be hunted, snared, captured, injured or killed. This includes animals perceived to be vermin. Checks of the surrounding areas must be regularly undertaken to ensure no traps have been set. Any snares or traps found on or adjacent to the site must be removed and disposed of;
- No domesticated animals must be allowed on site; and
- All food should be securely stored away to prevent attraction of faunal species and all rubbish should be disposed of away from the site. Bins located around the site should have tightly fitting lids to prevent faunal species raiding the bins and thereby becoming habituated to humans.

7. CONCLUSION

The study area is situated within the Egoli Granite Grassland vegetation type, which is classified as an Endangered Ecosystem. However, the study area was found to be mostly transformed since it is located on an old gold course and species diversity was generally rather low although one floral species, *Hypoxis hemerocallidea* which is classified as Declining has been confirmed on site and it is recommended that the plants are relocated by a suitably qualified botanist before construction commences.

No areas of high ecological sensitivity were found on the site. The majority of the study area was classified as medium-low sensitivity as the entire site was found to be degraded and all natural habitats altered. Areas of low ecological sensitivity included roads, building rubble dumping sites and old fairways.

It is the opinion of the ecologists that should the project proceed, impacts on the environment can be minimised through adherence to suggested mitigation measures.

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GLOSSARY

Alien species	Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity.
Biodiversity	Biodiversity is the variability among living organisms from all sources including <i>inter alia</i> terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.
Biome	A major biotic unit consisting of plant and animal communities having similarities in form and environmental conditions, but not including the abiotic portion of the environment.
Buffer zone	A collar of land that filters edge effects.
Climax community	<p>The presumed end point of successional sequence; a community that has reached a steady state, the most mature and fully developed vegetation that an ecosystem can achieve under the prevailing conditions. It is reached after a sequence of changes in the ecosystem, known as succession. Once climax vegetation develops, the changes are at a minimum and the vegetation is in dynamic equilibrium with its environment.</p> <p>Very few places show a true climax because physical environments are constantly changing so that ecosystems are always seeking to adjust to the new conditions through the process of succession.</p>
Conservation	The management of the biosphere so that it may yield the greatest sustainable benefit to present generation while maintaining its potential to meet the needs and aspirations of future generations. The wise use of natural resources to prevent loss of ecosystems function and integrity.
Conservation concern	Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened (see Threatened), Extinct in the wild, Data deficient, Near threatened , Critically rare, Rare and Declining . These plants are nationally protected by the National Environmental Management: Biodiversity Act. Within the context of these reports, plants that are Declining are also discussed under this heading.
Conservation status	An indicator of the likelihood of that species remaining extant either in the present day or the near future. Many factors are taken into account when assessing the conservation status of a species: not simply the number remaining, but the overall increase or decrease in the population over time, breeding success rates, known threats, and so on.
Community	Assemblage of populations living in a prescribed area or physical habitat, inhabiting some common environment.
Correspondence Analysis	Correspondence Analysis simultaneously ordines species and samples.
Critically Endangered	A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

Data Deficient	There is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. However, “data deficient” is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
Declining	A taxon is declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Threatened or Near Threatened, but there are threatening processes causing a continuous decline in the population (Raimondo <i>et al.</i> , 2009).
Ecological Corridors	Corridors are roadways of natural habitat providing connectivity of various patches of native habitats along or through which faunal species may travel without any obstructions where other solutions are not feasible.
Edge effect	Inappropriate influences from surrounding activities, which physically degrade habitat, endanger resident biota and reduce the functional size of remnant fragments including, for example, the effects of invasive plant and animal species, physical damage and soil compaction caused through trampling and harvesting, abiotic habitat alterations and pollution.
Endangered	A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
Fauna	The animal life of a region.
Flora	The plant life of a region.
Forb	A herbaceous plant other than grasses.
Habitat	Type of environment in which plants and animals live.
Indigenous	Any species of plant, shrub or tree that occurs naturally in South Africa.
Invasive species	Naturalised alien plants that have the ability to reproduce, often in large numbers. Aggressive invaders can spread and invade large areas.
Least Concern	A taxon is Least Concern when it has been evaluated against five IUCN criteria and does not qualify for the Threatened or Near threatened Categories (Raimondo <i>et al.</i> , 2009).
Mitigation	The implementation of practical measures to reduce adverse impacts.
Near Threatened	A Taxon is Near Threatened when available evidence indicates that that it nearly meets any of the five IUCN criteria for Vulnerable, and is therefore likely to qualify for a threatened category in the near future (Raimondo <i>et al.</i> , 2009).
Plant community	A collection of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighbouring patches of different vegetation types. The components of each plant community are influenced by soil type, topography, climate and human disturbance.

Protected Plant	According to Provincial Nature Conservation Ordinances, no one is allowed to sell, buy, transport, or remove this plant without a permit from the responsible authority. These plants are protected by provincial legislation.
Threatened	Species that have naturally small populations and species which have been reduced to small (often unsustainable) population by man's activities.
Red Data	A list of species, fauna and flora that require environmental protection - based on the IUCN definitions. Now termed Plants of Conservation Concern.
Species diversity	A measure of the number and relative abundance of species.
Species richness	The number of species in an area or habitat.
Succession	Progressive change in the composition of a community of plants, e.g. from the initial colonisation of a bare area, or of an already established community towards a largely stable climax. The complete process of succession may take hundreds or thousands of years and entails a number of intermediate communities - each called a seral community. The replacement of one seral community by another in most cases leads to the eventual formation of a climax community, a relatively stable community of plants and animals.
Vegetation Unit	A complex of plant communities ecologically and historically (both in spatial and temporal terms) occupying habitat complexes at the landscape scale. Mucina & Rutherford (2006) state: "Our vegetation units are the obvious vegetation complexes that share some general ecological properties such as position on major ecological gradients and nutrient levels, and appear similar in vegetation structure and especially floristic composition".
Threatened	Threatened Species are those that are facing a high risk of extinction, indicated by placing in the categories Critically Endangered (CR), Endangered (E) and Vulnerable (VU) (Raimondo <i>et al.</i> , 2009).
Vulnerable	A taxon is Vulnerable when it is not Critically Endangered or Endangered but meets any of the five IUCN criteria for Vulnerable and is therefore facing a high risk of extinction in the wild in the future (Raimondo <i>et al.</i> , 2009).

APPENDICES

- APPENDIX A** Methodology
- APPENDIX B** Plant species identified on the study site
- APPENDIX C** Bird species observed in the study area as well as their national and global conservation status
- APPENDIX D** Bird species of conservation concern occurring within QDGC 2628AA, probability of occurring on site and habitat preference
- APPENDIX E** Mammal species occurring within QDGC 2628AA, national and global conservation status, probability of occurring on site and habitat preference
- APPENDIX F** Reptile and Amphibian species occurring within QDGC 2628AA, national and global conservation status, probability of occurring on site and habitat preference
- APPENDIX G** Butterfly species occurring within QDGC 2628AA as well as likelihood of occurring on site including habitat preference and where possible, larval host plant species

APPENDIX A: METHODOLOGY

FLORA

Desktop analysis and literature review

The desktop studies entailed a literature survey of all plant species occurring in the QDGC 2628AA according to the Plants of Southern Africa online checklist (SANBI, 2009). Additional data such as habitat preference and species descriptions were gathered for all plants of conservation concern which were included in the list. Background information on the regional vegetation was gathered using GIS and Mucina and Rutherford (2006).

Field survey

The field survey was undertaken on the 6th and 7th of November 2012. The surveys were focussed within areas where natural vegetation persisted. The description of the regional vegetation relied on literature from Mucina & Rutherford (2006). Plant names follow Van Wyk & Malan (1997), Van Wyk & Van Wyk (1997), Van Wyk & Smith (2005) Pooley (1998), Henderson (2001), Schmidt *et al.* (2002), Van Oudtshoorn (2004) and Manning (2009). The South African National Red List status follows the latest update <http://redlist.sanbi.org> (2012).

During the site visit, a number of line transects were sampled and additional points where plants of conservation concern (red data or protected plants) occurred were recorded and further investigated. The points were recorded using a hand-held Garmin eTrex H GPS receiver. Waypoint localities are accurate to within 4m.

Transects were walked within the perceived natural habitat types on the site, concentrating on moving through environmental gradients encountered within the vegetation type in order to identify species and communities. Any additional information on any other feature thought to have ecological significance within the site, such as soil type, altitude, erosion, rocky cover, alien/exotic/invasive plants as well as plants species of conservation concern and/or their habitat were also recorded.

Due to the low basal cover, the cover abundance of the species was not assessed; rather presence and absence of species were noted. In order to identify as many plant species as possible, transects were walked throughout the study areas and supplementary notes such as past land use, soil etc. were collected.

Sensitivity classification was based on regional information such as the classification of the regional vegetation types and their sensitivity (Mucina & Rutherford, 2006) and the status of the vegetation as ascertained during the field survey.

FAUNA

Desktop analysis and literature review

Avifauna

A comprehensive list of bird species occurring in the area was compiled using electronic databases within Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011) where distribution maps have been interpreted and updated from the Atlas of Southern African Birds (Harrison *et al.*, 1997). Species of conservation concern that could potentially occur on site were noted and their habitat requirements were determined by consulting the relevant literature. Bird names follow Hockey *et al.* (2005).

Mammals

Geographical distribution and the presence of suitable habitat were used to determine the probability of occurrence of mammal species. High probability of occurrence would pertain to species with areas of occupancy within the geographic locality of the study site as well as the presence of suitable habitat occurring on the study site. Medium probability of occurrence refers to species whose area of occupancy is marginal to the study site or its habitat is found to be within the surroundings of the study area. Low probability of occurrence indicates that the species occupy an area surrounding the study area and that unsuitable habitat exists on site. Information was obtained from Skinner & Chimimba (2005), Stuart & Stuart (2007) and Monadjem *et al.* (2010).

