



**BIODIVERSITY ASSESSMENT
ASSOCIATED WITH THE PROPOSED
NEWCASTLE GREENWICH
LANDFILL DEVELOPMENT**

KwaZulu-Natal Province

April 2018

REFERENCE

GCS Newcastle Landfill

CLIENT

GCS

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Report Name	BIODIVERSITY ASSESSMENT ASSOCIATED WITH THE PROPOSED NEWCASTLE GREENWICH LANDFILL DEVELOPMENT	
Reference	GCS Newcastle Landfill	
Submitted to	GCS	
Report writer	Peter Kimberg	
Report reviewer		



EXECUTIVE SUMMARY

Peter Kimberg from The Biodiversity Company (TBC) was appointed by GCS to conduct a baseline biodiversity (fauna & flora) assessment as part of the Environmental Impact Assessment (EIA) for the Newcastle Greenwich Landfill development in KwaZulu-Natal. The biodiversity related field survey was conducted on the 21st to 23rd of February 2018.

This report, after taking into consideration the findings and recommendation provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

The following conclusions were reached based on the results of this assessment:

- The project area is situated in a highly sensitive and biodiverse area, a large part of which has been classified as a Critical Biodiversity Area (CBA) Optimal. The area is therefore unsuitable for a development such as a landfill site which requires the largescale clearing of indigenous vegetation and is likely to have substantial peripheral impacts;
- The CBA Optimal forms a linkage with an Irreplaceable CBA which is situated a short distance to the south and south-west of the project area. Destruction of this area will therefore remove an important linkage and migration corridor to other CBA areas in the vicinity;
- The Northern KwaZulu-Natal Moist Grassland vegetation community in which the project area is located is classified as Vulnerable and, with the exception of dense patches of alien invasive vegetation in the eastern portion of the project area, was found to be largely intact with high species diversity;
- Although few faunal species of conservation importance were recorded, the likelihood of these taxa occurring in the project area was rates as moderate to good;
- The significance of impacts on biodiversity were rated as moderate to high prior to implementation. The significance of some impacts remained high post-mitigation as it is felt that mitigation of these impacts will require intensive effort and cost to mitigate, something which is unlikely to be feasible for a development of this nature (landfill site). It is very likely that if the development proceeds, these mitigation measures will fall by the wayside and the potential impacts on biodiversity will be significant.

An impact statement is required as per the NEMA regulations with regards to the proposed development.

Based on the results of the impact assessment and the high levels of significance of potential impacts on biodiversity prior to and post-mitigation, it is recommended that an alternative brownfield site be sought for the proposed development and that permission for the proposed development be denied.



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REQUIREMENT	STATUS
1. A specialist report prepared in terms of these Regulations must contain–	
(a) details of–	
(i) the specialist who prepared the report; and	Yes
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Yes
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Yes
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Yes
(cA) an indication of the quality and age of base data used for the specialist report;	Yes
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Yes
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Yes
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Yes
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Yes
(g) an identification of any areas to be avoided, including buffers;	Yes
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	No
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Yes
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Yes
(k) any mitigation measures for inclusion in the EMPr;	Yes
(l) any conditions for inclusion in the environmental authorisation;	Yes
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	No
(n) a reasoned opinion–	Yes
(i) whether the proposed activity, activities or portions thereof should be authorised;	Yes



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REQUIREMENT	STATUS
(iA) regarding the acceptability of the proposed activity or activities; and	Yes
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Yes
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Yes
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	No
(q) any other information requested by the competent authority.	Yes
2. Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Yes



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DECLARATION

I, Peter Karl Kimberg declare that:

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



Peter Kimberg

B. Sc. Honours Zoology

The Biodiversity Company

April 2018



1 INTRODUCTION

Peter Kimberg from The Biodiversity Company (TBC) was appointed by GCS to conduct a baseline biodiversity (fauna & flora) assessment as part of the Environmental Impact Assessment (EIA) for the Newcastle Greenwich Landfill development in KwaZulu-Natal. The biodiversity related field survey was conducted on the 21st to 23rd of February 2018.

This report, after taking into consideration the findings and recommendation provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Terms of Reference

The aim of the study was to undertake and compile a biodiversity baseline and impact assessment for the proposed development.

This biodiversity assessment was informed by the 2012 KwaZulu-Natal Systematic Conservation Plan (KZNSCP).

2 LIMITATIONS

The following limitations should be noted for the study:

- The results of this assessment was based on single wet season survey, and therefore seasonal variation was not taken into consideration. Nevertheless, the confidence in the data collected and the report generated is high.

3 KEY LEGISLATIVE REQUIREMENTS

The following legal framework and requirements apply to the study:

- The National Environmental Management: Biodiversity Act (NEM:BA) No. 10 of 2004: specifically, the management and conservation of biological diversity within the RSA and of the components of such biological diversity.

4 PROJECT AREA

The project area is situated in KwaZulu-Natal approximately 11.5 km south of the town of Newcastle in the vicinity of Kilbarchan (Figure 1). The project area is approximately 185 hectares in size.

The site is situated in the North Eastern Uplands ecoregion, the Pongola-Mtamvuna Water Management Area (WMA_04) and the grassland biome. The site is situated within Quarter Degree Square (QDS) 2729DD.





Figure 1: The location of the Project area just south of the town of Newcastle in KZN

4.1 KwaZulu-Natal Systematic Conservation Plan (KZNSCP) 2012

The process of conservation planning involves extensive mapping of vegetation types, transformation, species data, ecological processes and threats (KZNSCP, 2012). This information is then used to identify different conservation priority areas:

- Critical Biodiversity Areas (CBAs) are the highest priority areas in terms of conservation. These areas need to be maintained in a near natural state in order to ensure the continuing functioning of ecosystems. The Critical Biodiversity Areas (CBAs) can be divided into two subcategories, namely;
 - Irreplaceable – areas considered critical for meeting biodiversity targets and thresholds and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems; and
 - Optimal – areas which represent the best localities out of a potentially larger selection of planning units (PUs). These areas should not necessarily be regarded as being of lower biodiversity value, only that there are more alternate options available within which the features located within can be met.
- Ecological Support Areas (ESAs) areas are required to support and sustain the ecological functioning of CBAs. These areas are functional but not necessarily pristine natural areas. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs

The provincial conservation priority areas associated with the Newcastle Greenwich landfill site are shown in Figure 2 (Ezemvelo KZN Wildlife, 2016).

Based on this assessment, the proposed project area is overlapped by a CBA Optimal (Figure 2). The remainder of the project area is classified as other natural area (Figure 2). The CBA Optimal connects with a CBA Irreplaceable which is situated approximately 600 m south and west of the project area (Figure 2).

Based on this assessment the ecosystems within the project area are classified as being of very high biodiversity importance and should be maintained in a near natural state.



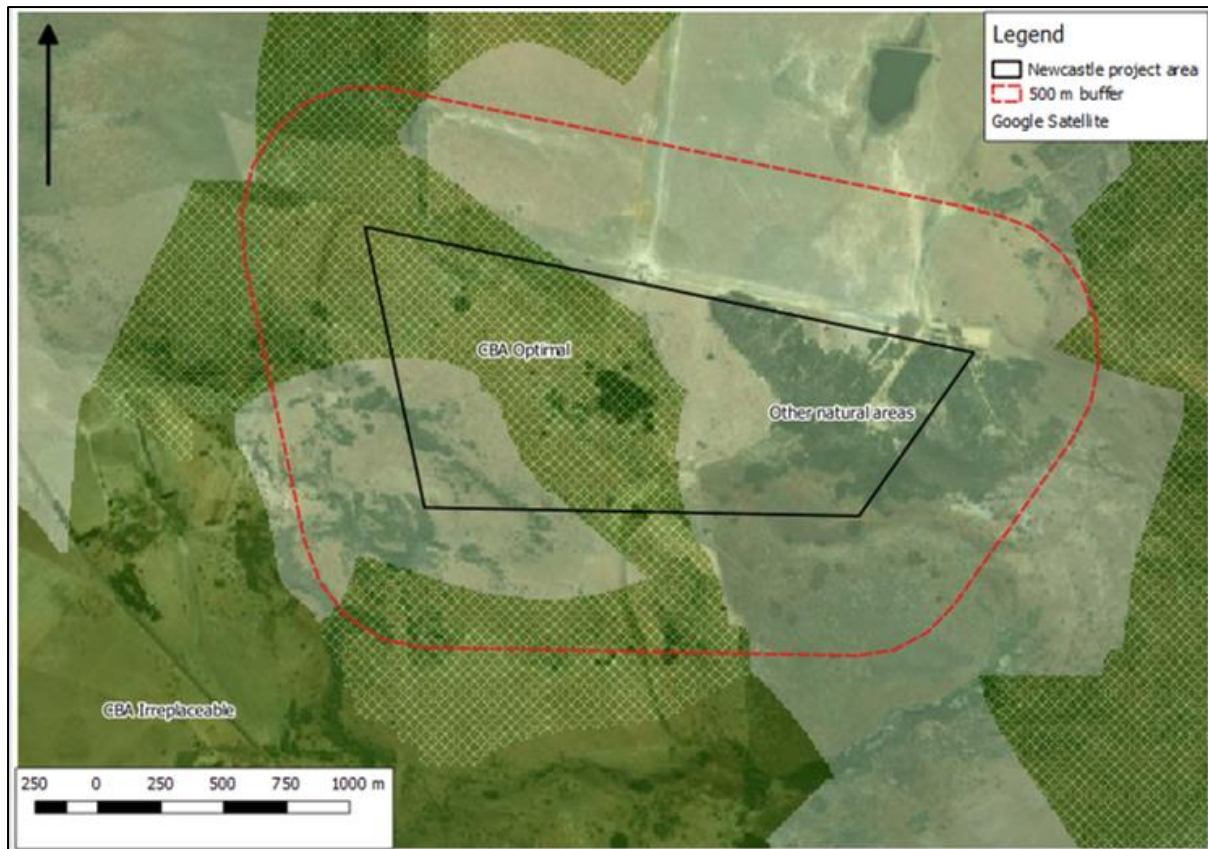


Figure 2: Provincial conservation priority areas associated with Newcastle Greenwich landfill site (Ezemvelo KZN Wildlife, 2016)

4.2 National Biodiversity Assessment (NBA, 2011)

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the Department of Environmental Affairs and stakeholders, scientists and biodiversity management experts throughout the country over a three-year period (Driver et al., 2012).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Driver et al., 2012).

The two headline indicators assessed in the NBA are ecosystem threat status and ecosystem protection level (Driver et al., 2012). The south-western portion of the project area is classified as Vulnerable (VU) and the north-eastern portion of the project area Least Threatened (LT). Based on the NBA (2011) the ecosystems in the project area are classified as poorly protected.

4.3 National Freshwater Ecosystem Priority Area (NFEPA) Status

In an attempt to better conserve aquatic ecosystems, South Africa has recently categorised its river systems according to set ecological criteria (i.e. ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al. 2011) The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel et al. 2011).

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Figure 3 shows the location of the project area in relation to wetland and river FEPAs. There are no FEPA rivers within the project area, the nearest FEPA is the Ncandu River which is situated approximately 3 km west of the site. Although there are wetlands within the project area and it buffer none of these are classified as FEPA wetlands (Figure 3). The nearest FEPA wetlands are situated approximately 1.3 km west and 1.8 km north of the project area (Figure 3).

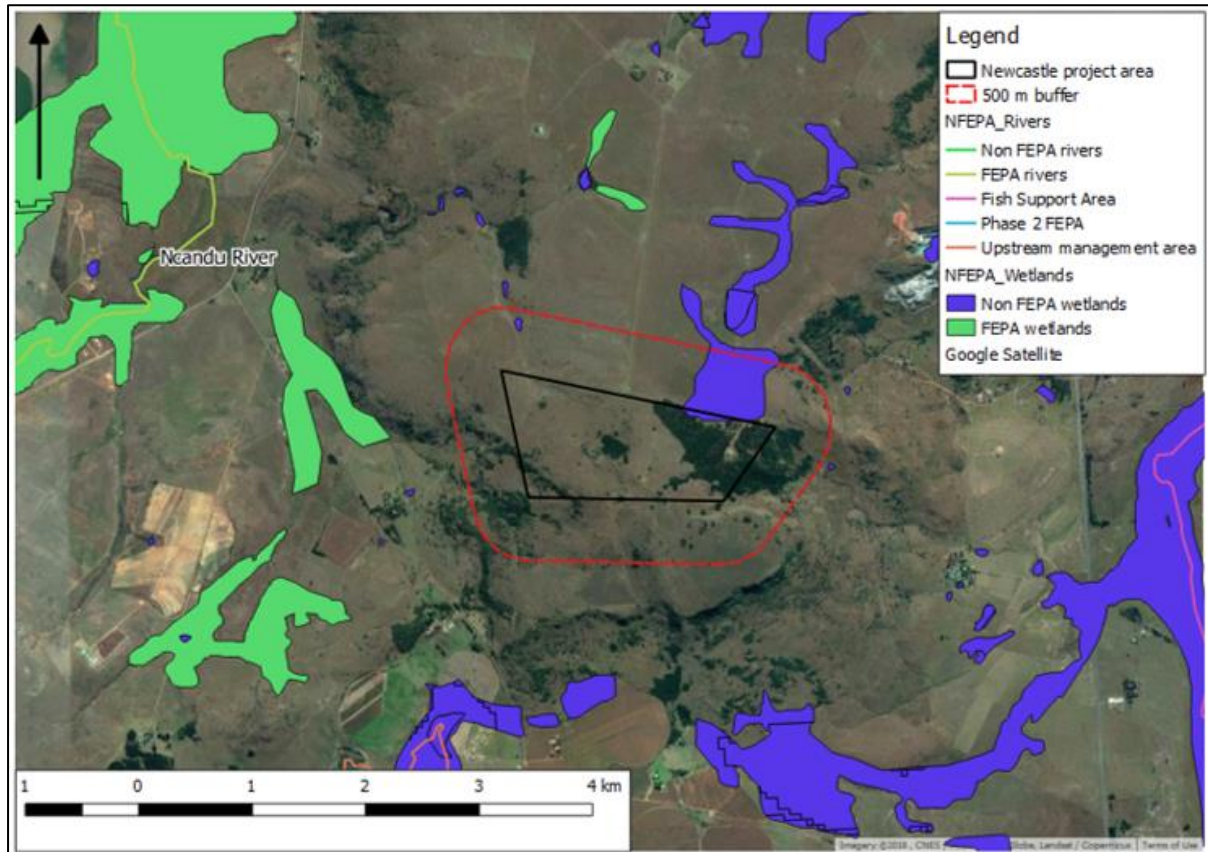


Figure 3: Newcastle Greenwich project area in relation to river and wetland FEPAs

4.4 Protected Areas

Figure 4 shows the location of formally protected areas in relation to the project area. Formally protected areas refer to areas protected either by national or provincial legislation.