Herpetofauna & Lepidoptera

A list of the reptile, amphibian and butterfly species occurring in the area was compiled using electronic databases such as FrogMAP (SAFAP), ReptileMAP (SARCA), the Southern African Butterfly Conservation Assessment (SABCA) and the IUCN.

Field survey

Avifauna

Bird species were detected by sight, call, and field evidence such as nests, feathers and droppings by walking slowly through the habitat. Species were verified using Chittenden (2007) as well as Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011).

Mammals

Mammal species were identified by sightings as well as field evidence such as spoor, droppings, roosting sights and burrows, and verified using Stuart & Stuart (2000 & 2007).

Herpetofauna

Herpetofauna were noted and identified as they were encountered. Possible burrows or suitable habitats (rocks and stumps) were noted. Reptiles were identified using Alexander & Marais (2010) while amphibians were identified using Du Preez & Carruthers (2009).

APPENDIX B: PLANTS IDENTIFIED ON THE SITEPlants in **RED** = Declining**(P)** Provincially protected species **(D)** Declining **(M)** Used medicinally

Please note that numerous plant species were not in flower or dormant and are subsequently not positively identified or added to this plant list

Scientific Name	Common Name	Locality in study area
Herbs		
<i>Acalypha indica</i> var <i>indica</i>		Sporadically throughout the study area
<i>Albica setosa</i>		Recorded in the northern sections of the study area where natural vegetation is present
<i>Albica</i> species		Sporadically throughout the study area
<i>Argyrolobium</i> species		Sporadically in the northern sections of the study area
<i>Asclepias</i> species		Recorded in the northern sections of the study area where natural vegetation is present
<i>Becium obovatum</i>	Cat's Wiskers	Recorded in the northern sections of the study area where natural vegetation is present
<i>Cleome monophylla</i>	Spindlepod	Recorded in disturbed areas and close to dumps
<i>Commelina benghalensis</i>	Benghal's Commelina	Sporadically throughout study area
<i>Cyanotis speciosa</i>	Doll's Powder puff Flower	Throughout the study area
<i>Cyperus sphaerocephalus</i>	Yellow Sedge	Sporadically throughout study area where natural vegetation was present
<i>Delosperma herbeum</i>	Highveld White Vygie	Recorded from the eastern section of the study area
<i>Elephantorrhiza elephantina</i>	Elephant's Root	Mostly recorded from disturbed areas in the southern section of the study area
<i>Euphorbia striata</i>		Sporadically throughout study area
<i>Felicia muricata</i>	White Felicia	Common throughout study area
<i>Gazania krebsiana</i>	Botterblom	Common throughout study area
<i>Gazania krebsiana</i> subsp. <i>serrulata</i>		Sporadically throughout the study area
<i>Gerbera ambigua</i>	Pink and White Gerbera	Sporadically in the northern sections of the study area where natural vegetation persists

<i>Gladiolus species</i>		Numerous plants were recorded in the northern section of the study area although no flowers were present at the time of the survey to identify the species
<i>Gomphocarpus fruticosus</i>	Milkweed	Throughout study area
<i>Graderia scabra</i>	Wild Penstemon	Sporadically in the northern part of the study area
<i>Hermannia species</i>		Sporadically throughout the study area
<i>Hypoxis costata</i>		Sporadically in northern section of study area
<i>Hypoxis hemerocallidea</i>	African Potato	Very common towards the northern section of the study area
<i>Hypoxis iridifolia</i>	Silver-leaved Star-flower	Sporadically throughout the study area
<i>Hypoxis rigidula</i>		Common throughout northern section of study area
<i>Ledebouria revoluta</i>		Common throughout study area where natural vegetation is present
<i>Ledebouria species</i>		Common throughout the study area
<i>Plantago lanceolata</i>	Buckhorn Plantain	Common throughout the study area
<i>Raphionacme hirsuta</i>		Recorded in southern section of the study area
<i>Scabosia columbaria</i>	Wild Scabosia	Few specimens recorded in the north eastern portion of the study area
<i>Senecio madagascariensis</i>		Sporadically throughout the study area
<i>Solanum panduriforme</i>	Poison Apple	Throughout the study area
<i>Vernonia oligocephala</i>	Bicoloured-leaved Vernonia	Sporadically throughout study area
<i>Vigna vexillata</i>	Narrow-leaved Wild Sweetpea	Sporadically throughout study area where natural vegetation is present
<i>Wahlenburgia undulata</i>	Wahlenburgia	Sporadically throughout study area especially in damp or moist areas
<i>Ziziphus zeyheriana</i>	Dwarf Buffalo Thorn	Sporadically in areas where natural vegetation is still present
Trees		
<i>Acacia caffra</i>	Common Hook-thorn	Isolated specimens in study area
<i>Acacia sieberiana</i>	Paperbark Thorn	Individual plant recorded in centre of study area
<i>Erythrina lysistemon</i>	Common Coral Tree	One plant was recorded from the north eastern section of the study area, although it is likely that it was planted during landscaping of the golf course

<i>Searsia lancea</i>	Karoo	Sporadically throughout study area
Grass		
<i>Alloteropsis semialata</i>	Blackseed Grass	Sporadically throughout study area
<i>Brachiaria serrata</i>	Velvet Grass	Sporadically throughout study area
<i>Eragrostis capensis</i>	Heart Seed Love Grass	Sporadically throughout study area
<i>Eragrostis curvula</i>	Weeping Love Grass	Common throughout study area
<i>Setaria sphacelata</i>		Sporadically throughout study area
<i>Tristachya leucotrix</i>	Hairy Trident Grass	Sporadically throughout study area
Alien species		
<i>Acacia dealbata</i>	Silver Wattle	Recorded in the southern part of the study area
<i>Centella asiatica</i>	Marsh Pennywort	Sporadically throughout study area
<i>Eucalyptus species</i>	Blue Gum	Very common throughout the study area
<i>Jacaranda mimosifolia</i>	Jacaranda	Sporadically used for landscaping of the golf course
<i>Melia azedarach</i>	Syringa	Very common in dumping areas towards the centre of the study area
<i>Paspalum dilatatum</i>	Common Paspalum	Common throughout study area
<i>Pennisetum clandestinum</i>	Kikuyu	Very common throughout study area, used in landscaping of the fairways
<i>Pinus patula</i>	Patula Pine	Common throughout the study area
<i>Quercus species</i>	Oak Trees	Two different species planted along the old fairway
<i>Solanum mauritianum</i>	Bugweed	Common in disturbed areas towards the centre of the study area
<i>Tipuana tipu</i>	Tipu Tree	Common in the southern part of the study area

APPENDIX C: Bird species observed in the study area as well as their national and global conservation status (LC = Least Concern; En = Endemic; Intro = Introduced)

Common name	Scientific name	Conservation Status	
		RSA	IUCN
Helmeted Guineafowl	<i>Numida meleagris</i>	LC	LC
Egyptian Goose	<i>Alopochen aegyptiaca</i>	LC	LC
Greater Honeyguide	<i>Indicator indicator</i>	LC	LC
Red-throated Wryneck	<i>Jynx ruficollis</i>	LC	LC
Crested Barbet	<i>Trachyphonus vaillantii</i>	LC	LC
European Bee-eater	<i>Merops apiaster</i>	LC	LC
Red-faced Mousebird	<i>Urocolius indicus</i>	LC	LC
Laughing Dove	<i>Spilopelia senegalensis</i>	LC	LC
Cape Turtle-Dove	<i>Streptopelia capicola</i>	LC	LC
Spotted Thick-knee	<i>Burhinus capensis</i>	LC	LC
Crowned Lapwing	<i>Vanellus coronatus</i>	LC	LC
Black-shouldered Kite	<i>Elanus caeruleus</i>	LC	LC
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>	LC	LC
Grey Heron	<i>Ardea cinerea</i>	LC	LC
Cattle Egret	<i>Bubulcus ibis</i>	LC	LC
Hadeda Ibis	<i>Bostrychia hagedash</i>	LC	LC
Common Fiscal	<i>Lanius collaris</i>	LC	LC
Bokmakierie	<i>Telophorus zeylonus</i>	LC; En	LC
Cape Glossy Starling	<i>Lamprotornis nitens</i>	LC	LC
Common Myna	<i>Acridotheres tristis</i>	LC; Intro	LC
Dark-capped Bulbul	<i>Pycnonotus tricolor</i>	LC	LC
Cape White-eye	<i>Zosterops capensis</i>	LC; En	LC
Amethyst Sunbird	<i>Chalcomitra amethystina</i>	LC	LC
Southern Masked-Weaver	<i>Ploceus velatus</i>	LC	LC

APPENDIX D: Bird species of conservation concern occurring within QDGC 2628AA, national and global conservation status (RE = Regionally Extinct; CR = Critically Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; En = Endemic; Ebr = Breeding range Endemic; NBM = Non-breeding Migrant), probability of occurring on site and habitat preference; those highlighted in red have a status higher than Least Concern

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Bokmakierie	<i>Telophorus zeylonus</i>	LC; En	LC	Confirmed	Most abundant in Karoo, fynbos and grassland biomes. Favours habitats with scattered shrubs or trees in open areas, open bushveld, bush-clump grassveld, alien tree plantations (especially in regrowth stages), orchards and vineyards, and bushy, boulder-strewn hillsides
Cape White-eye	<i>Zosterops capensis</i>	LC; En	LC	Confirmed	Montane evergreen forest, riverine scrub, <i>Acacia</i> veld, montane fynbos, woodland thickets, <i>Eucalyptus</i> plantations, parks and gardens
Acacia Pied Barbet	<i>Tricholaema leucomelas</i>	LC; En	LC	High	Semi-arid savanna, particularly <i>Acacia</i> or mixed <i>Acacia</i> woodlands
Karoo Thrush	<i>Turdus smithii</i>	LC; En	LC	High	Mostly in riverine vegetation, but not <i>Tamarix</i> spp, also in non-riverine woodland on highveld; favours suburban gardens; gardens also used as winter refuge in drier areas
Fiscal Flycatcher	<i>Sigelus silens</i>	LC; En	LC	High	Most common in moist and semi-arid lowland grasslands and valley bushveld favouring fairly open vegetation, with some trees or shrubs
Pied Starling	<i>Lamprotornis bicolor</i>	LC; En	LC	High	Open areas dominated by grassland, associated with agriculture; often on open ground around farm homesteads, on cultivated lands, and near domestic stock. In villages and small towns in rural areas
Cloud Cisticola	<i>Cisticola textrix</i>	LC; En	LC	High	Short grassland with bare ground between grass tufts; also taller red grass/lemon grass (<i>Themeda/Cymbopogon</i>) grasslands
Black-chested Prinia	<i>Prinia flavicans</i>	LC; En	LC	High	Arid and semi-arid shrublands, dry <i>Acacia</i> savanna with scattered low bushes, edges of drainage line woodland in dry areas, fallow cultivated cropland with tall shrubs
Eastern Clapper Lark	<i>Mirafra fasciolata</i>	LC; En	LC	High	Grassland, incl rocky slopes with tall grass on S African highveld, inter-dune valleys with dense cover of long grass and scattered bushes in Kalahari, and tall grassland on semi-arid plains around pans in n Namibia and Botswana
Sabota Lark	<i>Calendulauda sabota</i>	LC; En	LC	High	Savanna and open woodland, ranging from arid and semiarid savannas to mesic woodlands

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Greater Double-collared Sunbird	<i>Cinnyris afer</i>	LC; En	LC	High	Edges of Afromontane forest, coastal and dune forests, montane tall shrublands such as <i>Protea</i> spp, dry valley bushveld, <i>Acacia</i> savanna, woodland along rivers and streams in dry areas, and parks and gardens
Cape Sparrow	<i>Passer melanurus</i>	LC; En	LC	High	Arid and semi-arid savanna, dry woodland along drainage lines and seasonal watercourses, farmlands, alien plantations, orchards, and parks and gardens in towns and cities
Cape Longclaw	<i>Macronyx capensis</i>	LC; En	LC	High	Moist grassland from sea level to high montane slopes, mostly without tree cover; also in short fynbos
Martial Eagle	<i>Polemaetus bellicosus</i>	VU	NT	Medium-high	Open woodland, arid and mesic savanna, forest edges
Lanner Falcon	<i>Falco biarmicus</i>	NT	LC	Medium-high	Most frequent in open grassland, open or cleared woodland, and agricultural areas. Breeding pairs favour habitats where cliffs available as nest and roost sites, but will use alternative sites (eg trees, electricity pylons, buildings) if cliffs absent
Secretarybird	<i>Sagittarius serpentarius</i>	VU	VU	Medium	Open grassland (< 0.5 m) with scattered trees, shrubland, open <i>Acacia</i> and bushwillow (<i>Combretum</i> spp) savanna; absent from dense woodland and rocky hills
Lesser Kestrel	<i>Falco naumanni</i>	VU; NBM	LC	Medium	Warm, dry, open or lightly wooded environments; concentrated in grassy Karoo, w fringes of grassland biome and se Kalahari; generally avoids foraging in transformed habitats but occurs in some agricultural areas, incl croplands in fynbos and renosterveld of W Cape
Black Harrier	<i>Circus maurus</i>	NT; En	VU	Medium	Dry grassland, Karoo scrub, agricultural fields and high-altitude grasslands; intolerant of burnt areas
Melodious Lark	<i>Mirafraga cheniana</i>	NT; En	NT	Medium	Grassland dominated by <i>Themeda triandra</i> ; avoids wet lowlands, favouring fairly short grassland (< 0.5 m), with open spaces between tussocks, at 550-1 750 m altitude, with annual rainfall 400-800 mm
South African Cliff-Swallow	<i>Petrochelidon spilodera</i>	LC; Ebr	LC	Medium	Grassland, sparse savanna and semi-desert
Swainson's Spurfowl	<i>Pternistis swainsonii</i>	LC; En	LC	Medium	Tall grass in open country or woodland, often adjacent to cultivation and close to water
Southern Yellow-billed Hornbill	<i>Tockus leucomelas</i>	LC; En	LC	Medium	Favours dry, open <i>Acacia</i> and broad-leaved savannas, but found in many wooded vegetation types, usually with short ground cover.

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
					Widespread in stands of low bushveld, extending along wooded watercourses into more open habitats
White-backed Mousebird	<i>Colius colius</i>	LC; En	LC	Medium	Sparse woodland along perennial and seasonal rivers in semi-arid and arid regions; also farmyards, gardens and orchards
Northern Black Korhaan	<i>Afrotis afraoides</i>	LC; En	LC	Medium	Nama Karoo, Kalahari sandveld, dry grassland, open savanna and grassy dunes, mainly on flat to undulating terrain dominated by perennial grasses 0.5-1.0 m tall, with or without scattered trees
Southern Pale Chanting Goshawk	<i>Melierax canorus</i>	LC; En	LC	Medium	Karoo shrubland and Kalahari woodland; also dry open <i>Acacia</i> thornveld and scrub, mopane woodland
Jackal Buzzard	<i>Buteo rufofuscus</i>	LC; En	LC	Medium	Hilly and mountainous regions in fynbos, Karoo, grassland, open woodland and semi-desert, from sea level to > 3 000 m. One of the few raptor spp regularly encountered in the highest mountain ranges
Southern Boubou	<i>Laniarius ferrugineus</i>	LC; En	LC	Medium	In dense tangles of vegetation in diverse woodland types from sea level to high altitudes. In montane forest, coastal thicket, riverine scrub (incl mangroves), gardens and alien plantations
Marico Flycatcher	<i>Bradornis mariquensis</i>	LC; En	LC	Medium	Favours arid <i>Acacia</i> savanna. Also in mixed and mopane woodlands, but only if <i>Acacia</i> spp present
White-throated Robin-Chat	<i>Cossypha humeralis</i>	LC; En	LC	Medium	Thickets in <i>Acacia</i> and broad-leaved woodlands, thorn scrub, sand forest and dune forest ecotones. Favours dense thickets flanking irrigation channels and dry watercourses
Ant-eating Chat	<i>Myrmecocichla formicivora</i>	LC; En	LC	Medium	Open grasslands, rolling grassy hills, semi-arid shrublands and open arid savanna on sands
Ashy Tit	<i>Parus cinerascens</i>	LC; En	LC	Medium	Mesic and arid fine-leaved savanna woodlands, dry woodland along seasonal rivers
African Red-eyed Bulbul	<i>Pycnonotus nigricans</i>	LC; En	LC	Medium	Dry woodland, <i>Acacia</i> savanna, semi-arid shrublands, riverine bush, shrubby watercourses in open and treeless areas
Barred Wren-Warbler	<i>Calamonastes fasciolatus</i>	LC; En	LC	Medium	Semi-arid fine-leaved (<i>Acacia</i>) and broad-leaved (<i>Burkea</i> , <i>Combretum</i> and <i>Commiphora</i>) savannas with patches of medium to dense cover
Spike-heeled Lark	<i>Chersomanes albofasciata</i>	LC; En	LC	Medium	Sparse grassland in higher-rainfall areas; also desert grassland, shrubland and degraded patches in semi-arid rangelands

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Great Sparrow	<i>Passer motitensis</i>	LC; En	LC	Medium	Arid to semi-arid open savanna woodland and shrubland, usually in association with <i>Acacia</i> trees
Scaly-feathered Finch	<i>Sporopipes squamifrons</i>	LC; En	LC	Medium	Dry <i>Acacia</i> woodland, particularly with small trees; bush along seasonal rivers, and in farmyards and gardens
Cape Weaver	<i>Ploceus capensis</i>	LC; En	LC	Medium	Open grassland, lowland fynbos, coastal thicket and farmland; always with some trees and permanent water. In semi-arid regions, restricted to riverine and montane areas
Shaft-tailed Whydah	<i>Vidua regia</i>	LC; En	LC	Medium	Dry woodland and savanna with rank grass, mainly where annual rainfall > 150 mm, unless perennial water is available
Cape Canary	<i>Serinus canicollis</i>	LC; En	LC	Medium	Open <i>Protea</i> woodland, montane grassland with shrubs and patches of Oldwood <i>Leucosidea sericea</i> , open savanna, gardens, parks, alien plantations and edges of croplands
Cape Bunting	<i>Emberiza capensis</i>	LC; En	LC	Medium	Dry shrubland and heathland on rocky hills and plains, open woodland and shrubland along dry watercourses, villages and gardens
Eurasian Bittern	<i>Botaurus stellaris</i>	CR	LC	Low	Tall, dense emergent vegetation in interior of seasonal and permanent large wetlands
Blue Crane	<i>Anthropoides paradiseus</i>	VU; En	VU	Low	Open grassland and grassland/Karoo ecotone; wetlands, cultivated pastures and crop lands; tolerant of intensively grazed and burnt grassland
Cape Vulture	<i>Gyps coprotheres</i>	VU; En	VU	Low	Wide habitat range; cliffs
African Grass-Owl	<i>Tyto capensis</i>	VU	LC	Low	Treeless areas associated with damp substrata, mainly marshes and vleis. Favours patches of tall, rank grass, sedges or weeds. Also areas with dense ground cover in scattered thorn scrub, low fynbos and renosterveld, usually close to water and among thick stands of grass (<i>Stenotaphrum</i> sp) and sedge (<i>Juncus</i> sp)
White-bellied Korhaan	<i>Eupodotis senegalensis</i>	VU	LC	Low	Fairly tall, dense grassland, especially sour and mixed grassland, in open or lightly wooded, undulating to hilly country; in winter, occasionally on modified pastures and burnt ground
African Finfoot	<i>Podica senegalensis</i>	VU	LC	Low	Mostly quiet, wooded streams and rivers flanked by thick riparian vegetation and overhanging trees. Also dam verges, especially with sufficient overhanging vegetation and reed cover