The nearest formally protected area to the project area is Chelmsford Nature Reserve which is located about 11 km south of the project area and Ncandu Nature Reserve which is located approximately 20 km west of the project area (Figure 4).

Based on the nature of the development and its relatively small project footprint the proposed development is not expected to have an impact on any formally or informally protected areas (Figure 4).



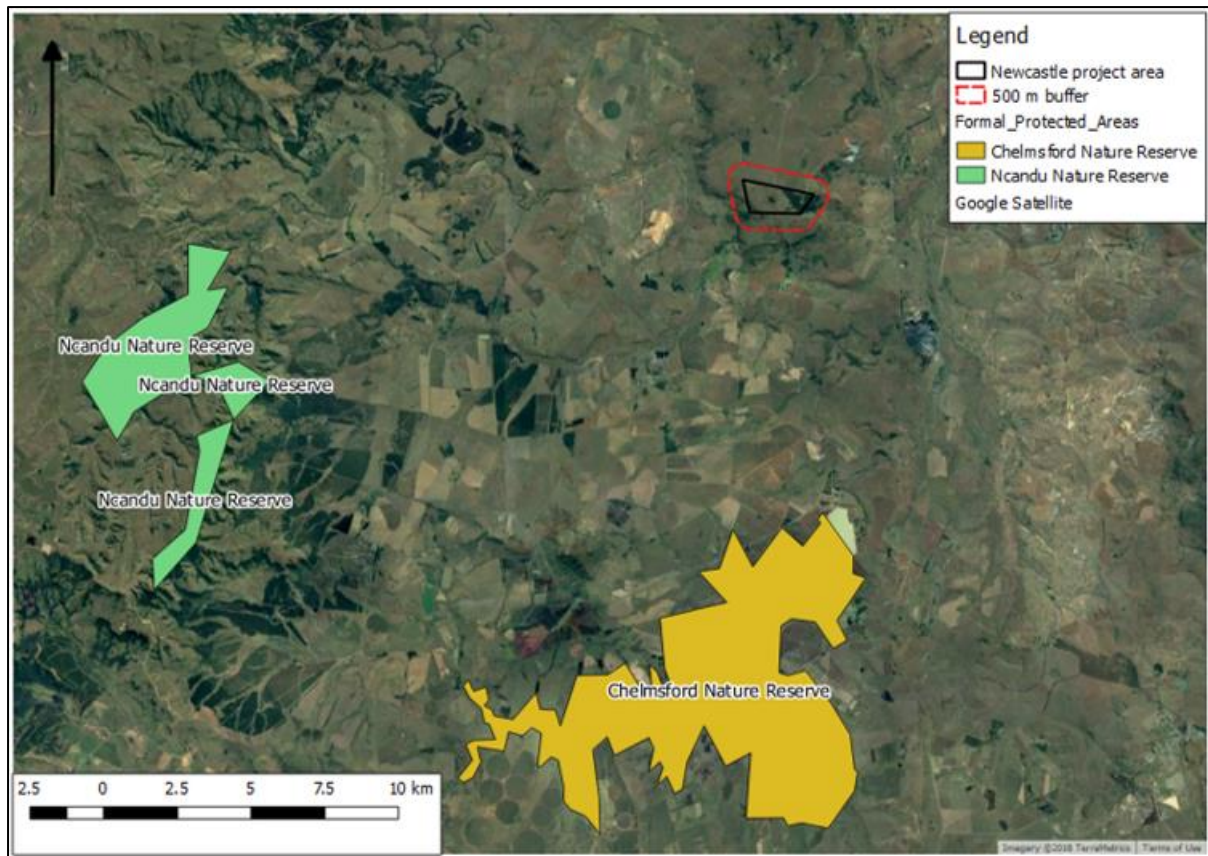


Figure 4: Newcastle Greenwich project area in relation to formally protected areas (BGIS,2017)

5 METHODOLOGY

5.1 Desktop Assessment

The requirements of this assessment served to combine aspects of the regional vegetation community (obtained from Mucina and Rutherford 2006) with the field study in order to formulate a series of conclusions and subsequent recommendations. The following datasets and sources were reviewed for the study:

- The Vegetation of South Africa, Lesotho & Swaziland (Mucina & Rutherford, 2006);
- The Southern Africa Bird Atlas Project (SABAP2, 2017) and BirdLife South Africa website (2017);
- Mammal information was referenced from the Animal Demography Unit (ADU, 2016), Skinner & Chimimba (2005) and the IUCN spatial database (IUCN, 2017); and
- Reptiles and amphibians were referenced from ADU (2016), Bates et al. (2014), Du Preez and Carruthers (2009) and the IUCN spatial database (IUCN, 2017) respectively.

The evaluation of species of concern was considered after the field study which served to identify their potential for occurrence. Therefore, all species identified under the above-mentioned references were not necessarily analysed in detail. Plants were identified using Van Oudtshoorn (2004) and Van Wyk & Van Wyk (1997).



The key to the rating of the species of conservation concern are as follows:

- CR = Critically Endangered;
- EN = Endangered;
- VU = Vulnerable;
- NT = Near Threatened; and
- LC = Least Concern.

The verification of the presence of red and orange listed plant species was one of the primary ecological requirements of the floral assessment.

5.2 Field Survey

A field survey was conducted by 2 ecologists where the floral and faunal communities in the project area were assessed. The timing of the study represented wet season condition. The project was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visit.

The fieldwork attempted to classify the fauna, flora and habitats, with emphasis on recording the actual and potential presence of Red Data species (also referred to as Red-Listed and Orange-Listed species), which are species of conservation concern in South African (either classified as threatened by the IUCN (2017), protected by NEMBA (2014) or indeed other legislations applicable provincially or nationally).

5.2.1 Vegetation Assessment

The survey included the following:

- A survey for Red and Orange Data plant species;
- Compilation of an observed plant species list; and
- Assessment of the presence of the degree of transformation and encroachment by alien invasive vegetation.

5.2.2 Faunal Assessment

The survey included the following:

- Compilation of expected species lists;
- A survey of the terrestrial habitats within the proposed development area (where applicable);
- Compilation of identified species lists;
- Identification of any Red Data or listed species present or potentially occurring in the area;
- A proximity assessment to any protected or ecologically important areas;



- Emphasis will be placed on the probability of occurrence of species of provincial, national and international conservation importance.

6 RESULTS & DISCUSSION

6.1 Desktop Assessment

6.1.1 Vegetation Assessment

The site is situated in the grassland biome. In South Africa the grassland biome occurs mainly on the highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape (Mucina & Rutherford, 2006).

According to Mucina & Rutherford (2006), the entire project area is situated in the Northern KwaZulu-Natal Moist Grassland vegetation community whilst portions of the 500 m buffer around the project area included Northern KwaZulu-Natal Shrubland.

Ezemvelo KZN Wildlife (Ezemvelo) together with various role players including government departments and NGOs developed a new vegetation map for the province (Scott-Shaw & Escott, 2011). Based on the updated vegetation map the entire project area is situated in the Northern KwaZulu-Natal Moist Grassland vegetation community whilst a portion of the 500 m buffer to the north of the project area is classified as Alluvial Wetland: Temperate Alluvial Vegetation.

The Northern KwaZulu-Natal Moist Grassland vegetation community occurs in KZN on gentle to steep upper slopes of mountains formed by hard dolerite dykes dominated by forb-rich tall sour *Themeda triandra* grasslands (Scott-Shaw & Escott, 2011).

Mucina & Rutherford (2006) classified Northern KwaZulu-Natal Moist Grassland as Vulnerable (VU), with only 2% statutorily conserved. The VU status of this vegetation community was confirmed during the development of the new vegetation map. A conservation status of VU is assigned to vegetation communities of which less than or equal to 60% remain of its original extent.



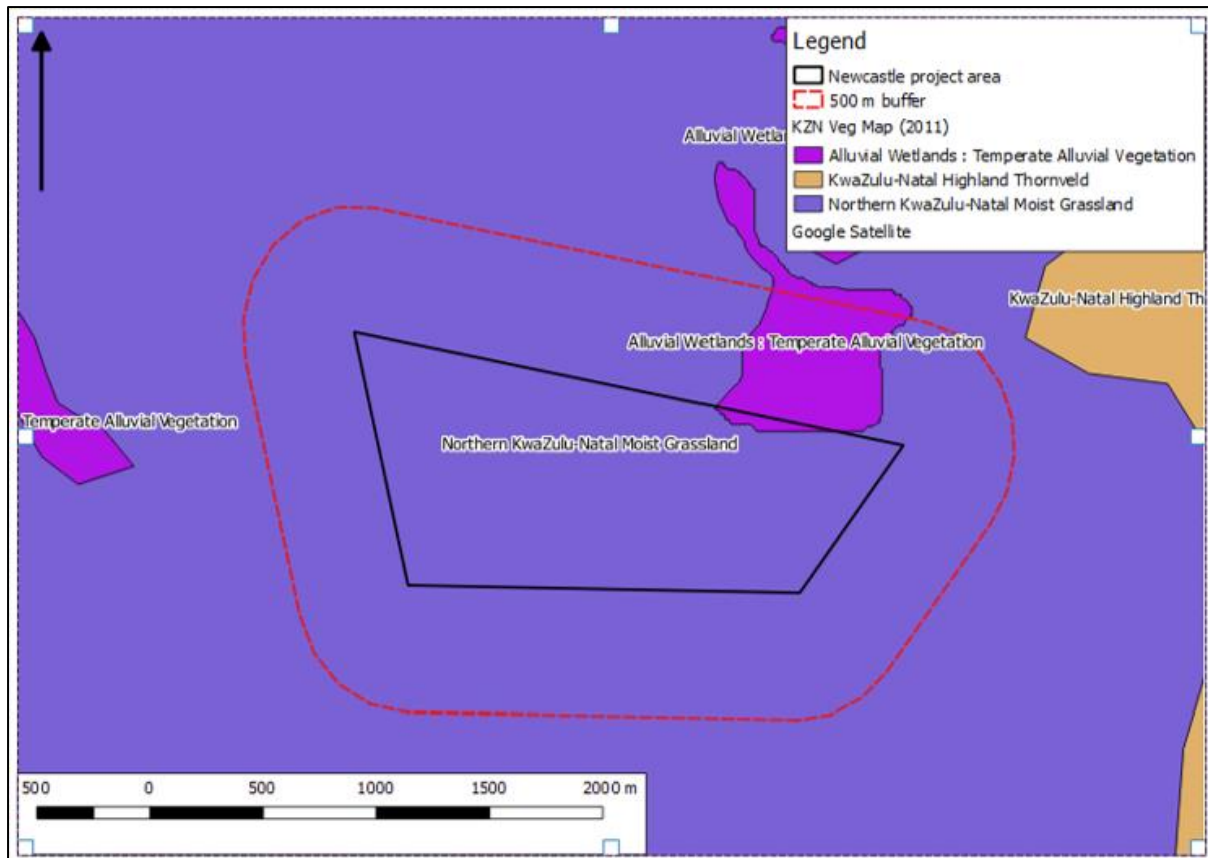


Figure 5: Project area showing the vegetation type based on the updated KwaZulu-Natal vegetation map (Scott-Shaw & Escott, 2011)

6.1.2 Faunal Assessment

6.1.2.1 Avifauna

Based on the South African Bird Atlas Project (SABAP, Version 2) 297 bird species are expected to occur in pentads 2750_2955, 2750_2950, 2745_2950 and 2745_2955. The full list of potential bird species is provided in Appendix B.

Of the expected bird species, 27 (9.1%) are listed as Species of Conservation Concern (SCC) either on a regional or global scale (Table 1).

The SCC include the following:

- Three (3) species that are listed as Endangered (EN) on a global basis. Six (6) species are listed as EN on a regional basis;
- Six (6) species that is listed as Vulnerable (VU) on a global scale and 11 on a regional scale; and
- Seven (7) species that are listed as Near Threatened (NT) on a global scale and 6 on a regional scale (Table 1).