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
African Marsh-Harrier	<i>Circus ranivorus</i>	VU	LC	Low	Almost exclusively inland and coastal wetlands
White-backed Night-Heron	<i>Gorsachius leuconotus</i>	VU	LC	Low	Clear and slow-flowing perennial rivers and streams with overhanging vegetation, in woodland and forest. Sometimes along vegetated watercourses in open country. Also lakes, dams and marshes with overhanging vegetation, mangrove swamps and, occasionally, reed beds
Pink-backed Pelican	<i>Pelecanus rufescens</i>	VU	LC	Low	Wide range of wetlands, incl lakes, dams and slow-flowing rivers, saline pools, lagoons, estuaries and sheltered bays
Corn Crane	<i>Crex crex</i>	VU; NBM	LC	Low	Rank grassland and savanna, grassland bordering marshes and streams incl long grass areas of seasonally flooded grassland and occasionally wet clay patches and soft mud fringing ponds
Blue Korhaan	<i>Eupodotis caerulescens</i>	NT; En	NT	Low	Flat and undulating terrain in grassland and Nama Karoo, where rainfall 300-1 000 mm; often on damp ground; sometimes attracted to burnt areas; favours short vegetation
Chestnut-banded Plover	<i>Charadrius pallidus</i>	NT	NT	Low	Natural and man-made salt pans; less often in coastal lagoons, shallow bays and estuaries; rarely in freshwater habitats
Lesser Flamingo	<i>Phoeniconaias minor</i>	NT	NT	Low	Primarily open, eutrophic, shallow wetlands; breeds on saline lakes and salt pans
Black-winged Pratincole	<i>Glareola nordmanni</i>	NT; NBM	NT	Low	Open grassland, edges of pans and cultivated fields, but most common in seasonally wet grasslands and pan systems
Pallid Harrier	<i>Circus macrourus</i>	NT; NBM	NT	Low	Grasslands associated with pans or floodplains; also croplands
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	NT	LC	Low	Clear, fast-flowing perennial streams, rivers and estuaries, usually narrow and secluded, with dense marginal vegetation; often near rapids
Yellow-throated Sandgrouse	<i>Pterocles gutturalis</i>	NT	LC	Low	Inhabits short, open grassy plains, particularly on relatively moist, cotton-clay-like soils, usually near seasonal rivers or swamps, or on seasonal flood plains where pioneer plant communities provide an abundant source of food; also, readily occupies fallow fields in cultivated areas and recently burnt ground
Greater Painted-snipe	<i>Rostratula benghalensis</i>	NT	LC	Low	Waterside habitats with substantial cover
Caspian Tern	<i>Hydroprogne caspia</i>	NT	LC	Low	Along coast, mostly in sheltered bays and estuaries; inland, at large

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
					water bodies, both natural and man-made, with preference for saline pans and large impoundments
Peregrine Falcon	<i>Falco peregrinus</i>	NT	LC	Low	Resident birds mostly restricted to mountainous, riparian or coastal habitats, where high cliffs provide br and roosting sites; breeding pairs prefer habitats that favour specialised, high-speed, aerial hunting, e.g. high cliffs overlooking vegetation with raised and/or discontinuous canopy, or expanses of open water
Greater Flamingo	<i>Phoenicopterus roseus</i>	NT	LC	Low	Large, shallow, eutrophic wetlands, slat pans, saline lakes, coastal mudflats
Great White Pelican	<i>Pelecanus onocrotalus</i>	NT	LC	Low	Shallow lakes, flood plain pans, estuaries and dams; sheltered coastal bays and lagoons; roosts on dry land in open areas, usually on islands or peninsulas where access by terrestrial predators limited
Black Stork	<i>Ciconia nigra</i>	NT	LC	Low	Dams, pans, floodplains, flooded grassland, associated with mountainous areas
Marabou Stork	<i>Leptoptilos crumeniferus</i>	NT	LC	Low	Both aquatic and terrestrial habitats, favouring open and semi-arid areas; largely absent from forest areas and true desert; common at wetlands, incl dams, pans and rivers, and in wildlife reserves and ranching areas
Yellow-billed Stork	<i>Mycteria ibis</i>	NT; NBM	LC	Low	Wetlands, incl alkaline and freshwater lakes, rivers, dams, pans, flood plains, marshes, flooded grassland and small pools or streams
Orange River Francolin	<i>Scleroptila levaillantoides</i>	LC; En	LC	Low	Resident; no evidence of seasonal migration, but considerable local movement during droughts and in response to habitat deterioration
Natal Spurfowl	<i>Pternistis natalensis</i>	LC; En	LC	Low	Most common in lowveld and dry savannas; ventures into riverine bush among escarpment grasslands
South African Shelduck	<i>Tadorna cana</i>	LC; En	LC	Low	Core range encompasses semi-arid south-western parts of region (rainfall < 600 mm/yr), centred in Karoo, and spanning both summer- and winter-rainfall regions; favours shallow, brackish, seasonal pans, dams, rivers and sewage works; prefers exposed muddy shorelines and extensive, open, shallow water (especially near crops)
Cape Shoveler	<i>Anas smithii</i>	LC; En	LC	Low	Shallow pans and dams in open grassland, favouring saline pans; also shallow bays and upper reaches of large dams

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Red-crested Korhaan	<i>Lophotis ruficrista</i>	LC; En	LC	Low	Most woodland-dependent s African bustard. Prefers dry country. Typically associated with sandy soils. Inhabits wide range of woodland, both broad-leaved and <i>Acacia</i>
Crimson-breasted Shrike	<i>Laniarius atrococcineus</i>	LC; En	LC	Low	Kalahari thornveld, <i>Acacia</i> savanna and semi-arid scrub with scattered clumps of small trees
Cape Rock-Thrush	<i>Monticola rupestris</i>	LC; En	LC	Low	Cliffs, rocky gorges, boulder-strewn hillsides and scree slopes, usually with scattered low trees, bushes and succulents
Sentinel Rock-Thrush	<i>Monticola explorator</i>	LC; En	LC	Low	Rolling alpine grasslands and heathlands, rocky slopes, felled plantations with exposed rocks, and open, grassy rangeland with scattered stones
Kalahari Scrub-Robin	<i>Erythropygia paena</i>	LC; En	LC	Low	Open sandveld with scattered low trees and bushes
Mountain Wheatear	<i>Oenanthe monticola</i>	LC; En	LC	Low	Rocky hills, slopes with boulders and bushes, small cliffs, old mine workings, farmyards and gardens of houses on rocky hillsides
Cape Grassbird	<i>Sphenoeacus afer</i>	LC; En	LC	Low	Rank grasses, restios and ferns
Fairy Flycatcher	<i>Stenostira scita</i>	LC; En	LC	Low	In br season, in shrublands (incl succulent and Nama Karoo), fynbos, woody hillsides, thorn thickets, scrubby mountain kloofs and valleys, and sweet grassland. In winter, moves into <i>Acacia</i> savanna, montane scrub, plantations and gardens; avoids closed woodland, but requires trees and shrubs, however sparse, for foraging and nesting
Chestnut-vented Tit-Babbler	<i>Sylvia subcaerulea</i>	LC; En	LC	Low	Drainage-line woodland in savanna and semi-arid shrubland, edges of thickets, bushy hillsides, and gardens in rural villages
Fawn-coloured Lark	<i>Calendulauda africanoides</i>	LC; En	LC	Low	Almost exclusively on sandy soils, in wide range of fine-leaved and broad-leaved savanna woodland and shrubland on dunes
Eastern Long-billed Lark	<i>Certhilauda semitorquata</i>	LC; En	LC	Low	Upland grassland and mixed shrubland and grassland, usually on rocky ridges
Pink-billed Lark	<i>Spizocorys conirostris</i>	LC; En	LC	Low	Open, short grassland, burnt grassland, Kalahari dunes with fairly dense grass cover, fallow fields and croplands immediately after harvesting
Swee Waxbill	<i>Estrilda melanotis</i>	LC; En	LC	Low	Edges of Afromontane and coastal forest; also alien plantations, gardens, bushy hillsides, farmyards, thick streamside bush, wooded valleys in fynbos and grassy clearings in moist woodland

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Red-headed Finch	<i>Amadina erythrocephala</i>	LC; En	LC	Low	Open desert grasslands, semi-arid and arid shrublands, arid savanna, croplands and farmyards
Yellow Canary	<i>Crithagra flaviventris</i>	LC; En	LC	Low	Open karroid shrubland, especially along small drainage lines where shrubs are taller, semi-arid savanna, alpine shrublands
Lark-like Bunting	<i>Emberiza impetuani</i>	LC; En	LC	Low	Open, dry shrubland, desert grassland, sparse shrubland and grassland on rocky ridges, dry watercourses, eroded gullies and road verges
African Skimmer	<i>Rynchops flavirostris</i>	RE; Vagrant	NT	Zero	Large lowland rivers and lakes with exposed, bare sandbars and islands that are used as br and roosting sites