Table 1: List of bird species of regional or global conservation importance that are expected to occur in pentads 2750_2955, 2750_2950, 2745_2950 and 2745_2955 (SABAP2, 2018, ESKOM, 2014; IUCN, 2018)

Species	Common Name	Global (IUCN, 2018)	Regional (BLSA, 2017)
<i>Balearica regulorum</i>	Crane, Grey Crowned	EN	EN
<i>Circus maurus</i>	Harrier, Black	EN	EN
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Anthropoides paradiseus</i>	Crane, Blue	VU	NT
<i>Bucorvus leadbeateri</i>	Ground-hornbill, Southern	VU	EN
<i>Geronticus calvus</i>	Ibis, Southern Bald	VU	VU
<i>Lioptilus nigricapillus</i>	Blackcap, Bush	VU	VU
<i>Polemaetus bellicosus</i>	Eagle, Martial	VU	EN
<i>Sagittarius serpentarius</i>	Secretarybird, Secretarybird	VU	VU
<i>Calidris ferruginea</i>	Sandpiper, Curlew	NT	LC
<i>Eupodotis caerulescens</i>	Korhaan, Blue	NT	LC
<i>Falco vespertinus</i>	Falcon, Red-footed	NT	NT
<i>Geocolaptes olivaceus</i>	Woodpecker, Ground	NT	Unlisted
<i>Monticola explorator</i>	Rock-thrush, Sentinel	NT	Unlisted
<i>Neotis denhami</i>	Bustard, Denham's	NT	VU
<i>Stephanoaetus coronatus</i>	Eagle, African Crowned	NT	VU
<i>Circus ranivorus</i>	Marsh-harrier, African	LC	EN
<i>Aquila verreauxii</i>	Eagle, Verreaux's	LC	VU
<i>Ciconia nigra</i>	Stork, Black	LC	VU
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	LC	VU
<i>Falco biarmicus</i>	Falcon, Lanner	LC	VU
<i>Sterna caspia</i>	Tern, Caspian	LC	VU
<i>Tyto capensis</i>	Grass-owl, African	LC	VU
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	LC	NT
<i>Coracias garrulus</i>	Roller, European	LC	NT
<i>Phoenicopterus ruber</i>	Flamingo, Greater	LC	NT
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	LC	NT

6.1.2.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2018) lists 84 mammal species that could be expected to occur within the project area (Appendix C). Of these species, 8 are medium to large conservation dependant species, such as *Diceros bicornis* (Black rhinoceros), *Ceratotherium simum* (Southern White Rhinoceros) and *Equus quagga* (Plains zebra) that in South Africa are restricted to protected areas such as game reserves. These species are not expected to occur in the project area and were therefore removed from the expected SCC list. They are however still shown included in Appendix C.

Of the remaining 76 small to medium sized mammal species, 14 (18.4%) are listed as being of conservation concern on a regional or global basis (Table 2).

The list of potential species includes:



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- One (1) that is listed as Endangered (EN) on a global scale and 2 on a regional scale;
- Two (2) that are listed as VU on a global scale and 6 on a regional scale (Table 2); and
- Four (4) that are listed as NT on a global scale and 5 on a regional scale (Table 2).

Table 2: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2018; SANBI, 2016)

Species	Common Name	Global (IUCN, 2018)	Regional (SANBI, 2016)
<i>Mystromys albicaudatus</i>	White-tailed rat	EN	VU
<i>Felis nigripes</i>	Black-footed cat	VU	VU
<i>Panthera pardus</i>	Leopard	VU	VU
<i>Aonyx capensis</i>	Cape clawless otter	NT	NT
<i>Eidolon helvum</i>	Straw-coloured fruit bat	NT	LC
<i>Hydrichtis maculicollis</i>	Spotted-necked otter	NT	VU
<i>Parahyaena brunnea</i>	Brown hyaena	NT	NT
<i>Crocidura maquassiensis</i>	Maquassie musk shrew	LC	VU
<i>Leptailurus serval</i>	Serval	LC	NT
<i>Ourebia ourebi</i>	Oribi	LC	EN
<i>Pelea capreolus</i>	Grey rhebok	LC	NT
<i>Poecilogale albinucha</i>	African striped weasel	LC	NT
<i>Redunca fulvorufula</i>	Mountain reedbeek	LC	EN
<i>Rhinolophus swinnyi</i>	Swinny's horseshoe bat	LC	VU

The expected mammal SCC are discussed below.

Aonyx capensis (Cape Clawless Otter) is the most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic and it is seldom found far from water. Based on the absence of permanently flowing or natural open water bodies within the project footprint the likelihood of occurrence of this species occurring in the project area is considered to be low.

Crocidura mariquensis (Swamp Musk Shrew) has very specific habitat requirements. It occurs in close proximity to open water bodies with a distinct preference for marshy ponds, and riverine and semi-aquatic vegetation such as reed beds (IUCN, 2017). It is known to be common in suitable habitats. Based on the low availability of this habitat type in the project area, the likelihood of occurrence of this species occurring in the project area is rated as low.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa, commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. Their likelihood of occurrence within the project area is rated as moderate.

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of



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formally protected areas the likelihood of occurrence of this species in the project area is moderate to good. The presence of moderate to large herbivores such as Kudu on the property increases the likelihood of occurrence of this species.

Pelea capreolus (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In SA, their distribution is irregular and patchy, and they no longer occur north of the Orange River in the Northern Cape, or in parts of the North-West Province (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. Based on the confirmed presence of these habitats the likelihood of occurrence of this species was rated as moderate to good.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wide habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas. The likelihood of occurrence of this species in the project area is moderate due to its small size and its inconspicuous nature and the availability of suitable habitat.

Panthera pardus (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Although known to occur and persist outside of formally protected areas, densities in these areas are usually very low and the likelihood of occurrence in an area with relatively high human density & the presence of cattle, is regarded as low.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the arid central Karoo region of South Africa, the habitat in the project area can be considered to be marginal and the likelihood of occurrence low.

Hydrictis maculicollis (Spotted-necked Otter) is known to be found in lakes and larger rivers throughout much of Africa south of 10°N (IUCN, 2017). The species inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes, the likelihood of occurrence is rated as low.

Mystromys albicaudatus (White-tailed Rat) is Vulnerable (VU) on a regional basis and Endangered (EN) on a global scale (Table 2). It is relatively widespread across South Africa and Lesotho; the species is known to occur in shrubland and grassland areas. A major requirement of the species is black loam with good vegetation cover. Although the vegetation type is suitable, the high degree of disturbance means that the likelihood of occurrence of this species is rated as low.

Eidolon helvum (African Straw-coloured Fruit Bat) is listed as LC on a regional scale and NT on a global scale (Table 2). This species has been recorded from a very wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered



to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). No colonies of this species are known to occur in the project area or in the immediate vicinity and although individuals may occasionally be recorded it is not expected to be resident in the project area.

6.1.2.3 Herpetofauna (reptiles & amphibians)

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017) 13 reptile species are expected to occur in the project area (Appendix D). No species of conservation concern should be present according to the above-mentioned sources within the project area but *in situ* observations may prove otherwise.

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017) 25 amphibian species are expected to occur in the project area (Appendix D). One (1) amphibian species of species of conservation concern, *Hemisus guttatus* (Spotted shovel-nosed frog) is expected to occur in the project area. This species is listed as VU on the IUCN Red List of Threatened Species (IUCN, 2018).

6.2 Field Survey

6.2.1 Vegetation Assessment

Prior to commencement of the field survey 16 vegetation plots were randomly selected throughout the project area. During the survey these plots were sampled, and 4 vegetation communities identified in the project area namely:

- Alien Invasive vegetation;
- Indigenous shrub patches;
- Rocky grassland; and
- Grassland (Figure 6).

A total of 30 plant species were recorded in the indigenous vegetation communities (Table 3), whereas the alien invasive communities were dominated by a handful of invasive species namely *Acacia mearnsii*, *Eucalyptus saligna* and *Datura stramonium*.

The indigenous vegetation communities were found to be largely intact, although evidence of trampling by cattle was noted along with an increase in annual grass species such as *Aristida congesta* that dominates the grassland community. The rocky grassland and indigenous shrub vegetation communities were found to be most intact, although even in these areas evidence of overgrazing and trampling was evident.



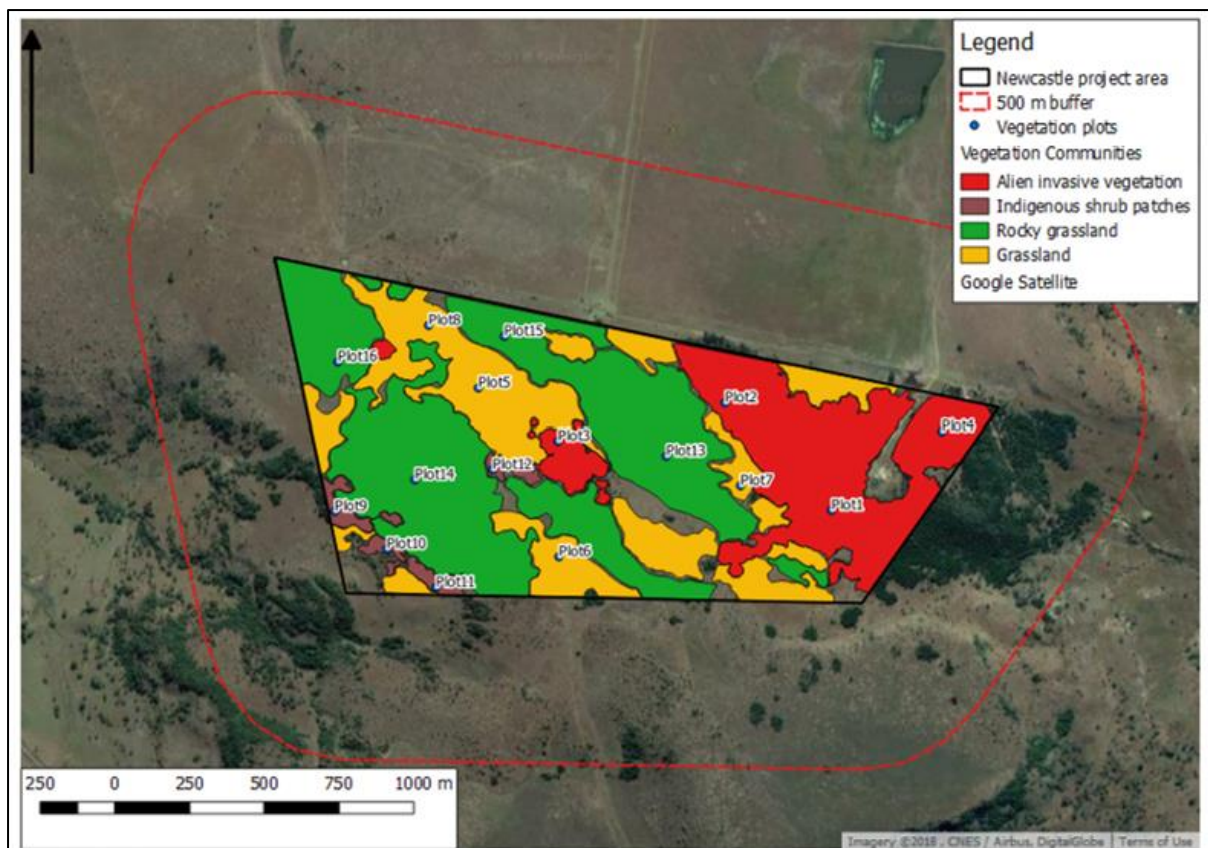


Figure 6: Location of vegetation plots and vegetation communities within the project area

Table 3: Plants species recorded in grassland, rocky grassland and indigenous shrub vegetation communities during the February 2018 field survey

Species	SANBI Red List (2018)
<i>Acacia sieberiana</i>	LC
<i>Aloe maculata</i>	LC
<i>Aristida congesta</i>	LC
<i>Asparagus densiflorus</i>	LC
<i>Berkheya rehmani</i>	LC
<i>Berkheya speciosa</i>	LC
<i>Centella asiatica</i>	LC
<i>Commelina erecta</i>	LC
<i>Crassula alba</i>	LC
<i>Cucumis zeyheri</i>	LC
<i>Cussonia spicata</i>	LC
<i>Cymbopogon caesius</i>	LC
<i>Datura stramonium</i>	LC
<i>Diheteropogon amplexans</i>	LC
<i>Eragrostis plana</i>	LC
<i>Eragrostis superba</i>	LC
<i>Euclea natalensis</i>	LC
<i>Euphorbia pulvinata</i>	LC



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<i>Gerbera ambigua</i>	LC
<i>Gladioli crassifolius</i>	LC
<i>Helichrysum rugulosum</i>	LC
<i>Hypoxis haemarcallidea</i>	Declining
<i>Heteropogon contortus</i>	LC
<i>Ipomoea crassipes</i>	LC
<i>Ledebouria ovatifolia</i>	LC
<i>Nuxia congesta</i>	LC
<i>Searsia pyroides</i>	LC
<i>Solanum panduriforme</i>	LC
<i>Themeda triandra</i>	LC
<i>Ziziphus mucronata</i>	LC

6.2.2 Faunal Assessment

Due the proximity of the sites to each other and the similarity of habitats observed on the sites the sites were treated as 1 for the faunal assessment.

6.2.2.1 Avifauna

A total of 49 bird species were recorded in the project area during the February 2018 survey (Table 4).

One (1) bird species of conservation concern, *Geronticus calvus* (Ibis, Southern Bald) was observed flying over the site. This species is listed as VU both at a global and regional scale. The species can be expected to forage on the site.

The alien invasive bird species *Acridotheres tristis* (Myna, Common) was observed at several location during the survey.

Table 4: Bird species recorded in the project area during the February 2018 field survey

Species	Common Name	Global (IUCN, 2018)	Regional (BLSA, 2017)
<i>Bubo africanus</i>	Eagle-owl, Spotted	LC	Unlisted
<i>Acridotheres tristis</i> *	Myna, Common	LC	Unlisted
<i>Anthus cinnamomeus</i>	Pipit, African	LC	Unlisted
<i>Ardea cinerea</i>	Heron, Grey	LC	Unlisted
<i>Batis molitor</i>	Batis, Chinspot	LC	Unlisted
<i>Bostrychia hagedash</i>	Ibis, Hadedda	LC	Unlisted
<i>Bubulcus ibis</i>	Egret, Cattle	LC	Unlisted
<i>Buteo rufofuscus</i>	Buzzard, Jackal	LC	Unlisted
<i>Caprimulgus pectoralis</i>	Nightjar, Fiery-necked	LC	Unlisted
<i>Cercomela familiaris</i>	Chat, Familiar	LC	Unlisted
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	LC	Unlisted
<i>Cisticola juncidis</i>	Cisticola, Zitting	LC	Unlisted
<i>Cisticola tinniens</i>	Cisticola, Levillant's	LC	Unlisted
<i>Colius striatus</i>	Mousebird, Speckled	LC	Unlisted
<i>Columba guinea</i>	Pigeon, Speckled	LC	Unlisted



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<i>Corvus albus</i>	Crow, Pied	LC	Unlisted
<i>Cossypha caffra</i>	Robin-chat, Cape	LC	Unlisted
<i>Crithagra atrogularis</i>	Canary, Black-throated	LC	Unlisted
<i>Crithagra mozambicus</i>	Canary, Yellow-fronted	LC	Unlisted
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	LC	Unlisted
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	LC	Unlisted
<i>Euplectes orix</i>	Bishop, Southern Red	LC	Unlisted
<i>Falco amurensis</i>	Falcon, Amur	LC	Unlisted
<i>Geronticus calvus</i>	Ibis, Southern Bald	VU	VU
<i>Hirundo cucullata</i>	Swallow, Greater Striped	LC	Unlisted
<i>Hirundo spilodera</i>	Cliff-swallow, South African	LC	Unlisted
<i>Indicator indicator</i>	Honeyguide, Greater	LC	Unlisted
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	LC	Unlisted
<i>Lanius collaris</i>	Fiscal, Common (Southern)	LC	Unlisted
<i>Mirafra africana</i>	Lark, Rufous-naped	LC	Unlisted
<i>Numida meleagris</i>	Guineafowl, Helmeted	LC	Unlisted
<i>Onychognathus morio</i>	Starling, Red-winged	LC	Unlisted
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	LC	Unlisted
<i>Passer domesticus</i>	Sparrow, House	LC	Unlisted
<i>Passer melanurus</i>	Sparrow, Cape	LC	Unlisted
<i>Ploceus velatus</i>	Masked-weaver, Southern	LC	Unlisted
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	LC	Unlisted
<i>Saxicola torquatus</i>	Stonechat, African	LC	Unlisted
<i>Streptopelia capicola</i>	Turtle-dove, Cape	LC	Unlisted
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	LC	Unlisted
<i>Streptopelia senegalensis</i>	Dove, Laughing	LC	Unlisted
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	LC	Unlisted
<i>Trachyphonus vaillantii</i>	Barbet, Crested	LC	Unlisted
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	LC	Unlisted
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	LC	Unlisted
<i>Vanellus armatus</i>	Lapwing, Blacksmith	LC	Unlisted
<i>Vanellus senegallus</i>	Lapwing, African Wattled	LC	Unlisted
<i>Vidua macroura</i>	Whydah, Pin-tailed	LC	Unlisted

* Alien invasive species

6.2.2.2 Mammals

Ten (10) mammal species were observed or recorded in the project area based on visual tracks & signs (Table 5). This included 5 rodent species, 1 shrew, an Eastern rock sengi and 2 species of antelope (Table 5). The species present in the area are all common. No mammal SCC were recorded during the survey.



Table 5: Mammal species observed or deduced to be present in the project area based on tracks and signs during the February 2018 survey

Species	Common Name	Global (IUCN, 2018)	Regional (SANBI, 2016)
<i>Aethomys namaquensis</i>	Namaqua rock rat	LC	Unlisted
<i>Cryptomys hottentotus</i>	Common mole-rat	LC	LC
<i>Elephantulus myurus</i>	Eastern rock sengi	LC	LC
<i>Mastomys natalensis</i>	Natal multimammate mouse	LC	LC
<i>Pronolagus saundersiae</i>	Hewitt's red rock rabbit	LC	LC
<i>Rhabdomys pumilio</i>	Xeric four-striped mouse	LC	LC
<i>Steatomys pratensis</i>	Fat mouse	LC	LC
<i>Suncus varilla</i>	Lesser dwarf shrew	LC	LC
<i>Sylvicapra grimmia</i>	Common duiker	LC	LC
<i>Tragelaphus strepsiceros</i>	Kudu	LC	LC

6.2.2.3 Herpetofauna (reptiles & amphibians)

Two (2) reptile species and 1 amphibian species were observed in the project area during the February 2018 survey (Table 6, Figure 7). No herpetofauna species of conservation concern were recorded. Both observed reptile species are near-endemic (Table 6).

The low species diversity was attributed to the short duration of the survey and the timing of the survey during a period of cold and wet weather. During these periods, reptiles and amphibians reduce their activity and seek shelter in burrows and under rocks.

Table 6: Herpetofauna species recorded within the project area during the February 2018 survey

Species	Common Name	Global (IUCN, 2018)	Regional (Bates, Branch et al., 2014)
<i>Agama atra</i>	Southern rock agama	LC	Near-endemic
<i>Pachydactylus vansonii</i>	Van Son's thick-toed gecko	LC	Near-endemic
<i>Sclerophrys capensis</i>	Raucous toad	LC	LC





Figure 7: Herpetofauna species observed during the February 2018 survey included Van Son's thick-toed gecko and Raucous toad

7 IMPACT ASSESSMENT

7.1 Methodology

Potential impacts were evaluated against the data captured during the fieldwork to identify relevance to the study area. The relevant impacts were then subjected to a prescribed impact assessment methodology which is described below. Clearly defined rating and rankings scales (Table 7 to Table 13) were used to assess the impacts associated with the proposed activities..

Each impact identified was rated according the expected magnitude, duration, scale and probability of the impact.

Each impact identified was assessed in terms of scale (spatial scale), magnitude (severity) and duration (temporal scale). Consequence was then determined as follows:

Consequence = Severity + Spatial Scale + Duration

The Risk of the activity is then calculated based on frequency of the activity and impact, how easily it can be detected and whether the activity is governed by legislation. Thus:

Likelihood = Frequency of activity + frequency of impact + legal issues + detection

The risk is then based on the consequence and likelihood.

Risk = Consequence x likelihood

In order to assess each of these factors for each impact, the ranking scales in Table 7 – Table 13 were used.

Table 7: Severity

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful / within a regulated sensitive area	5

Table 8: Spatial Scale

Area specific (at impact site)	1
Whole site (entire surface right)	2
Local (within 5km)	3



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Regional / neighboring areas (5km to 50km)	4
National	5

Table 9: Duration

One day to one month (immediate)	1
One month to one year (Short term)	2
One year to 10 years (medium term)	3
Life of the activity (long term)	4
Beyond life of the activity (permanent)	5

Table 10: Frequency of the activity

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

Table 11: Frequency of the incident/impact

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

Table 12: Legal Issues

No legislation	1
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Fully covered by legislation	5
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Table 13: Detection

Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Environmental effects will be rated as either of high, moderate or low significance on the basis provided in Table 14.

Table 14: Impact Ratings

Rating	Class
1 – 55	(L) Low Risk
56 – 169	(M) Moderate Risk
170 – 600	(H) High Risk

Impacts were assessed in terms of the following project phases:

- Construction;
- Operation;
- Decommissioning and Closure;
- Residual; and
- Cumulative

7.2 Existing Impacts

Photographs of existing impacts that have had an impact on biodiversity of the project area are shown in Figure 8 and discussed below.

- Presence of alien and invasive plant species; and
- Presence of livestock with associated problems such as overgrazing and spread of alien and invasive plant species as well as trampling of wetland areas.





Figure 8: Existing impacts observed in the project area included stands of dense alien vegetation particularly in the eastern section of the project area as well as cattle grazing and trampling in the grasslands and wetlands

7.3 Identification of Additional Impacts

The proposed development comprises a landfill site. The construction phase of the development will require clearing of existing vegetation including VU grassland communities, earthworks, construction of roads, construction of supporting infrastructure, upgrading of road to site.

During the operational phase, increased human presence on the site will result in loss of biodiversity from peripheral areas due to increased human presence resulting in increased resource extraction, hunting, harvesting of medicinal plants, establishment of informal settlements, establishment of an economic node with supporting economic activities (recycling businesses, provision of food etc.)

During the decommissioning and closure phase of the project earthworks will be undertaken with the aim of covering the landfill and re-establishing vegetation on the site. This will result in changes to the drainage of the site as well as the establishment of pioneer plant and animal communities. The potential for establishment of alien invasive plant species during the phase of the project remains very high.



7.4 Assessment of Significance of Impacts prior to and post mitigation

The significance of impacts on biodiversity prior to and post mitigation is shown in Table 15.

Table 15: Assessment of significance on impacts on biodiversity prior to and post mitigation

Impact description					Significance before mitigation	Significance after mitigation	Mitigation measures	Action plan	Responsible person		
No.	Phases	Activity	Aspect	Impact							
1	Construction	Site clearing / preparation	vegetation removal	Loss of floral species and habitat	-	M	-	M	Avoidance of areas of natural vegetation		Site manager
2	Construction	Site clearing / preparation	vegetation removal	Loss of faunal species and habitat	-	M	0	M	Avoid natural habitats and in particularly undisturbed grasslands. Find an alternative brownfields site.		
3	Construction	Site clearing / preparation	vegetation removal	Loss of high biodiversity importance CBA	-	H	0	M	Stay out of CBA Optimal areas as well as their buffers		
4	Construction	Site clearing / preparation	vegetation removal	Loss of habitat functionality and connectivity including servicing of Irreplaceable CBA situated to the south of the site	-	H	0	M	Stay out of CBA Optimal areas as well as their buffers		
5	Operation	Waste site operation	Increased traffic	Disturbance of faunal species due to vehicle impacts & noise	0	M	0	M	As operation of the waste site is impossible without increased vehicle traffic this impact will be difficult / impossible to mitigate.		



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6	Operation	Waste site operation	Increased human density	Loss of biodiversity from peripheral areas due to increased human presence resulting in increased resource extraction, hunting, harvesting of medicinal plants	0	M	0	M	Limit / restrict access to peripheral areas	
7	Operation	Waste site operation	Increased human and vehicle activity	Increased presence of alien invasive species due to increased vehicle traffic, dumping of garden refuse	0	H	0	H	Put alien invasive management plan in place before start of construction. Conduct biannual auditing of alien invasive management plan	Compilation of alien invasive management plan
8	Decommissioning and Closure	Earth Excavation	Alteration of landscape	Decommissioning is likely to result in altered topography of the project area, decreased faunal and floral diversity	0	M	0	M	Ensure that rehabilitation plan is in place prior to commencement.	Compilation of rehabilitation plan
9	Cumulative	Waste site operation	Increased economic activity in the area is likely to result in establishment of supporting infrastructure & peripheral economic activities	Loss of habitat in peripheral areas due to establishment of economic node.	0	H	0	H	Difficult to mitigate, except through selection of an alternative brownfield site	



7.4.1 Construction Phase

During the construction phase the significance of impacts ranged from moderate to high prior to implementation of mitigation (Table 15). Post mitigation all impacts were rated as moderately significant, however it should be noted that for some impacts the only viable mitigation comprised avoidance of the proposed Newcastle landfill site, or a large portion of the site and selection of an alternative brownfields site elsewhere.

7.4.2 Operational Phase

During the operational phase the significance of potential impacts ranged from moderate to high (Table 15). Implementation of the recommended mitigation measures reduced the significance of most impacts to a moderate level (Table 15). The significance of increased alien invasive plant species on the site remained high post mitigation due primarily to the high likelihood of this impact occurring and the intensive management that will be required to mitigate it.

7.4.3 Decommissioning & Closure

The significance of impacts during the decommissioning and closure phases remained moderate pre- and post-mitigation (Table 15).

7.4.4 Cumulative

The significance of cumulative impacts were rated as highly significant prior to mitigation and remained high post mitigation due to the difficulty controlling and managing the informal economic migrants and activities that are likely to be attracted to the periphery of the landfill site (Table 15).



8 CONCLUSIONS

The following conclusions were reached based on the results of this assessment:

- The project area is situated in a highly sensitive and biodiverse area, a large part of which has been classified as a Critical Biodiversity Area (CBA) Optimal. The area is therefore unsuitable for a development such as a landfill site which requires the largescale clearing of indigenous vegetation and is likely to have substantial peripheral impacts;
- The CBA Optimal forms a linkage with an Irreplaceable CBA which is situated a short distance to the south and south-west of the project area. Destruction of this area will therefore remove an important linkage and migration corridor to other CBA areas in the vicinity;
- The Northern KwaZulu-Natal Moist Grassland vegetation community in which the project area is located is classified as Vulnerable and, with the exception of dense patches of alien invasive vegetation in the eastern portion of the project area, was found to be largely intact with high species diversity;
- Although few faunal species of conservation importance were recorded, the likelihood of these taxa occurring in the project area was rates as moderate to good;
- The significance of impacts on biodiversity were rated as moderate to high prior to implementation. The significance of some impacts remained high post-mitigation as it is felt that mitigation of these impacts will require intensive effort and cost to mitigate, something which is unlikely to be feasible for a development of this nature (landfill site). It is very likely that if the development proceeds, these mitigation measures will fall by the wayside and the potential impacts on biodiversity will be significant.

9 IMPACT STATEMENT

An impact statement is required as per the NEMA regulations with regards to the proposed development.

Based on the results of the impact assessment and the high levels of significance of potential impacts on biodiversity prior to and post-mitigation, it is recommended that an alternative brownfield site be sought for the proposed development and that permission for the proposed development be denied.