APPENDIX E: Mammal species occurring within QDGC 2628AA, national and global conservation status (CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; Pr = Protected; En = Endemic; NBM = Non-breeding Migrant), probability of occurring on site and habitat preference; those highlighted in red have a status higher than Least Concern

Common name	Scientific name	Conservation Status		Probability of occurring on site	Evidence / Habitat preference
		RSA	IUCN		
Common Mole-rat	<i>Cryptomys hottentotus</i>	LC	LC	Confirmed	Mounds / Most soils except heavy clay and compacted types
Scrub Hare	<i>Lepus saxatilis</i>	LC	LC	High	Woodland and grassland with scrub cover; often seen in agricultural land
Four-striped Grass Mouse	<i>Rhabdomys pumilio</i>	LC	LC	High	Wide range of habitats preferring short, dense grass cover
Lesser Woolly Bat	<i>Kerivoula lanosa</i>	NT	LC	Medium	Savanna woodland
Geoffroy's Horseshoe Bat	<i>Rhinolophus clivosus</i>	NT	LC	Medium	Savanna woodland, fynbos, riparian forest; roosts in dead leaf clusters, under bark, roofs of houses or abandoned weaver birds nests
Southern African Hedgehog	<i>Atelerix frontalis</i>	LC; Pr	LC	Medium	Variety of habitats including savanna, woodland and riparian forest; roosts in caves and mine adits
Lesser Grey-brown Musk Shrew	<i>Crocidura silacea</i>	DD	LC	Medium	Wide habitat tolerance; absent from arid west
Tete Veld Rat	<i>Aethomys ineptus</i>	LC	LC	Medium	Wide range of habitats from grassland to savanna including rocky outcrops
Highveld Gerbil	<i>Tatera brantsii</i>	LC	LC	Medium	Open or lightly wooded grasslands on consolidated sands
Bushveld Gerbil	<i>Tatera leucogaster</i>	LC	LC	Medium	Wide range of veg types with light, sandy soils
Southern Multimammate Mouse	<i>Mastomys coucha</i>	LC	LC	Medium	Wide habitat tolerance; dry areas
Natal Multimammate Mouse	<i>Mastomys natalensis</i>	LC	LC	Medium	Wide habitat tolerance
Pouched Mouse	<i>Saccostomus campestris</i>	LC	LC	Medium	Savanna woodland
Kreb's Fat Mouse	<i>Steatomys krebsii</i>	LC	LC	Medium	Sandy soils in savanna
Fat Mouse	<i>Steatomys pratensis</i>	LC	LC	Medium	Open savanna, grassland
Yellow Mongoose	<i>Cynictis penicillata</i>	LC	LC	Medium	Open habitats, short grassland, semi-desert scrub
Banded Mongoose	<i>Mungos mungo</i>	LC	LC	Medium	Wide habitat tolerance with a preference for woodland
Striped Polecat	<i>Ictonyx striatus</i>	LC	LC	Medium	Found in all habitat types including agricultural land
African Striped Weasel	<i>Poecilogale albinucha</i>	DD	LC	Medium	Wide habitat tolerance but prefers grassland or open woodland
African Wild Cat	<i>Felis silvestris</i>	LC	LC	Medium	Wide habitat tolerance but requires cover

Common name	Scientific name	Conservation Status		Probability of occurring on site	Evidence / Habitat preference
		RSA	IUCN		
Small-spotted Genet	<i>Genetta genetta</i>	LC	LC	Medium	Dry savanna woodland
Wahlberg's Epauletted Fruit Bat	<i>Epomophorus wahlbergi</i>	LC	LC	Medium	Forest and forest edge habitats especially riparian forest with fruit-bearing trees; also urban areas with fruiting trees
Egyptian Slit-faced Bat	<i>Nycteris thebaica</i>	LC	LC	Medium	Wide range of habitats from karoo to savanna, avoids grassland; roosts in caves, Aardvark (<i>Orycteropus afer</i>) burrows, road culverts and large tree trunks
Cape Serotine	<i>Neoromicia capensis</i>	LC	LC	Medium	Wide habitat tolerance, semi-desert, grassland, forest, savanna; roosts under bark of trees, at base of aloe leaves and under roofs of houses
Yellow-bellied House Bat	<i>Scotophilus dinganii</i>	LC	LC	Medium	Widely distributed in savanna; avoids open areas; roosts in holes in trees and roofs of houses
Egyptian Free-tailed Bat	<i>Tadarida aegyptiaca</i>	LC	LC	Medium	Forages over desert, semi-arid scrub, savanna, grassland and agricultural land; roosts in caves, crevices, hollow trees and under bark, and roofs of houses
Mauritian Tomb Bat	<i>Taphozous mauritanus</i>	LC	LC	Medium	Variety of savanna woodlands preferring open habitats and avoiding closed forest interior; variety of roost sites including rock faces, tree trunks, and walls
Rock Hyrax	<i>Procavia capensis</i>	LC	LC	Medium	Widespread, dry savanna to dense forest, rocky areas
Steenbok	<i>Raphicerus campestris</i>	LC	LC	Medium	Open grassland, stoney savanna, <i>Acacia</i> -grassland mosaics
Common Duiker	<i>Sylvicapra grimmia</i>	LC	LC	Medium	Wide range of habitats preferring areas with dense vegetation for cover
White-tailed Mouse	<i>Mystromys albicaudatus</i>	EN; En	EN	Low	Grassland / shrubland, vleis with black loam
Oribi	<i>Ourebia ourebi</i>	EN	LC	Low	Open grassland; floodplains; grassed vleis; tall grass cover essential
Leopard	<i>Panthera pardus</i>	VU; Pr	NT	Low	Woodland, grassland savanna
Maquassie Musk Shrew	<i>Crocidura maquassiensis</i>	VU; En	LC	Low	Dense matted vegetation in moist areas
Blasius's Horseshoe Bat	<i>Rhinolophus blasii</i>	VU	LC	Low	Associated with savanna; roosts in caves and mine adits
Brown Hyaena	<i>Hyaena brunnea</i>	NT; En; Pr	NT	Low	Desert / open savanna
Serval	<i>Leptailurus serval</i>	NT; Pr	LC	Low	Usually near water in areas of tall grassland, reed beds or rank vegetation
Spotted-necked Otter	<i>Lutra maculicollis</i>	NT; Pr	LC	Low	Unpolluted, un-silted freshwater habitats
Honey Badger	<i>Mellivora capensis</i>	NT; Pr	LC	Low	Found in most habitat types; absent from desert

Common name	Scientific name	Conservation Status		Probability of occurring on site	Evidence / Habitat preference
		RSA	IUCN		
African Marsh Rat	<i>Dasymys incomtus</i>	NT	LC	Low	Well vegetated and wet habitats
Temminck's Myotis	<i>Myotis tricolor</i>	NT	LC	Low	Mountainous areas; roosts gregariously in caves
Welwitsch's Myotis	<i>Myotis welwitschii</i>	NT	LC	Low	Woodland or forest near mountainous areas; roosts in furled banana leaves, hanging in branches and caves
Darling's Horseshoe Bat	<i>Rhinolophus darlingi</i>	NT	LC	Low	Savanna and savanna woodland; dependant on caves, mines, broken rocky areas, buildings and similar structures as roost sites
Small Spotted Cat	<i>Felis nigripes</i>	LC; En; Pr	VU	Low	Specialist of dry open, short grass areas with an abundance of small rodents and ground-roosting birds
African Straw-coloured Fruit Bat	<i>Eidolon helvum</i>	LC; NBM	NT	Low	Intact fruit-producing woodland
Black Wildebeest	<i>Connochaetes gnou</i>	LC; En; Pr	LC	Low	Restricted to conservation and private lands
Cape Fox	<i>Vulpes chama</i>	LC; En; Pr	LC	Low	Open grassland, grassland with scattered thickets, and lightly wooded areas
Cape Clawless Otter	<i>Aonyx capensis</i>	LC; Pr	LC	Low	Rivers, marshes, dams and lakes
Springbok	<i>Antidorcas marsupialis</i>	LC; En	LC	Low	Karoo, arid and semi-arid desert scrub and grassland
Blesbok	<i>Damaliscus pygargus</i>	LC; En	LC	Low	Open grassland with water
Grey Rhebok	<i>Pelea capreolus</i>	LC; En	LC	Low	Rocky hillsides / grassland
Brant's Climbing Mouse	<i>Dendromus mesomelas</i>	LC	LC	Low	Tall grass and rank vegetation
Namaqua Rock Mouse	<i>Micaelamys namaquensis</i>	LC	LC	Low	Rocky habitats
Red Hartebeest	<i>Alcelaphus buselaphus</i>	LC	LC	Low	Open grasslands and semi-arid bush savanna and open woodland
Water Mongoose	<i>Atilax paludinosus</i>	LC	LC	Low	Rivers, marshes, dams, lakes and estuaries with good cover
Black-backed Jackal	<i>Canis mesomelas</i>	LC	LC	Low	Dry, open grasslands or savannas
Caracal	<i>Caracal caracal</i>	LC	LC	Low	Semi-desert, open grasslands and savanna woodland
Blue Wildebeest	<i>Connochaetes taurinus</i>	LC	LC	Low	Short-grass plains, and bordering <i>Acacia</i> savanna open bushveld
Cape Short-tailed Gerbil	<i>Desmodillus auricularis</i>	LC	LC	Low	Hard ground with grass or karroid bush
Eastern Rock Sengi	<i>Elephantulus myurus</i>	LC	LC	Low	Rocky koppies
Long-tailed Serotine Bat	<i>Eptesicus hottentotus</i>	LC	LC	Low	Close to rivers, or in a range of surrounding habitats including montane grassland, marshland and well-wooded banks
Woodland Dormouse	<i>Graphiurus murinus</i>	LC	LC	Low	Woodland savanna