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APPENDIX A: EXPECTED PLANT SPECIES

Species	Threat status	SA Endemic
<i>Abrus laevigatus</i> E.Mey.	LC	No
<i>Abutilon angulatum</i> (Guill. & Perr.) Mast. var. <i>angulatum</i>	LC	No
<i>Abutilon pycnodon</i> Hochr.	LC	No
<i>Acalypha angustata</i> Sond.	LC	No
<i>Acalypha indica</i> L. var. <i>indica</i>	LC	No
<i>Acalypha segetalis</i> Müll.Arg.	LC	No
<i>Acalypha villicaulis</i> Hochst.	LC	No
<i>Achyranthes aspera</i> L. var. <i>sicula</i> L.	Not Evaluated	No
<i>Acokanthera oppositifolia</i> (Lam.) Codd	LC	No
<i>Acrotome hispida</i> Benth.	LC	No
<i>Agelanthus natalitius</i> (Meisn.) Polhill & Wiens subsp. <i>natalitius</i>	LC	No
<i>Alysicarpus zeyheri</i> Harv.	LC	No
<i>Amaranthus thunbergii</i> Moq.	LC	No
<i>Apodytes dimidiata</i> E.Mey. ex Arn. subsp. <i>dimidiata</i>	LC	No
<i>Asclepias densiflora</i> N.E.Br.	LC	No
<i>Ascolepis capensis</i> (Kunth) Ridl.	LC	No
<i>Asparagus virgatus</i> Baker	LC	No
<i>Aspidoglossum glabrescens</i> (Schltr.) Kupicha	LC	No
<i>Barleria pretoriensis</i> C.B.Clarke	LC	No
<i>Berkheya latifolia</i> J.M.Wood & M.S.Evans	LC	No
<i>Blechnum australe</i> L. subsp. <i>australe</i>	LC	No
<i>Blepharis integrifolia</i> (L.f.) E.Mey. ex Schinz var. <i>integrifolia</i>	LC	No
<i>Blepharis leendertziae</i> Oberm.	LC	No
<i>Bonatea saundersioides</i> (Kraenzl. & Schltr.) Cortesi	LC	No
<i>Boscia albitrunca</i> (Burch.) Gilg & Gilg-Ben.	LC	No
<i>Brachystelma gracile</i> E.A.Bruce	LC	No
<i>Bryum pycnophyllum</i> (Dixon) Mohamed	Unlisted	No
<i>Buddleja saligna</i> Willd.	LC	No
<i>Bulbine angustifolia</i> Poelln.	LC	No
<i>Burkea africana</i> Hook.	LC	No
<i>Burmannia madagascariensis</i> Mart.	LC	No
<i>Cadaba aphylla</i> (Thunb.) Wild	LC	No
<i>Campylopus pilifer</i> Brid. var. <i>pilifer</i>	Unlisted	No
<i>Carex spicatopaniculata</i> Boeckeler ex C.B.Clarke	LC	No
<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	LC	No
<i>Chamaecrista biensis</i> (Steyaert) Lock	LC	No



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<i>Chamaecrista mimosoides</i> (L.) Greene	LC	No
<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>humilis</i> (Gilg) I.Verd.	LC	No
<i>Clutia pulchella</i> L. var. <i>pulchella</i>	LC	No
<i>Colchicum melanthoides</i> (Willd.) J.C.Manning & Vinn. subsp. <i>melanthoides</i>	LC	No
<i>Combretum molle</i> R.Br. ex G.Don	LC	No
<i>Combretum zeyheri</i> Sond.	LC	No
<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B.Clarke	LC	No
<i>Commelina livingstonii</i> C.B.Clarke	LC	No
<i>Convolvulus sagittatus</i> Thunb.	LC	No
<i>Corbichonia decumbens</i> (Forssk.) Exell	LC	No
<i>Corchorus argillicola</i> M.J.Moeha & P.J.D.Winter	Unlisted	No
<i>Corchorus asplenifolius</i> Burch.	LC	No
<i>Corchorus schimperi</i> Cufod.	LC	No
<i>Corrigiola litoralis</i> L. subsp. <i>litoralis</i> var. <i>litoralis</i>	LC	No
<i>Crabbea hirsuta</i> Harv.	LC	No
<i>Crassula setulosa</i> Harv. var. <i>setulosa</i> forma <i>setulosa</i>	Not Evaluated	No
<i>Crinum graminicola</i> I.Verd.	LC	No
<i>Croton gratissimus</i> Burch. var. <i>subgratissimus</i> (Prain) Burtt Davy	LC	No
<i>Cussonia spicata</i> Thunb.	LC	No
<i>Cyperus congestus</i> Vahl	LC	No
<i>Cyperus esculentus</i> L. var. <i>esculentus</i>	LC	No
<i>Cyperus leptocladus</i> Kunth	LC	No
<i>Cyphia assimilis</i> Sond.	LC	No
<i>Cyrtanthus breviflorus</i> Harv.	LC	No
<i>Deverra burchellii</i> (DC.) Eckl. & Zeyh.	LC	No
<i>Dicerocaryum senecioides</i> (Klotzsch) Abels	LC	No
<i>Dicoma macrocephala</i> DC.	LC	No
<i>Dioscorea retusa</i> Mast.	LC	No
<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC	No
<i>Dipcadi marlothii</i> Engl.	LC	No
<i>Dipcadi papillatum</i> Oberm.	LC	No
<i>Dipcadi viride</i> (L.) Moench	LC	No
<i>Doellia cafra</i> (DC.) Anderb.	LC	No
<i>Drosera collinsiae</i> N.E.Br. ex Burtt Davy	LC	No
<i>Equisetum ramosissimum</i> Desf. subsp. <i>ramosissimum</i>	LC	No
<i>Eriosema burkei</i> Benth. ex Harv. var. <i>burkei</i>	LC	No
<i>Eriosema pauciflorum</i> Klotzsch var. <i>pauciflorum</i>	LC	No
<i>Erythrina lysistemon</i> Hutch.	LC	No



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<i>Euphorbia clavarioides</i> Boiss. var. <i>truncata</i> (N.E.Br.) A.C.White, R.A.Dyer & B.Sloane	LC	No
<i>Euphorbia heterophylla</i> L.	Not Evaluated	No
<i>Evolvulus alsinoides</i> (L.) L.	LC	No
<i>Ficus ingens</i> (Miq.) Miq.	LC	No
<i>Ficus salicifolia</i> Vahl	LC	No
<i>Fissidens ovatus</i> Brid.	Unlisted	No
<i>Floscopa glomerata</i> (Willd. ex Schult. & J.H.Schult.) Hassk.	LC	No
<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt subsp. <i>virosa</i>	LC	No
<i>Frithia pulchra</i> N.E.Br.	Rare	No
<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>zeyheri</i> (Harv.) Merxm.	LC	No
<i>Gladiolus permeabilis</i> D.Delaroche subsp. <i>edulis</i> (Burch. ex Ker Gawl.) Oberm.	LC	No
<i>Gleichenia polyodioides</i> (L.) Sm.	LC	No
<i>Grewia flava</i> DC.	LC	No
<i>Grewia monticola</i> Sond.	LC	No
<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC	No
<i>Grewia subspathulata</i> N.E.Br.	LC	No
<i>Helichrysum argyrosphaerum</i> DC.	LC	No
<i>Helichrysum cerastioides</i> DC. var. <i>cerastioides</i>	LC	No
<i>Helichrysum kraussii</i> Sch.Bip.	LC	No
<i>Helichrysum mixtum</i> (Kuntze) Moeser var. <i>mixtum</i>	LC	No
<i>Hermannia burkei</i> Burt Davy	LC	No
<i>Hermannia floribunda</i> Harv.	LC	No
<i>Hermannia grisea</i> Schinz	LC	No
<i>Hermannia quartiniana</i> A.Rich.	LC	No
<i>Hermbstaedia odorata</i> (Burch.) T.Cooke var. <i>odorata</i>	LC	No
<i>Hibiscus engleri</i> K.Schum.	LC	No
<i>Hibiscus lunarifolius</i> Willd.	LC	No
<i>Hibiscus marlothianus</i> K.Schum.	LC	No
<i>Hibiscus pusillus</i> Thunb.	LC	No
<i>Hibiscus sidiformis</i> Baill.	LC	No
<i>Hibiscus subreniformis</i> Burt Davy	LC	No
<i>Hypericum lalandii</i> Choisy	LC	No
<i>Hypoestes forskoolii</i> (Vahl) R.Br.	LC	No
<i>Indigofera heterotricha</i> DC.	LC	No
<i>Indigofera hiliaris</i> Eckl. & Zeyh. var. <i>hiliaris</i>	LC	No
<i>Indigofera oxytropis</i> Benth. ex Harv.	LC	No
<i>Indigofera praticola</i> Baker f.	LC	No
<i>Ipomoea bolusiana</i> Schinz	LC	No



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<i>Ipomoea coscinosperma</i> Hochst. ex Choisy	LC	No
<i>Ipomoea oblongata</i> E.Mey. ex Choisy	LC	No
<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	LC	No
<i>Isoglossa grantii</i> C.B.Clarke	LC	No
<i>Isolepis fluitans</i> (L.) R.Br. var. <i>fluitans</i>	LC	No
<i>Justicia anagalloides</i> (Nees) T.Anderson	LC	No
<i>Khadia acutipetala</i> (N.E.Br.) N.E.Br.	LC	No
<i>Kniphofia ensifolia</i> Baker subsp. <i>ensifolia</i>	LC	No
<i>Kyllinga alba</i> Nees	LC	No
<i>Lapeirousia sandersonii</i> Baker	LC	No
<i>Ledebouria cooperi</i> (Hook.f.) Jessop	LC	No
<i>Limeum viscosum</i> (J.Gay) Fenzl subsp. <i>viscosum</i> var. <i>viscosum</i>	LC	No
<i>Lycopodiella cernua</i> (L.) Pic.Serm.	LC	No
<i>Maytenus undata</i> (Thunb.) Blakelock	LC	No
<i>Menodora africana</i> Hook.	LC	No
<i>Mollugo nudicaulis</i> Lam.	Unlisted	No
<i>Momordica balsamina</i> L.	LC	No
<i>Monopsis decipiens</i> (Sond.) Thulin	LC	No
<i>Morella serrata</i> (Lam.) Killick	LC	No
<i>Mundulea sericea</i> (Willd.) A.Chev. subsp. <i>sericea</i>	LC	No
<i>Ochna pulchra</i> Hook.f.	LC	No
<i>Ocimum gratissimum</i> L. subsp. <i>gratissimum</i> var. <i>gratissimum</i>	LC	No
<i>Ocimum obovatum</i> E.Mey. ex Benth. subsp. <i>obovatum</i> var. <i>obovatum</i>	LC	No
<i>Olea capensis</i> L. subsp. <i>enervis</i> (Harv. ex C.H.Wright) I.Verd.	LC	No
<i>Ophrestia oblongifolia</i> (E.Mey.) H.M.L.Forbes var. <i>oblongifolia</i>	LC	No
<i>Orthosiphon suffrutescens</i> (Thonn.) J.K.Morton	LC	No
<i>Osmunda regalis</i> L.	LC	No
<i>Ozoroa paniculosa</i> (Sond.) R.& A.Fern. var. <i>paniculosa</i>	LC	No
<i>Ozoroa paniculosa</i> (Sond.) R.& A.Fern. var. <i>salicina</i> (Sond.) R.& A.Fern.	LC	No
<i>Pearsonia sessilifolia</i> (Harv.) Dummer subsp. <i>sessilifolia</i>	LC	No
<i>Philonotis africana</i> (Müll.Hal.) Rehm ex Paris	Unlisted	No
<i>Phyllanthus incurvus</i> Thunb.	LC	No
<i>Pittosporum viridiflorum</i> Sims	LC	No
<i>Plumbago zeylanica</i> L.	Not Evaluated	No
<i>Pterocelastrus echinatus</i> N.E.Br.	LC	No
<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	LC	No
<i>Raphionacme galpinii</i> Schltr.	LC	No
<i>Rhynchosia albissima</i> Gand.	LC	No



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<i>Rhynchosia caribaea</i> (Jacq.) DC.	LC	No
<i>Rhynchosia crassifolia</i> Benth. ex Harv.	LC	No
<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	LC	No
<i>Rhynchosia venulosa</i> (Hiern) K.Schum.	Not Evaluated	No
<i>Ruellia cordata</i> Thunb.	LC	No
<i>Sarcostemma viminale</i> (L.) R.Br. subsp. <i>viminale</i>	LC	No
<i>Satyrium hallackii</i> Bolus subsp. <i>ocellatum</i> (Bolus) A.V.Hall	LC	No
<i>Scabiosa columbaria</i> L.	LC	No
<i>Schistostephium heptalobum</i> (DC.) Oliv. & Hiern	LC	No
<i>Schoenoplectus brachyceras</i> (Hochst. ex A.Rich.) Lye	LC	No
<i>Schoenoplectus muricinux</i> (C.B.Clarke) J.Raynal	LC	No
<i>Searsia chirindensis</i> (Baker f.) Moffett	LC	No
<i>Searsia lancea</i> (L.f.) F.A.Barkley	LC	No
<i>Searsia magalismsontana</i> (Sond.) Moffett subsp. <i>magalismsontana</i>	LC	No
<i>Searsia pyroides</i> (Burch.) Moffett var. <i>pyroides</i>	LC	No
<i>Sebaea junodii</i> Schinz	LC	No
<i>Senecio lydenburgensis</i> Hutch. & Burt Davy	LC	No
<i>Senecio venosus</i> Harv.	LC	No
<i>Senegalia burkei</i> Benth.	LC	No
<i>Senegalia caffra</i> (Thunb.) Willd.	LC	No
<i>Sida chrysantha</i> Ulbr.	LC	No
<i>Sonchus friesii</i> Boulos var. <i>friesii</i>	LC	No
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>galphimiiifolius</i> (A.Juss.) P.D.de Villiers & D.J.Botha	LC	No
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	LC	No
<i>Sphenostylis angustifolia</i> Sond.	LC	No
<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC	No
<i>Striga forbesii</i> Benth.	LC	No
<i>Stylosanthes fruticosa</i> (Retz.) Alston	LC	No
<i>Tagetes minuta</i> L.	Not Evaluated	No
<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>capensis</i>	LC	No
<i>Tephrosia multijuga</i> R.G.N.Young	LC	No
<i>Tephrosia villosa</i> (L.) Pers. subsp. <i>ehrenbergiana</i> (Schweinf.) Brummitt var. <i>ehrenbergiana</i>	LC	No
<i>Tetradenia brevispicata</i> (N.E.Br.) Codd	LC	No
<i>Thunbergia atriplicifolia</i> E.Mey. ex Nees	LC	No
<i>Tragia incisifolia</i> Prain	LC	No
<i>Tragia okanyua</i> Pax	LC	No
<i>Tritonia nelsonii</i> Baker	LC	No