Common name	Scientific name	Conservation Status		Probability of occurring on site	Evidence / Habitat preference
		RSA	IUCN		
Slender Mongoose	<i>Galerella sanguinea</i>	LC	LC	Low	From forest to open savanna as long as there is adequate cover
Cape Porcupine	<i>Hystrix africaeaustralis</i>	LC	LC	Low	Occurs in all habitat types except true desert
White-tailed Mongoose	<i>Ichneumia albicauda</i>	LC	LC	Low	Woodland savanna, marginally in forest
Aardvark	<i>Orycteropus afer</i>	LC	LC	Low	Open woodland, sparse scrub and grassland
Angoni Vlei Rat	<i>Otomys angoniensis</i>	LC	LC	Low	Vleis, swamps and swampy ground near rivers; may be found away from water in dry grassland or bushveld
Vlei Rat	<i>Otomys irroratus</i>	LC	LC	Low	Vleis, swamps and moist grassland
Savanna Baboon	<i>Papio cynocephalus</i>	LC	LC	Low	Wide habitat tolerance
Springhare	<i>Pedetes capensis</i>	LC	LC	Low	Sandy soils, edges of vleis, floodplain grassland
Banana Bat	<i>Neoromicia nana</i>	LC	LC	Low	Widespread with a preference for moister forested areas where bananas and <i>Strelizias</i> are found; roosts in furled banana leaves
Zulu Serotine	<i>Neoromicia zuluensis</i>	LC	LC	Low	Savanna woodland with riparian habitat
Jameson's Red Rock Rabbit	<i>Pronolagus randensis</i>	LC	LC	Low	Rocky koppies, krantzies, boulder strewn hillsides, rocky kloofs and gorges
Aardwolf	<i>Proteles cristatus</i>	LC	LC	Low	Wide habitat tolerance with a preference for open areas
Mountain Reedbuck	<i>Redunca fulvorufula</i>	LC	LC	Low	Mountainous and rocky areas
Bushveld Horseshoe Bat	<i>Rhinolophus simulator</i>	LC	LC	Low	Savanna woodland with riparian forest and wooded drainage lines; roosts in caves and mine adits
Flat-headed Free-tailed Bat	<i>Sauromys petrophilus</i>	LC	LC	Low	Rocky areas roosting in narrow rock fissures and crevices
Suricate	<i>Suricata suricatta</i>	LC	LC	Low	Open, arid, lightly vegetated areas in grassland and arid scrub
Acacia Rat	<i>Thallomys paedulus</i>	LC	LC	Low	Arboreal species associated with <i>Acacia</i> bushveld
Bushbuck	<i>Tragelaphus scriptus</i>	LC	LC	Low	Wide variety of habitats as long as ample cover available
Reddish-grey Musk Shrew	<i>Crocidura cyanea</i>	DD	LC	Low	Montane grasslands and temperate and subtropical forests
Swamp Musk Shrew	<i>Crocidura mariquensis</i>	DD	LC	Low	Moist habitats such as reed beds, swamps and thick grass along river banks
Short-snouted Sengi	<i>Elephantulus brachyrhynchus</i>	DD	LC	Low	Sandy ground with dense grass, scrub and scattered trees
Rock Dormouse	<i>Graphiurus platyops</i>	DD	LC	Low	Rocky areas
Lesser Dwarf Shrew	<i>Suncus varilla</i>	DD	LC	Low	Open grassland, associated with termite mounds

Common name	Scientific name	Conservation Status		Probability of occurring on site	Evidence / Habitat preference
		RSA	IUCN		
Black Rhinoceros	<i>Diceros bicornis</i>	EN	CR	Zero	Restricted to conservation areas
White Rhinoceros	<i>Ceratotherium simum</i>	NT; Pr	NT	Zero	Restricted to conservation areas
Plains Zebra	<i>Equus quagga</i>	LC; En	LC	Zero	Grassland and open grassy savanna
African Buffalo	<i>Syncerus caffer</i>	LC	LC	Zero	Restricted to conservation areas
Eland	<i>Tragelaphus oryx</i>	LC	LC	Zero	Arid scrub, savanna woodland, montane grassland

APPENDIX F: Herpetofauna occurring within QDGC 2628AA, national and global conservation status (NT = Near Threatened; LC = Least Concern; NE = Not Evaluated; En = Endemic), probability of occurring on site and habitat preference

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Reptiles					
Striped Harlequin Snake	<i>Homoroselaps dorsalis</i>	En	NT	Medium	Highveld grassland and moist savanna; moribund termite mounds
Common Slug-eater	<i>Duberria lutrix</i>	En	LC	Low	Savanna, coastal bush and fynbos
Aurora House Snake	<i>Lamprophis aurora</i>	En	LC	Medium	Grassland, coastal bush and fynbos
Olive House Snake	<i>Lamprophis inomatus</i>	En	LC	Medium	Moist coastal bushveld and fynbos, grassland
Rinkhals	<i>Hemachatus haemachatus</i>	En	LC	Medium	Grassland
Thin-tailed Legless Skink	<i>Acontias gracilicauda</i>	En	LC	Low	Mesic thicket grassland, entering sandy regions in KZN
Ground Agama	<i>Agama aculeata</i>	En	NE	Low	Semi-desert and sanded savanna
Spotted Harlequin Snake	<i>Homoroselaps lacteus</i>	En	NE	Low	Fynbos, costal forest, moist savanna and grassland
Common Water Snake	<i>Lycodonomorphus rufulus</i>	En	NE	Low	Small streams, pans and vleis
Coppery Grass Lizard	<i>Chamaesaura aenea</i>	En	NE	Low	Grass covered montane slopes and plateaus
Shield Cobra	<i>Aspidelaps scutatus</i>	En	NE	Low	Sandy and stony areas
Transvaal Gecko	<i>Pachydactylus affinis</i>	En	NE	High	Rocky outcrops and dead termite nests
Delalande's Sandveld Lizard	<i>Nucras lalandii</i>	En	NE	Low	Montane and temperate grassland
Bibron's Blind Snake	<i>Typhlops bibronii</i>	En	NE	Medium	Highveld and coastal grassland
Black-headed Centipede-eater	<i>Aparallactus capensis</i>		LC		Varied, highveld, montane grassland, savanna and coastal bush
Flap-neck Chameleon	<i>Chamaeleo dilepis</i>		LC		Savanna woodland, coastal forest in KZN
Rhombic Egg-eater	<i>Dasypeltis scabra</i>		LC		Absent only from closed canopy and desert areas
Southern File Snake	<i>Mehelya capensis</i>		LC		Savanna, coastal forest and arid regions
Western Stripe-bellied Sand Snake	<i>Psammophis subtaeniatus</i>		LC		Open dry savanna, thornveld and bushveld
Striped Skaapsteker	<i>Psammophylax tritaeniatus</i>		LC		Open grassland and savanna
Montane Speckled Skink	<i>Trachylepis punctatissima</i>		LC		Variety of habitats, wet and dry, from grassland and savanna to shrubland, including rock outcrops
Southern Rock Agama	<i>Agama atra</i>		NE		Semi-desert to fynbos

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Common Purple-glossed Snake	<i>Amblyodipsas polylepis</i>		NE		Sandy or humic soils in well wooded areas
Southern Stiletto Snake	<i>Atractaspis bibronii</i>		NE		Varied, highveld grassland and semi- desert to coastal bush
Brown House Snake	<i>Lamprophis capensis</i>		NE		Highveld grassland, karroid regions and tolerant in urban areas
Herald Snake	<i>Crotaphopeltis hotamboeia</i>		NE		Savanna and open woodland
Common Wolf Snake	<i>Lycophidion capense</i>		NE		Variety of habitats incl lowland forest, fynbos, moist savanna, grassland and karoo scrub
Green Water Snake	<i>Philothamnus hoplogaster</i>		NE		Varied, coastal bush, fynbos, arid and mesic savanna
Sundevall's Shovel-snout	<i>Prosymna sundevallii</i>		NE		Dry areas, savanna woodlands, highveld and karroid areas, entering mesic thicket in the cape
Short-snouted Grass Snake	<i>Psammophis brevirostris</i>		NE		Varied including grassland and moist savanna
Crossed Whip Snake	<i>Psammophis crucifer</i>		NE		Highveld and montane grassland, entering fynbos
Spotted Skaapsteker	<i>Psammophylax rhombeatus</i>		NE		Highveld grassland, mesic thicket, fynbos, karroid areas
Mole Snake	<i>Pseudaspis cana</i>		NE		Sandy scrubland in SW Cape, highveld grassland, mountainous and desert areas
Transvaal Girdled Lizard	<i>Cordylus vittifer</i>		NE		Rock outcrops in grassland
Sundevall's Garter Snake	<i>Elapsoidea sundevallii</i>		NE		Varied, coastal forest, highveld grassland, arid and mesic savanna
Mozambique Spitting Cobra	<i>Naja mossambica</i>		NE		Savanna, cleared areas in former forest
Cape Dwarf Gecko	<i>Lygodactylus capensis</i>		NE		Well-wooded savanna and tropical thicket
Cape Gecko	<i>Pachydactylus capensis</i>		NE		Varied, karroid veld, grassland
Yellow-throated Plated Lizard	<i>Gerrhosaurus flavigularis</i>		NE		Varied, montane grassland, savanna, bushveld
Peter's Worm Snake	<i>Leptotyphlops scutifrons</i>		NE		Varied, grassland, coastal bush, mesic and arid savanna
Peter's Worm Snake	<i>Leptotyphlops scutifrons</i>		NE		Varied, grassland, coastal bush, mesic and arid savanna
Wahlberg's Snake-eyed Skink	<i>Panaspis walbergii</i>		NE		Arid and mesic savanna
Cape Skink	<i>Trachylepis capensis</i>		NE		Very varied
Variable Skink	<i>Trachylepis varia</i>		NE	Confirmed	Varied, grassland to arid mesic savanna
Water Monitor	<i>Varanus niloticus</i>		NE		Rivers, pans and major lakes