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<i>Triumfetta annua</i> L. forma <i>annua</i>	Not Evaluated	No
<i>Triumfetta annua</i> L. forma <i>piligera</i> Sprague & Hutch.	Not Evaluated	No
<i>Turraea obtusifolia</i> Hochst.	LC	No
<i>Tylosema esculentum</i> (Burch.) A.Schreib.	LC	No
<i>Ursinia nana</i> DC. subsp. <i>leptophylla</i> Prassler	LC	No
<i>Vachellia karroo</i> Hayne	LC	No
<i>Vachellia robusta</i> Burch. subsp. <i>robusta</i>	LC	No
<i>Vernonia fastigiata</i> Oliv. & Hiern	LC	No
<i>Vernonia staehelinoides</i> Harv.	LC	No
<i>Vitex zeyheri</i> Sond.	LC	No
<i>Waltheria indica</i> L.	LC	No
<i>Xenostegia tridentata</i> (L.) D.F.Austin & Staples subsp. <i>angustifolia</i> (Jacq.) Lejoly & Lisowski	LC	No
<i>Zornia linearis</i> E.Mey.	LC	No



APPENDIX B: EXPECTED AVIFAUNAL SPECIES

Species	Common Name	Global (IUCN, 2018)	Regional (BLSA, 2017)
<i>Balearica regulorum</i>	Crane, Grey Crowned	EN	EN
<i>Circus maurus</i>	Harrier, Black	EN	EN
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Anthropoides paradiseus</i>	Crane, Blue	VU	NT
<i>Bucorvus leadbeateri</i>	Ground-hornbill, Southern	VU	EN
<i>Geronticus calvus</i>	Ibis, Southern Bald	VU	VU
<i>Lioptilus nigricapillus</i>	Blackcap, Bush	VU	VU
<i>Polemaetus bellicosus</i>	Eagle, Martial	VU	EN
<i>Sagittarius serpentarius</i>	Secretarybird, Secretarybird	VU	VU
<i>Calidris ferruginea</i>	Sandpiper, Curlew	NT	LC
<i>Eupodotis caerulescens</i>	Korhaan, Blue	NT	LC
<i>Falco vespertinus</i>	Falcon, Red-footed	NT	NT
<i>Geocolaptes olivaceus</i>	Woodpecker, Ground	NT	Unlisted
<i>Monticola explorator</i>	Rock-thrush, Sentinel	NT	Unlisted
<i>Neotis denhami</i>	Bustard, Denham's	NT	VU
<i>Stephanoaetus coronatus</i>	Eagle, African Crowned	NT	VU
<i>Circus ranivorus</i>	Marsh-harrier, African	LC	EN
<i>Aquila verreauxii</i>	Eagle, Verreaux's	LC	VU
<i>Ciconia nigra</i>	Stork, Black	LC	VU
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	LC	VU
<i>Falco biarmicus</i>	Falcon, Lanner	LC	VU
<i>Sterna caspia</i>	Tern, Caspian	LC	VU
<i>Tyto capensis</i>	Grass-owl, African	LC	VU
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	LC	NT
<i>Coracias garrulus</i>	Roller, European	LC	NT
<i>Phoenicopterus ruber</i>	Flamingo, Greater	LC	NT
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	LC	NT
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	LC	Unlisted
<i>Acridotheres tristis</i>	Myna, Common	LC	Unlisted
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	LC	Unlisted
<i>Acrocephalus schoenobaenus</i>	Warbler, Sedge	LC	Unlisted
<i>Actitis hypoleucos</i>	Sandpiper, Common	LC	Unlisted
<i>Alcedo cristata</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	LC	Unlisted
<i>Amadina erythrocephala</i>	Finch, Red-headed	LC	Unlisted
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	Unlisted
<i>Amblyospiza albifrons</i>	Weaver, Thick-billed	LC	Unlisted
<i>Anas capensis</i>	Teal, Cape	LC	Unlisted
<i>Anas erythrorhyncha</i>	Teal, Red-billed	LC	Unlisted
<i>Anas hottentota</i>	Teal, Hottentot	LC	Unlisted



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<i>Anas platyrhynchos</i>	Duck, Mallard	LC	Unlisted
<i>Anas smithii</i>	Shoveler, Cape	LC	Unlisted
<i>Anas sparsa</i>	Duck, African Black	LC	Unlisted
<i>Anas undulata</i>	Duck, Yellow-billed	LC	Unlisted
<i>Anhinga rufa</i>	Darter, African	LC	Unlisted
<i>Anser anser</i>	Goose, Domestic	LC	Unlisted
<i>Anthus cinnamomeus</i>	Pipit, African	LC	Unlisted
<i>Anthus leucophrys</i>	Pipit, Plain-backed	LC	Unlisted
<i>Anthus similis</i>	Pipit, Long-billed	LC	Unlisted
<i>Anthus vaalensis</i>	Pipit, Buffy	LC	Unlisted
<i>Apalis thoracica</i>	Apalis, Bar-throated	LC	Unlisted
<i>Aplopelia larvata</i>	Dove, Lemon	LC	Unlisted
<i>Apus affinis</i>	Swift, Little	LC	Unlisted
<i>Apus apus</i>	Swift, Common	LC	Unlisted
<i>Apus barbatus</i>	Swift, African Black	LC	Unlisted
<i>Apus caffer</i>	Swift, White-rumped	LC	Unlisted
<i>Apus horus</i>	Swift, Horus	LC	Unlisted
<i>Aquila wahlbergi</i>	Eagle, Wahlberg's	LC	Unlisted
<i>Ardea cinerea</i>	Heron, Grey	LC	Unlisted
<i>Ardea goliath</i>	Heron, Goliath	LC	Unlisted
<i>Ardea melanocephala</i>	Heron, Black-headed	LC	Unlisted
<i>Ardea purpurea</i>	Heron, Purple	LC	Unlisted
<i>Ardeola ralloides</i>	Heron, Squacco	LC	Unlisted
<i>Asio capensis</i>	Owl, Marsh	LC	Unlisted
<i>Batis capensis</i>	Batis, Cape	LC	Unlisted
<i>Batis molitor</i>	Batis, Chinspot	LC	Unlisted
<i>Bostrychia hagedash</i>	Ibis, Hadedash	LC	Unlisted
<i>Bradypterus baboecala</i>	Rush-warbler, Little	LC	Unlisted
<i>Bubo africanus</i>	Eagle-owl, Spotted	LC	Unlisted
<i>Bubulcus ibis</i>	Egret, Cattle	LC	Unlisted
<i>Burhinus capensis</i>	Thick-knee, Spotted	LC	Unlisted
<i>Buteo rufofuscus</i>	Buzzard, Jackal	LC	Unlisted
<i>Buteo vulpinus</i>	Buzzard, Steppe	Unlisted	Unlisted
<i>Calandrella cinerea</i>	Lark, Red-capped	LC	Unlisted
<i>Calidris minuta</i>	Stint, Little	LC	LC
<i>Campephaga flava</i>	Cuckoo-shrike, Black	LC	Unlisted
<i>Campethera abingoni</i>	Woodpecker, Golden-tailed	LC	Unlisted
<i>Caprimulgus europaeus</i>	Nightjar, European	LC	Unlisted
<i>Caprimulgus pectoralis</i>	Nightjar, Fiery-necked	LC	Unlisted
<i>Cercomela familiaris</i>	Chat, Familiar	LC	Unlisted
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	LC	Unlisted
<i>Certhilauda semitorquata</i>	Lark, Eastern Long-billed	LC	Unlisted
<i>Ceryle rudis</i>	Kingfisher, Pied	LC	Unlisted
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	LC	Unlisted



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<i>Charadrius hiaticula</i>	Plover, Common Ringed	LC	Unlisted
<i>Charadrius pecuarius</i>	Plover, Kittlitz's	LC	Unlisted
<i>Charadrius tricollaris</i>	Plover, Three-banded	LC	Unlisted
<i>Chersomanes albofasciata</i>	Lark, Spike-heeled	LC	Unlisted
<i>Chlidonias hybrida</i>	Tern, Whiskered	LC	Unlisted
<i>Chlidonias leucopterus</i>	Tern, White-winged	LC	Unlisted
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	LC	Unlisted
<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	LC	Unlisted
<i>Ciconia ciconia</i>	Stork, White	LC	Unlisted
<i>Cinnyricinclus leucogaster</i>	Starling, Violet-backed	LC	Unlisted
<i>Cinnyris afer</i>	Sunbird, Greater Double-collared	LC	Unlisted
<i>Cinnyris chalybeus</i>	Sunbird, Southern Double-collared	LC	Unlisted
<i>Cinnyris talatala</i>	Sunbird, White-bellied	LC	Unlisted
<i>Circaetus cinereus</i>	Snake-eagle, Brown	LC	Unlisted
<i>Circaetus pectoralis</i>	Snake-eagle, Black-chested	LC	Unlisted
<i>Cisticola aberrans</i>	Cisticola, Lazy	LC	Unlisted
<i>Cisticola aridulus</i>	Cisticola, Desert	LC	Unlisted
<i>Cisticola ayresii</i>	Cisticola, Wing-snapping	LC	Unlisted
<i>Cisticola cinnamomeus</i>	Cisticola, Pale-crowned	LC	Unlisted
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	LC	Unlisted
<i>Cisticola juncidis</i>	Cisticola, Zitting	LC	Unlisted
<i>Cisticola lais</i>	Cisticola, Wailing	LC	Unlisted
<i>Cisticola textrix</i>	Cisticola, Cloud	LC	Unlisted
<i>Cisticola tinniens</i>	Cisticola, Levillant's	LC	Unlisted
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	LC	Unlisted
<i>Clamator levaillantii</i>	Cuckoo, Levillant's	LC	Unlisted
<i>Coccyzygia melanotis</i>	Waxbill, Swee	LC	Unlisted
<i>Colius striatus</i>	Mousebird, Speckled	LC	Unlisted
<i>Columba arquatrix</i>	Olive-pigeon, African	LC	Unlisted
<i>Columba guinea</i>	Pigeon, Speckled	LC	Unlisted
<i>Columba livia</i>	Dove, Rock	LC	Unlisted
<i>Corvus albus</i>	Crow, Pied	LC	Unlisted
<i>Corvus capensis</i>	Crow, Cape	LC	Unlisted
<i>Cossypha caffra</i>	Robin-chat, Cape	LC	Unlisted
<i>Cossypha dichroa</i>	Robin-chat, Chorister	LC	Unlisted
<i>Coturnix coturnix</i>	Quail, Common	LC	Unlisted
<i>Crecopsis egregia</i>	Crake, African	LC	Unlisted
<i>Crithagra atrogularis</i>	Canary, Black-throated	LC	Unlisted
<i>Crithagra gularis</i>	Seedeater, Streaky-headed	LC	Unlisted
<i>Crithagra mozambicus</i>	Canary, Yellow-fronted	LC	Unlisted
<i>Crithagra scotops</i>	Canary, Forest	LC	Unlisted
<i>Crithagra sulphuratus</i>	Canary, Brimstone	Unlisted	Unlisted
<i>Cuculus canorus</i>	Cuckoo, Common	LC	Unlisted



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<i>Cuculus clamosus</i>	Cuckoo, Black	LC	Unlisted
<i>Cuculus gularis</i>	Cuckoo, African	LC	Unlisted
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	LC	Unlisted
<i>Cursorius temminckii</i>	Cursor, Temminck's	LC	Unlisted
<i>Cypsiurus parvus</i>	Palm-swift, African	LC	Unlisted
<i>Delichon urbicum</i>	House-martin, Common	LC	Unlisted
<i>Dendrocygna bicolor</i>	Duck, Fulvous	LC	Unlisted
<i>Dendrocygna viduata</i>	Duck, White-faced	LC	Unlisted
<i>Dendropicos fuscescens</i>	Woodpecker, Cardinal	LC	Unlisted
<i>Dendropicos griseocephalus</i>	Woodpecker, Olive	LC	Unlisted
<i>Dendropicos namaquus</i>	Woodpecker, Bearded	LC	Unlisted
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	LC	Unlisted
<i>Dryoscopus cubla</i>	Puffback, Black-backed	LC	Unlisted
<i>Egretta alba</i>	Egret, Great	LC	Unlisted
<i>Egretta garzetta</i>	Egret, Little	LC	Unlisted
<i>Egretta intermedia</i>	Egret, Yellow-billed	LC	Unlisted
<i>Elanus caeruleus</i>	Kite, Black-shouldered	LC	Unlisted
<i>Emberiza capensis</i>	Bunting, Cape	LC	Unlisted
<i>Emberiza flaviventris</i>	Bunting, Golden-breasted	LC	Unlisted
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	LC	Unlisted
<i>Estrilda astrild</i>	Waxbill, Common	LC	Unlisted
<i>Euplectes afer</i>	Bishop, Yellow-crowned	LC	Unlisted
<i>Euplectes albonotatus</i>	Widowbird, White-winged	LC	Unlisted
<i>Euplectes ardens</i>	Widowbird, Red-collared	LC	Unlisted
<i>Euplectes axillaris</i>	Widowbird, Fan-tailed	LC	Unlisted
<i>Euplectes capensis</i>	Bishop, Yellow	LC	Unlisted
<i>Euplectes orix</i>	Bishop, Southern Red	LC	Unlisted
<i>Euplectes progne</i>	Widowbird, Long-tailed	LC	Unlisted
<i>Falco amurensis</i>	Falcon, Amur	LC	Unlisted
<i>Falco naumanni</i>	Kestrel, Lesser	LC	Unlisted
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	Unlisted
<i>Fulica cristata</i>	Coot, Red-knobbed	LC	Unlisted
<i>Gallinago nigripennis</i>	Snipe, African	LC	Unlisted
<i>Gallinula chloropus</i>	Moorhen, Common	LC	Unlisted
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	LC	Unlisted
<i>Haliaeetus vocifer</i>	Fish-eagle, African	LC	Unlisted
<i>Himantopus himantopus</i>	Stilt, Black-winged	LC	Unlisted
<i>Hirundo abyssinica</i>	Swallow, Lesser Striped	LC	Unlisted
<i>Hirundo albicularis</i>	Swallow, White-throated	LC	Unlisted
<i>Hirundo cucullata</i>	Swallow, Greater Striped	LC	Unlisted
<i>Hirundo fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Hirundo rustica</i>	Swallow, Barn	LC	Unlisted
<i>Hirundo semirufa</i>	Swallow, Red-breasted	LC	Unlisted
<i>Hirundo spilodera</i>	Cliff-swallow, South African	LC	Unlisted