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Puff Adder	<i>Bitis arietans</i>		NE		Absent only from desert, dense forest and mountain tops
Rhombic Night Adder	<i>Causus rhombeatus</i>		NE		Mesic savanna
Amphibians					
Red Toad	<i>Schismaderma carens</i>	LC	LC	Medium	Widespread in savanna and woodland, readily adapts to human habitation
Boettger's Caco	<i>Cacosternum boettgeri</i>	LC	LC	Medium	Variety of habitats in Nama Karoo, succulent Karoo, grassland and thicket favouring open areas and especially abundant in grassland areas; occasionally forest clearings
Striped Stream Frog	<i>Strongylopus fasciatus</i>	LC	LC	Medium	Open, grassy areas near dams, ponds or streams in forest, thicket, grassland and savanna, sometimes parks and gardens
Tremelo Sand Frog	<i>Tomopterna cryptotis</i>	LC	LC	Medium	Variety of habitats in savanna and grassland
Natal Sand Frog	<i>Tomopterna natalensis</i>	LC	LC	Medium	Variety of habitats in savanna and grassland; breeds in shallow permanent furrows, canals or streams in grassland and agricultural land
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	NT; Pr	LC	Low	Fossorial, breeding in seasonal, shallow, grassy pans, vleis and other rain-filled depressions in open, flat areas of grassland or savanna
Guttural Toad	<i>Amietophrynus gutturalis</i>	LC	LC	Low	Around open pools, dams, vleis and other semi-permanent bodies of water in grassland, thicket and savanna; suburban gardens and farmland
Raucous Toad	<i>Amietophrynus rangeri</i>	LC	LC	Low	Rivers and streams in grassland and fynbos; frequently in gardens and farmland
Bubbling Kassina	<i>Kassina senegalensis</i>	LC	LC	Low	Grassland around vleis and pans; breeds in temporary and permanent water bodies including vleis, marshes, pans, ponds and dams
Snoring Puddle Frog	<i>Phrynobatrachus natalensis</i>	LC	LC	Low	Margins of permanent and temporary water bodies including shallow marshes, lakes, rivers, streams and pools; also semi-desert scrub, arid and humid savanna, agricultural land and forest clearings
Common Platanna	<i>Xenopus laevis</i>	LC	LC	Low	Restricted to aquatic habitats but opportunistic and can be found in any form of wetland

Common name	Scientific name	Conservation Status		Probability of occurring on site	Habitat preference
		RSA	IUCN		
Common River Frog	<i>Amietia angolensis</i>	LC	LC	Low	Banks of slow-moving streams or other permanent bodies of water in a wide variety of wetland habitats in grassland, savanna and forest edge
Cape River Frog	<i>Amietia fuscigula</i>	LC	LC	Low	Widespread around permanent rivers and streams in grassland, fynbos and Karoo scrub including farm dams and other artificial water bodies
Eastern Olive Toad	<i>Amietophrynus garmani</i>	LC	LC	Low	Vleis and pans in bushveld savanna with relatively high rainfall > 600mm pa; suburban gardens
Western Olive Toad	<i>Amietophrynus poweri</i>	LC	LC	Low	Around vleis and pans in thornveld savanna where rainfall is relatively low < 600mm pa
Bushveld Rain Frog	<i>Breviceps adpersus</i>	LC	LC	Low	Sandy to sandy-loam soils in semi-arid habitats in savanna and grassland, absent from forest
Banded Rubber Frog	<i>Phrynomantis bifasciatus</i>	LC	LC	Low	Hot, semi-arid to subtropical environments; savanna woodland, grassland and wide variety of bushveld vegetation types; also agriculturally developed areas
Plain Grass Frog	<i>Ptychadena anchietae</i>	LC	LC	Low	Widely distributed in savanna, open woodland and grassland; agricultural and suburban areas
Rattling Frog	<i>Semnodactylus wealii</i>	LC	LC	Low	Summer and winter rainfall areas in well-vegetated areas around pans and vleis in grassland or fynbos heath in south of range
Tandy's Sand Frog	<i>Tomopterna tandyi</i>	LC	LC	Low	Nama Karoo, grassland and savanna; breeds in small streams, pans and farm dams as well as temporary rain pools

APPENDIX G: Butterfly species occurring within QDGC 2628AA as well as their conservation status

Family	Scientific Name	Common Name	Conservation Status
HESPERIIDAE	<i>Coeliades forestan forestan</i>	Striped policeman	Least Concern
HESPERIIDAE	<i>Coeliades pisistratus</i>	Two-pip policeman	Least Concern
HESPERIIDAE	<i>Eretismumbra umbra</i>	Small marbled elf	Least Concern
HESPERIIDAE	<i>Gegenes niso niso</i>	Common hottentot	Least Concern
HESPERIIDAE	<i>Gegenes pumilio gambica</i>	Dark hottentot	Least Concern
HESPERIIDAE	<i>Gomalia elma elma</i>	Green-marbled skipper	Least Concern
HESPERIIDAE	<i>Kedestes barberae barberae</i>	Barber's ranger	Least Concern
HESPERIIDAE	<i>Kedestes chaka</i>	Shaka's ranger	Least Concern
HESPERIIDAE	<i>Kedestes lepenula</i>	Chequered ranger	Least Concern
HESPERIIDAE	<i>Kedestes nerva nerva</i>	Scarce ranger	Least Concern
HESPERIIDAE	<i>Kedestes wallengrenii wallengrenii</i>	Wallengren's ranger	Least Concern
HESPERIIDAE	<i>Metisella aegipan aegipan</i>	Mountain sylph	Least Concern
HESPERIIDAE	<i>Metisella malgacha malgacha</i>	Grassveld sylph	Least Concern
HESPERIIDAE	<i>Metisella meninx</i>	Marsh sylph	Vulnerable
HESPERIIDAE	<i>Metisella willemi</i>	Netted sylph	Least Concern
HESPERIIDAE	<i>Pelopidas mathias</i>	Black-banded swift	Least Concern
HESPERIIDAE	<i>Platylesches ayresii</i>	Peppered hopper	Least Concern
HESPERIIDAE	<i>Platylesches moritili</i>	Honey hopper	Least Concern
HESPERIIDAE	<i>Platylesches neba</i>	Flower-girl hopper	Least Concern
HESPERIIDAE	<i>Spialia asterodia</i>	Star sandman	Least Concern
HESPERIIDAE	<i>Spialia colotes transvaaliae</i>	Bushveld sandman	Least Concern
HESPERIIDAE	<i>Spialia diomus ferax</i>	Common sandman	Least Concern
HESPERIIDAE	<i>Spialia mafa mafa</i>	Mafa sandman	Least Concern
HESPERIIDAE	<i>Spialia spio</i>	Mountain sandman	Least Concern
HESPERIIDAE	<i>Tsitana tsita</i>	Dismal sylph	Least Concern
LYCAENIDAE	<i>Actizera lucida</i>	Rayed blue	Least Concern
LYCAENIDAE	<i>Alaena amazoula amazoula</i>	Yellow zulu	Least Concern
LYCAENIDAE	<i>Aloeides almeida</i>	Almeida copper	Least Concern
LYCAENIDAE	<i>Aloeides aranda</i>	Aranda copper	Least Concern
LYCAENIDAE	<i>Aloeides dentatis maseruna</i>	Roodepoort copper	Least Concern
LYCAENIDAE	<i>Aloeides henningi</i>	Henning's copper	Least Concern
LYCAENIDAE	<i>Aloeides molomo coalescens</i>	Molomo copper	Not listed
LYCAENIDAE	<i>Aloeides molomo molomo</i>	Molomo copper	Least Concern
LYCAENIDAE	<i>Aloeides taikosama</i>	Dusky copper	Least Concern
LYCAENIDAE	<i>Aloeides trimeni trimeni</i>	Trimeni's copper	Least Concern
LYCAENIDAE	<i>Anthene marah marah</i>	Black striped hairtail	Least Concern
LYCAENIDAE	<i>Anthene definite definita</i>	Common hairtail	Least Concern