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<i>Indicator indicator</i>	Honeyguide, Greater	LC	Unlisted
<i>Indicator minor</i>	Honeyguide, Lesser	LC	Unlisted
<i>Ispidina picta</i>	Pygmy-Kingfisher, African	LC	Unlisted
<i>Jynx ruficollis</i>	Wryneck, Red-throated	LC	Unlisted
<i>Lagonosticta rubricata</i>	Firefinch, African	LC	Unlisted
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	LC	Unlisted
<i>Laniarius ferrugineus</i>	Boubou, Southern	LC	Unlisted
<i>Lanius collaris</i>	Fiscal, Common (Southern)	LC	Unlisted
<i>Lanius collurio</i>	Shrike, Red-backed	LC	Unlisted
<i>Lanius minor</i>	Shrike, Lesser Grey	LC	Unlisted
<i>Larus cirrocephalus</i>	Gull, Grey-headed	LC	Unlisted
<i>Lissotis melanogaster</i>	Bustard, Black-bellied	LC	Unlisted
<i>Lonchura cucullatus</i>	Mannikin, Bronze	Unlisted	Unlisted
<i>Lophaetus occipitalis</i>	Eagle, Long-crested	LC	Unlisted
<i>Lybius torquatus</i>	Barbet, Black-collared	LC	Unlisted
<i>Macronyx capensis</i>	Longclaw, Cape	LC	Unlisted
<i>Megaceryle maximus</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Melaenornis pammelaina</i>	Flycatcher, Southern Black	LC	Unlisted
<i>Merops apiaster</i>	Bee-eater, European	LC	Unlisted
<i>Merops pusillus</i>	Bee-eater, Little	LC	Unlisted
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Milvus migrans</i>	Kite, Black	LC	Unlisted
<i>Mirafra africana</i>	Lark, Rufous-naped	LC	Unlisted
<i>Motacilla aguimp</i>	Wagtail, African Pied	LC	Unlisted
<i>Motacilla capensis</i>	Wagtail, Cape	LC	Unlisted
<i>Muscicapa adusta</i>	Flycatcher, African Dusky	LC	Unlisted
<i>Muscicapa striata</i>	Flycatcher, Spotted	LC	Unlisted
<i>Myrmecocichla formicivora</i>	Chat, Anteating	LC	Unlisted
<i>Nectarinia famosa</i>	Sunbird, Malachite	LC	Unlisted
<i>Netta erythrophthalma</i>	Pochard, Southern	LC	Unlisted
<i>Nilaus afer</i>	Brubru, Brubru	LC	Unlisted
<i>Numida meleagris</i>	Guinea fowl, Helmeted	LC	Unlisted
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	LC	Unlisted
<i>Oena capensis</i>	Dove, Namaqua	LC	Unlisted
<i>Oenanthe bifasciata</i>	Chat, Buff-streaked	LC	Unlisted
<i>Oenanthe monticola</i>	Wheatear, Mountain	LC	Unlisted
<i>Onychognathus morio</i>	Starling, Red-winged	LC	Unlisted
<i>Oriolus larvatus</i>	Oriole, Black-headed	LC	Unlisted
<i>Ortygospiza atricollis</i>	Quailfinch, African	LC	Unlisted
<i>Pandion haliaetus</i>	Osprey, Osprey	LC	Unlisted
<i>Parus niger</i>	Tit, Southern Black	Unlisted	Unlisted
<i>Passer domesticus</i>	Sparrow, House	LC	Unlisted
<i>Passer griseus</i>	Sparrow, Northern Grey-headed	LC	Unlisted
<i>Passer melanurus</i>	Sparrow, Cape	LC	Unlisted



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<i>Pavo cristatus</i>	Peacock, Common	LC	Unlisted
<i>Petronia superciliaris</i>	Petronia, Yellow-throated	LC	Unlisted
<i>Phalacrocorax africanus</i>	Cormorant, Reed	Unlisted	Unlisted
<i>Phalacrocorax carbo</i>	Cormorant, White-breasted	LC	Unlisted
<i>Philomachus pugnax</i>	Ruff, Ruff	LC	Unlisted
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	LC	Unlisted
<i>Phyllastrephus terrestris</i>	Brownbul, Terrestrial	LC	Unlisted
<i>Phylloscopus trochilus</i>	Warbler, Willow	LC	Unlisted
<i>Platalea alba</i>	Spoonbill, African	LC	Unlisted
<i>Plectropterus gambensis</i>	Goose, Spur-winged	LC	Unlisted
<i>Plegadis falcinellus</i>	Ibis, Glossy	LC	Unlisted
<i>Ploceus capensis</i>	Weaver, Cape	LC	Unlisted
<i>Ploceus cucullatus</i>	Weaver, Village	LC	Unlisted
<i>Ploceus ocularis</i>	Weaver, Spectacled	LC	Unlisted
<i>Ploceus velatus</i>	Masked-weaver, Southern	LC	Unlisted
<i>Polyboroides typus</i>	Harrier-Hawk, African	LC	Unlisted
<i>Porphyrio madagascariensis</i>	Swamphen, African Purple	Unlisted	Unlisted
<i>Prinia hypoxantha</i>	Prinia, Drakensberg	LC	Unlisted
<i>Prinia maculosa</i>	Prinia, Karoo	LC	Unlisted
<i>Prinia subflava</i>	Prinia, Tawny-flanked	LC	Unlisted
<i>Prodotiscus regulus</i>	Honeybird, Brown-backed	LC	Unlisted
<i>Psalidoprocne holomelaena</i>	Saw-wing, Black (Southern race)	Unlisted	Unlisted
<i>Psophocichla litsipsirupa</i>	Thrush, Groundscraper	Unlisted	Unlisted
<i>Pternistis afer</i>	Spurfowl, Red-necked	LC	Unlisted
<i>Pternistis natalensis</i>	Spurfowl, Natal	LC	Unlisted
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	LC	Unlisted
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	LC	Unlisted
<i>Recurvirostra avosetta</i>	Avocet, Pied	LC	Unlisted
<i>Rhinopomastus cyanomelas</i>	Scimitarbill, Common	LC	Unlisted
<i>Riparia cincta</i>	Martin, Banded	LC	Unlisted
<i>Riparia paludicola</i>	Martin, Brown-throated	LC	Unlisted
<i>Riparia riparia</i>	Martin, Sand	LC	Unlisted
<i>Sarkidiornis melanotos</i>	Duck, Comb	LC	Unlisted
<i>Saxicola torquatus</i>	Stonechat, African	LC	Unlisted
<i>Scleroptila africanus</i>	Francolin, Grey-winged	LC	Unlisted
<i>Scleroptila levaillantii</i>	Francolin, Red-winged	LC	Unlisted
<i>Scleroptila shelleyi</i>	Francolin, Shelley's	LC	Unlisted
<i>Scopus umbretta</i>	Hamerkop, Hamerkop	LC	Unlisted
<i>Serinus canicollis</i>	Canary, Cape	LC	Unlisted
<i>Sigelus silens</i>	Flycatcher, Fiscal	LC	Unlisted
<i>Sphenoeacus afer</i>	Grassbird, Cape	LC	Unlisted
<i>Spizocorys conirostris</i>	Lark, Pink-billed	LC	Unlisted
<i>Spreo bicolor</i>	Starling, Pied	LC	Unlisted

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<i>Stenostira scita</i>	Flycatcher, Fairy	LC	Unlisted
<i>Streptopelia capicola</i>	Turtle-dove, Cape	LC	Unlisted
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	LC	Unlisted
<i>Streptopelia senegalensis</i>	Dove, Laughing	LC	Unlisted
<i>Struthio camelus</i>	Ostrich, Common	LC	Unlisted
<i>Sylvietta rufescens</i>	Crombec, Long-billed	LC	Unlisted
<i>Tachybaptus ruficollis</i>	Grebe, Little	LC	Unlisted
<i>Tachymarptis melba</i>	Swift, Alpine	LC	Unlisted
<i>Tadorna cana</i>	Shelduck, South African	LC	Unlisted
<i>Tchagra senegalus</i>	Tchagra, Black-crowned	LC	Unlisted
<i>Telophorus olivaceus</i>	Bush-shrike, Olive	LC	Unlisted
<i>Telophorus sulfureopectus</i>	Bush-shrike, Orange-breasted	LC	Unlisted
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	LC	Unlisted
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	LC	Unlisted
<i>Thamnolaea cinnamomeiventris</i>	Cliff-chat, Mocking	LC	Unlisted
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	LC	Unlisted
<i>Trachyphonus vaillantii</i>	Barbet, Crested	LC	Unlisted
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	LC	Unlisted
<i>Tringa glareola</i>	Sandpiper, Wood	LC	Unlisted
<i>Tringa nebularia</i>	Greenshank, Common	LC	Unlisted
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	LC	Unlisted
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	LC	Unlisted
<i>Turdus libonyanus</i>	Thrush, Kurrichane	Unlisted	Unlisted
<i>Turdus olivaceus</i>	Thrush, Olive	LC	Unlisted
<i>Turdus smithi</i>	Thrush, Karoo	LC	Unlisted
<i>Turnix sylvaticus</i>	Buttonquail, Kurrichane	LC	Unlisted
<i>Tyto alba</i>	Owl, Barn	LC	Unlisted
<i>Upupa africana</i>	Hoopoe, African	Unlisted	Unlisted
<i>Uraeginthus angolensis</i>	Waxbill, Blue	LC	Unlisted
<i>Urocolius indicus</i>	Mousebird, Red-faced	LC	Unlisted
<i>Vanellus armatus</i>	Lapwing, Blacksmith	LC	Unlisted
<i>Vanellus coronatus</i>	Lapwing, Crowned	LC	Unlisted
<i>Vanellus melanopterus</i>	Lapwing, Black-winged	LC	Unlisted
<i>Vanellus senegallus</i>	Lapwing, African Wattled	LC	Unlisted
<i>Vidua macroura</i>	Whydah, Pin-tailed	LC	Unlisted
<i>Zosterops pallidus</i>	White-eye, Orange River	LC	Unlisted
<i>Zosterops virens</i>	White-eye, Cape	LC	Unlisted



APPENDIX C: EXPECTED MAMMAL SPECIES

Species	Common Name	Global (IUCN, 2018)	Regional (SANBI, 2016)
<i>Mystromys albicaudatus</i>	White-tailed rat	EN	VU
<i>Felis nigripes</i>	Black-footed cat	VU	VU
<i>Panthera pardus</i>	Leopard	VU	VU
<i>Aonyx capensis</i>	Cape clawless otter	NT	NT
<i>Eidolon helvum</i>	Straw-coloured fruit bat	NT	LC
<i>Hydricotis maculicollis</i>	Spotted-necked otter	NT	VU
<i>Parahyaena brunnea</i>	Brown hyaena	NT	NT
<i>Crocidura maquassiensis</i>	Maquassie musk shrew	LC	VU
<i>Leptailurus serval</i>	Serval	LC	NT
<i>Ourebia ourebi</i>	Oribi	LC	EN
<i>Pelea capreolus</i>	Grey rhebok	LC	NT
<i>Poecilogale albinucha</i>	African striped weasel	LC	NT
<i>Redunca fulvorufula</i>	Mountain reedbeek	LC	EN
<i>Rhinolophus swinnyi</i>	Swinny's horseshoe bat	LC	VU
<i>Aethomys ineptus</i>	Tete veld rat	LC	LC
<i>Aethomys namaquensis</i>	Namaqua rock rat	LC	Unlisted
<i>Amblysomus hottentotus</i>	Hottentot golden mole	LC	LC
<i>Atilax paludinosus</i>	Water mongoose	LC	LC
<i>Canis mesomelas</i>	Black-backed jackal	LC	LC
<i>Caracal caracal</i>	Caracal	LC	LC
<i>Chlorocebus pygerythrus</i>	Vervet monkey	LC	LC
<i>Crocidura cyanea</i>	Reddish-grey musk shrew	LC	LC
<i>Cryptomys hottentotus</i>	Common mole-rat	LC	LC
<i>Cynictis penicillata</i>	Yellow mongoose	LC	LC
<i>Dendromus melanotis</i>	Grey climbing mouse	LC	LC
<i>Dendromus mystacalis</i>	Chestnut climbing mouse	LC	LC
<i>Elephantulus myurus</i>	Eastern rock sengi	LC	LC
<i>Eptesicus hottentotus</i>	Long-tailed serotine bat	LC	LC
<i>Felis silvestris</i>	African wildcat	LC	LC
<i>Genetta genetta</i>	Small-spotted genet	LC	LC
<i>Gerbilliscus brantsii</i>	Highveld gerbil	LC	LC
<i>Graphiurus murinus</i>	Woodland dormouse	LC	LC
<i>Herpestes pulverulentus</i>	Cape grey mongoose	LC	LC
<i>Herpestes sanguineus</i>	Slender mongoose	LC	LC
<i>Hystrix africae australis</i>	Cape porcupine	LC	LC
<i>Ichneumia albicauda</i>	White-tailed mongoose	LC	LC
<i>Ictonyx striatus</i>	Striped polecat	LC	LC
<i>Kerivoula lanosa</i>	Lesser wooly cat	LC	LC
<i>Lemniscomys rosalia</i>	Single-striped mouse	LC	LC
<i>Lepus saxatilis</i>	Scrub hare	LC	LC
<i>Lepus victoriae</i>	African savanna hare	LC	LC