LYCAENIDAE	<i>Anthene livida livida</i>	Pale hairtail	Least Concern
LYCAENIDAE	<i>Axiocerses tjoane tjoane</i>	Eastern scarlet	Least Concern
LYCAENIDAE	<i>Azonus jesous</i>	Topaz babul blue	Least Concern
LYCAENIDAE	<i>Azonus moriqua</i>	Black-bordered babul blue	Least Concern
LYCAENIDAE	<i>Azonus ubaldus</i>	Velvet-spotted babul blue	Least Concern
LYCAENIDAE	<i>Cacyreus fracta fracta</i>	Water geranium bronze	Least Concern
LYCAENIDAE	<i>Cacyreus marshalli</i>	Common geranium bronze	Least Concern
LYCAENIDAE	<i>Cacyreus virilis</i>	Mocker bronze	Least Concern
LYCAENIDAE	<i>Capys disjunctus</i>	Russet protea	Least Concern
LYCAENIDAE	<i>Chilades trochylus</i>	Grass jewel	Least Concern
LYCAENIDAE	<i>Chrysothrix lycegenes</i>	Moorivier opal	Least Concern
LYCAENIDAE	<i>Cigaritis ella</i>	Ella's bar	Least Concern
LYCAENIDAE	<i>Cigaritis mozambica</i>	Mozambique bar	Least Concern
LYCAENIDAE	<i>Cigaritis natalensis</i>	Natal bar	Least Concern
LYCAENIDAE	<i>Crudaria leroma</i>	Silver spotted grey	Least Concern
LYCAENIDAE	<i>Cupidopsis cissus cissus</i>	Common meadow blue	Least Concern
LYCAENIDAE	<i>Cupidopsis jobates jobates</i>	Tailed meadow blue	Least Concern
LYCAENIDAE	<i>Durbania limbata</i>	Natal rocksitter	Least Concern
LYCAENIDAE	<i>Eicochrysops messapus mahallakoena</i>	Cupreous blue	Least Concern
LYCAENIDAE	<i>Euchrysops dolorosa</i>	Sabie smoky blue	Least Concern
LYCAENIDAE	<i>Euchrysops malathana</i>	Common smoky blue	Least Concern
LYCAENIDAE	<i>Euchrysops subpallida</i>	Ashen smoky blue	Least Concern
LYCAENIDAE	<i>Hemiolaus caeculus caeculus</i>	Azure hairstreak	Least Concern
LYCAENIDAE	<i>Lolaus trimeni</i>	Trimen's sapphire	Least Concern
LYCAENIDAE	<i>Lachnocnema bibulus</i>	Common woolly legs	Least Concern
LYCAENIDAE	<i>Lachnocnema durhani</i>	D'Urban's woolly legs	Least Concern
LYCAENIDAE	<i>Lampides boeticus</i>	Pea blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops ignota</i>	Zulu blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops ketsi ketsi</i>	Ketsi blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops ortygia</i>	Koppie blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops patricia</i>	Patricia blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops plebeian plebeia</i>	Twin-spot blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops praeterita</i>	Highveld blue	Endangered
LYCAENIDAE	<i>Lepidochrysops trimeni</i>	Trimen's blue	Least Concern
LYCAENIDAE	<i>Lepidochrysops variabilis</i>	Variable blue	Least Concern
LYCAENIDAE	<i>Leptomyrina gorgias gorgias</i>	Common black-eye	Least Concern
LYCAENIDAE	<i>Leptomyrina henningi henningi</i>	Henning's black-eye	Least Concern
LYCAENIDAE	<i>Leptomyrina lara</i>	Cape black-eye	Least Concern
LYCAENIDAE	<i>Leptotes babaulti</i>	Babault's zebra blue	Least Concern
LYCAENIDAE	<i>Leptotes pirithous pirithous</i>	Common zebra blue	Least Concern

LYCAENIDAE	<i>Lycaena clarki</i>	Eastern sorrel copper	Least Concern
LYCAENIDAE	<i>Myrina silenus ficedula</i>	Common fig tree blue	Least Concern
LYCAENIDAE	<i>Oraidium barberae</i>	Dwarf blue	Least Concern
LYCAENIDAE	<i>Tarucus sybaris sybaris</i>	Dotted blue	Least Concern
LYCAENIDAE	<i>Tuxentius calice</i>	White pie	Least Concern
LYCAENIDAE	<i>Uranotauma nubifer nubifer</i>	Black heart	Least Concern
LYCAENIDAE	<i>Virachola dinochares</i>	Apricot playboy	Least Concern
LYCAENIDAE	<i>Zintha hintza hintza</i>	Hintza pierrot	Least Concern
LYCAENIDAE	<i>Zizeeria knysna knysna</i>	African grass blue	Least Concern
LYCAENIDAE	<i>Zizina otis antanossa</i>	Dark grass blue	Least Concern
LYCAENIDAE	<i>Zizula hylax</i>	Tiny grass blue	Least Concern
NYMPHALIDAE	<i>Acraea aglaonice</i>	Clear-spotted acraea	Least Concern
NYMPHALIDAE	<i>Acraea axina</i>	Little acraea	Least Concern
NYMPHALIDAE	<i>Acraea horta</i>	Garden acraea	Least Concern
NYMPHALIDAE	<i>Acraea lygus</i>	Lygus acraea	Least Concern
NYMPHALIDAE	<i>Acraea natalica</i>	Natal acraea	Least Concern
NYMPHALIDAE	<i>Acraea neobule neobule</i>	Wandering donkey acraea	Least Concern
NYMPHALIDAE	<i>Aeropetes tulbaghia</i>	Table mountain beauty	Least Concern
NYMPHALIDAE	<i>Byblia anvataria acheloia</i>	Joker	Least Concern
NYMPHALIDAE	<i>Byblia lithyia</i>	Spotted joker	Least Concern
NYMPHALIDAE	<i>Catacroptera cloanthe cloanthe</i>	Pirate	Least Concern
NYMPHALIDAE	<i>Charaxes jasius saturnus</i>	Foxy charaxes	Least Concern
NYMPHALIDAE	<i>Charaxes vansoni</i>	Van Son's charaxes	Least Concern
NYMPHALIDAE	<i>Danaus chrysippus orientis</i>	African monarch, Plain tiger	Least Concern
NYMPHALIDAE	<i>Hypolimnas misippus</i>	Common diadem	Least Concern
NYMPHALIDAE	<i>Junonia hierta cebrene</i>	Yellow pansy	Least Concern
NYMPHALIDAE	<i>Junonia oenone oenone</i>	Blue pansy	Least Concern
NYMPHALIDAE	<i>Junonia orithya madagascariensis</i>	Eyed pansy	Least Concern
NYMPHALIDAE	<i>Junonia terea elgiva</i>	Soldier pansy	Least Concern
NYMPHALIDAE	<i>Melanitis leda</i>	Twilight bown	Least Concern
NYMPHALIDAE	<i>Paternympha narycia</i>	Spotted-eye brown	Least Concern
NYMPHALIDAE	<i>Phalanta phalantha aethiopica</i>	African leopard	Least Concern
NYMPHALIDAE	<i>Precis antilope</i>	Darker commodore	Least Concern
NYMPHALIDAE	<i>Precis archesia archesia</i>	Garden commodore	Least Concern
NYMPHALIDAE	<i>Precis ceryne ceryne</i>	Marsh commodore	Least Concern
NYMPHALIDAE	<i>Precis Octavia sesamus</i>	Gaudy Commodore	Least Concern
NYMPHALIDAE	<i>Stygionympha robertsoni</i>	Robertson's hillside brown	Least Concern
NYMPHALIDAE	<i>Stygionympha wichgrafi wichgrafi</i>	Wichgraf's hillside brown	Least Concern
NYMPHALIDAE	<i>Telchinia anacreon</i>	Orange acraea	Least Concern
NYMPHALIDAE	<i>Telchinia cabira</i>	Yellow-banded acraea	Least Concern

NYMPHALIDAE	<i>Telchinia rahira rahira</i>	Marsh acraea	Least Concern
NYMPHALIDAE	<i>Telchinia serena</i>	Dancing acraea	Least Concern
NYMPHALIDAE	<i>Vanessa cardui</i>	Painted lady	Least Concern
PAPILIONIDAE	<i>Papilio demodocus demodocus</i>	Citrus swallowtail	Least Concern
PAPILIONIDAE	<i>Papilio nireus lyaeus</i>	Green-banded swallowtail	Least Concern
PIERIDAE	<i>Afrodryas leda</i>	Autumn leaf vagrant	Least Concern
PIERIDAE	<i>Belenois aurota</i>	Brown-veined white	Least Concern
PIERIDAE	<i>Belenois creona severina</i>	African common white	Least Concern
PIERIDAE	<i>Belenois zochalia zochalia</i>	Forest white	Least Concern
PIERIDAE	<i>Catopsilia florella</i>	African migrant	Least Concern
PIERIDAE	<i>Colias electo electo</i>	African clouded yellow	Least Concern
PIERIDAE	<i>Colotis annae annae</i>	Scarlet tip	Least Concern
PIERIDAE	<i>Colotis antevippe gavisa</i>	Red tip	Least Concern
PIERIDAE	<i>Colotis eupipe omphale</i>	Smoky orange tip	Least Concern
PIERIDAE	<i>Colotis evagore antigone</i>	Small orange tip	Least Concern
PIERIDAE	<i>Colotis evenina evenina</i>	Orange tip	Least Concern
PIERIDAE	<i>Dixeia charina charina</i>	African small white	Least Concern
PIERIDAE	<i>Dixeia pigea</i>	Ant-heap white	Least Concern
PIERIDAE	<i>Eurema brigitta brigitta</i>	Broad-bordered grass yellow	Least Concern
PIERIDAE	<i>Eurema hecabe solifera</i>	Lowveld yellow	Least Concern
PIERIDAE	<i>Mylothris agathina agathina</i>	Common dotted border	Least Concern
PIERIDAE	<i>Mylothris rueppellii haemus</i>	Twin dotted border	Least Concern
PIERIDAE	<i>Pinacopteryx eriphia eriphia</i>	Zebra white	Least Concern
PIERIDAE	<i>Pontia helice helice</i>	Common meadow white	Least Concern
PIERIDAE	<i>Teracolus agoye agoye</i>	Speckled sulphur tip	Least Concern
PIERIDAE	<i>Teracolus agoye bowkeri</i>	Speckled sulphur tip	Least Concern
PIERIDAE	<i>Teracolus subfasciatus</i>	Lemon traveller	Least Concern