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<i>Mastomys natalensis</i>	Natal multimammate mouse	LC	LC
<i>Mellivora capensis</i>	Honey badger	LC	LC
<i>Mus musculus</i>	Mouse mouse	LC	Unlisted
<i>Myosorex varius</i>	Forest shrew	LC	LC
<i>Myotis welwitschii</i>	Welwitsch's hairy bat	LC	LC
<i>Neoromicia capensis</i>	Cape serotine bat	LC	LC
<i>Neoromicia zuluensis</i>	Aloe bat	LC	LC
<i>Oreotragus oreotragus</i>	Klipspringer	LC	LC
<i>Orycteropus afer</i>	Aardvark	LC	LC
<i>Otomys angoniensis</i>	Angoni vlei rat	LC	LC
<i>Otomys irroratus</i>	Vlei rat	LC	LC
<i>Otomys sloggetti</i>	Slogget's rat	LC	LC
<i>Papio ursinus</i>	Chacma baboon	LC	LC
<i>Pipistrellus anchietae</i>	Anchieta's pipistrelle bat	LC	Unlisted
<i>Procavia capensis</i>	Rock hyrax	LC	LC
<i>Pronolagus crassicaudatus</i>	Natal red rock rabbit	LC	LC
<i>Pronolagus saundersiae</i>	Hewitt's red rock rabbit	LC	LC
<i>Proteles cristata</i>	Aardwolf	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Rattus rattus</i>	Black rat	LC	Unlisted
<i>Redunca arundinum</i>	Southern reedbuck	LC	LC
<i>Rhodomys pumilio</i>	Xeric four-striped mouse	LC	LC
<i>Rhinolophus clivosus</i>	Geoffroy's horseshoe bat	LC	LC
<i>Rhinolophus darlingi</i>	Darling's horseshoe bat	LC	LC
<i>Rhinolophus simulator</i>	Bushveld horseshoe bat	LC	LC
<i>Scotophilus dinganii</i>	Yellow house bat	LC	LC
<i>Steatomys krebsii</i>	Kreb's fat mouse	LC	LC
<i>Steatomys pratensis</i>	Fat mouse	LC	LC
<i>Suncus varilla</i>	Lesser dwarf shrew	LC	LC
<i>Suricata suricatta</i>	Suricate	LC	LC
<i>Sylvicapra grimmia</i>	Common duiker	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat	LC	LC
<i>Tragelaphus oryx</i>	Eland	LC	LC
<i>Tragelaphus scriptus</i>	Bushbuck	LC	Unlisted
<i>Vulpes chama</i>	Cape fox	LC	LC
Conservation Dependant species			
<i>Alcelaphus buselaphus</i>	Red hartebeest	LC	LC
<i>Antidorcas marsupialis</i>	Springbok	LC	LC
<i>Ceratotherium simum</i>	Southern white rhinoceros	NT	NT
<i>Connochaetes gnou</i>	Black wildebeest	LC	LC
<i>Damaliscus pygargus</i>	Blesbok	LC	LC
<i>Diceros bicornis</i>	Black rhinoceros	CR	EN
<i>Equus quagga</i>	Plains zebra	NT	LC
<i>Syncerus caffer</i>	Cape buffalo	LC	LC



APPENDIX D: EXPECTED REPTILE AND AMPHIBIAN SPECIES

Species	Common Name	Global (IUCN, 2018)	Regional (Bates, Branch et al., 2014)
<i>Afroedura nivaria</i>	Drakensberg flat gecko	LC	Endemic
<i>Aparallactus capensis</i>	Black-headed centipede eater	LC	LC
<i>Chamaeleo dilepis</i>	Flap-neck chameleon	LC	LC
<i>Crocodylus niloticus</i>	Nile crocodile	LR/lc	VU
<i>Dasypeltis scabra</i>	Common egg-eater	LC	LC
<i>Dendroaspis polylepis</i>	Black mamba	LC	LC
<i>Duberria lutrix</i>	Common slug-eater	LC	Endemic
<i>Hemachatus haemachatus</i>	Rinkhals	LC	LC
<i>Lamprophis aurora</i>	Aurora house snake	LC	Endemic
<i>Lycodonomorphus inornatus</i>	Olive house snake	LC	Endemic
<i>Pachydactylus vansoni</i>	Van Son's thick-toed gecko	LC	Near-endemic
<i>Prosymna ambigua</i>	East African shovel snout	LC	Unlisted
<i>Trachylepis punctatissima</i>	Speckled rock skink	LC	LC
Amphibians			
<i>Amietia angolensis</i>	Common river frog	LC	LC
<i>Breviceps adpersus</i>	Bushveld rain frog	LC	LC
<i>Breviceps mossambicus</i>	Mozambique rain frog	LC	LC
<i>Cacosternum boettgeri</i>	Boettger's caco	LC	LC
<i>Cacosternum parvum</i>	Mountain caco	LC	LC
<i>Hadromophryne natalensis</i>	Natal ghost frog	LC	LC
<i>Hemisus guttatus</i>	Spotted shovel-nosed frog	VU	VU
<i>Hyperolius marmoratus</i>	Painted reed frog	LC	LC
<i>Kassina senegalensis</i>	Bubbling kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring puddle frog	LC	LC
<i>Ptychadena anchietae</i>	Plain grass frog	LC	LC
<i>Ptychadena oxyrhynchus</i>	Sharp-nosed grass frog	LC	LC
<i>Ptychadena porosissima</i>	Striped grass frog	LC	LC
<i>Schismaderma carens</i>	Red toad	LC	LC
<i>Sclerophrys capensis</i>	Raucous toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural toad	LC	LC
<i>Semnodactylus wealii</i>	Rattling frog	LC	LC
<i>Strongylopus fasciatus</i>	Striped stream frog	LC	LC
<i>Strongylopus grayii</i>	Clicking stream frog	LC	LC
<i>Tomopterna cryptotis</i>	Tremolo sand frog	LC	LC
<i>Tomopterna krugerensis</i>	Knocking sand frog	LC	LC
<i>Tomopterna natalensis</i>	Natal sand frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's sand frog	LC	LC
<i>Vandijkophrynus gariiepensis</i>	Karoo toad	LC	LC
<i>Xenopus laevis</i>	Common platanna	LC	LC



APPENDIX E: CURRICULUM VITAE (CV) FOR PETER KIMBERG

1. Area of expertise Biodiversity

2. Name of Firm: The Biodiversity Company

3. Name of Staff: Peter Kimberg

4. Date of Birth: 06 November 1975 **Nationality:** South African & Estonian

5. Education:

- B.Sc. Honours; Zoology: Baseline assessment of aquatic ecosystems in the Mankwe River, Pilanesberg National Park, University of Johannesburg, 2002
- BSc, Majors: Zoology & Botany , University of Johannesburg 1999 - 2001

6. Other Training:

- Smithsonian-Mason School of Conservation at the George Mason University in Virginia, USA titled 'Strategies for Implementing Biodiversity Action Plans for the Private Sector' (2016)
- Banks and Biodiversity Training Course: Equator Principles Association, Citibank, WWF and BBOP, (2013);
- Workshop to discuss the mainstreaming of biodiversity considerations into the strategic development of the Waterberg Coal Corridor: National Biodiversity and Business Network, (2013);
- Ecological Risk Assessment Workshop: presented by W. Landis (Washington University) at North- West University, (2013);
- Introduction to the Upstream Petroleum Industry – Oil and Gas School: Golder Associates 3-day training seminar, (2011);
- Manager Excellence: Golder Associates Africa 4-day training course, (2010);
- S21(c) and (i) Water Uses – Comprehensive Training: Directorate Water Abstraction and Instream Use, (2009); and
- Monitoring contaminant levels in freshwater fish for bioaccumulation surveys and human consumption: University of Johannesburg & Water Resource Commission (WRC), (2005).

7. Countries of Work Experience: Guinea, Liberia, Mozambique, Zambezi, Togo, South Africa

8. Languages:	Languages	Read	Write	Speak
	English	Excellent	Excellent	Excellent
	Afrikaans	Excellent	Excellent	Excellent

9. Employment Record:



Year: February 2015 – current

Company: The Biodiversity Company

Area: Johannesburg

Position: Aquatic and Biodiversity Consultant

Duties:

- Providing specialist aquatic and biodiversity consulting services.
- Project management for multi-disciplinary biodiversity studies.
- New business development & markets.
- Client liaison.

Year: January 2014 – January 2015

Company: Self-employed as Hydrocynus Consulting

Area: Johannesburg

Position: Independent Aquatic and Biodiversity Consultant

Duties:

- Providing specialist aquatic and biodiversity consulting services to the private sector

Year: August 2013 – December 2013

Company: Golder Associates Africa

Area: Johannesburg

Position: Discipline Lead Ecological Services. In addition to specialist responsibilities

Duties:

- Leading innovation and business development within division;
- Providing in-house advisory services to project opportunities in Africa including resource allocation, project complexity, location and project risks.

Year: March 2009 – September 2013

Company: Golder Associates Africa

Area: Johannesburg

Position: Divisional Leader Ecology

Duties:

- Management of all aspects pertaining to running of division including financial performance, strategic planning, human resource management and health & safety management;
- Quality control & review of ecology division deliverables;

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info@thebiodiversitycompany.com



GCS

- Project management and client interaction.
- Compilation of integrated biodiversity reports from various specialist ecological disciplines;
- Specialist studies of aquatic ecosystems including high level/risk baseline and impact assessments and compilation of complex management plans.

Year: July 2007 – February 2009

Company: Golder Associates Africa

Area: Johannesburg

Position: Group Leader Aquatics

Duties:

- Management of a aquatics group including group coordination and scheduling;
- Project management and client interaction;
- Specialist studies of aquatic ecosystems including baseline and impact assessments and compilation of management plans.

Year: February 2004 – June 2007

Company: Ecosun cc

Area: Johannesburg

Position: Senior Aquatic Consultant

Duties:

- Specialist assessments of aquatic ecosystems.

Year: January 2003 – December 2003

Company: Incomati Tigerfish Action Group (iTag)

Area: Kruger National Park

Position: Field Researcher

Duties:

- Assessment of migratory movements and habitat use of Tigerfish (*Hydrocynus vittatus*) using radio telemetry in the Crocodile and Komati Rivers

Year: January 1997 – December 1998

Company: Legacy Hotel Group

Area: North West Province

Position: Field guide



Duties:

- Leading guided game drives and bush walks in the Pilanesberg National Park.

Detailed Assigned Consultant's Experts:	Tasks on Team of	Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks
Aquatic Biodiversity Specialist	Ecologist /	<p>Location: Guinea Project duration & year: 2010 - 2012 Client: SMFG Name of Project: Société des Mines de Fer de Guinée (SMFG) Project Description: Aquatic baseline, critical habitat and impact assessment of aquatic ecosystems associated with the proposed iron ore mine at Nimba World Heritage Site, Guinea Job Title and Duties: Team leader aquatic field surveys, data analysis & report compilation, Critical Habitat Assessment</p> <p>Location: Liberia Project duration & year: 2010 - 2011 Client: Aureus Mining Name of Project: New Liberty Gold Mine Project Description: Aquatic baseline and impact assessment report for input into project ESIA report Job Title and Duties: Aquatic specialist studies – field surveys and reporting</p> <p>Location: Togo Project duration & year: 2011 Client: Scantogo Name of Project: Scantogo Cement Project Project Description: Ecological specialist assessment report for inclusion into project ESIA report Job Title and Duties: Biodiversity & aquatic field surveys & reporting</p> <p>Location: Mozambique Project duration & year: Client: Name of Project: Riversdale Benga</p>



	<p>Project Description: Scoping, baseline and impact assessment of aquatic ecosystems in the Zambezi and Revú boè Rivers associated with proposed coal mining activities</p> <p>Job Title and Duties:</p> <p>Location: South Africa</p> <p>Project duration & year:</p> <p>Client:</p> <p>Name of Project: Hillside Aluminum</p> <p>Project Description: Receptor characterization component of Source, Pathway, Receptor (SPR) report</p> <p>Job Title and Duties:</p> <p>Location: South Africa</p> <p>Project duration & year:</p> <p>Client:</p> <p>Name of Project: Royal Vopak</p> <p>Project Description: Sensitive biodiversity and ecosystem assessment</p> <p>Job Title and Duties:</p> <p>Location: South Africa</p> <p>Project duration & year:</p> <p>Client:</p> <p>Name of Project: Exxaro</p> <p>Project Description: Update of Belfast Wetland offset and compilation of additional impact assessment reports.</p> <p>Job Title and Duties:</p>
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