



Ecological Assessment for the Hlabisa landfill site

Compiled by: Ina Venter

Pr.Sci.Nat Botanical Science (400048/08)

M.Sc. Botany

trading as Kyllinga Consulting

53 Oakley Street, Rayton, 1001

i.venter@telkomsa.net

In association with Lukas Niemand

Pr.Sci.Nat (400095/06)

M.Sc. Restoration Ecology / Zoology

Pachnoda Consulting

88 Rubida Street, Murryfield x1, Pretoria

lukas@pachnoda.co.za



Table of Contents

1. Introduction	1
1.1. Uncertainties and limitations.....	1
2. Site	1
2.1. Location.....	1
2.2. Site description	1
3. Background information	4
3.1. Vegetation.....	4
3.2. Centres of floristic endemism	4
3.3. C-Plan	4
4. Methods.....	5
4.1. Vegetation Assessment.....	5
4.2. Fauna Assessment.....	5
5. Results.....	5
5.1. Vegetation.....	5
5.1.1. Description.....	5
5.1.2. Invasive species.....	7
5.1.3. Species of conservation importance.....	7
5.2. Fauna.....	9
5.2.1. Mammals	9
5.2.2. Avifauna	9
5.2.3. Herpetofauna	11
5.2.4. Invertebrates.....	12
6. Buffer recommendations.....	12
7. Sensitivity.....	12
8. Impact assessment and mitigation recommendations.....	14
9. Conclusion.....	16
10. References & further reading	17

List of Figures

Figure 1. Location of the Hlabisa landfill site.....	2
Figure 2. View of the site.	3
Figure 3. Active landfill portion of the site.	3
Figure 4. Short grassland surrounding the site and providing habitat for a number of bird species...	10



Figure 5. Riparian areas and other watercourses in proximity to the Hlabisa landfill site..... 13

List of Tables

Table 1. Plant species observed on site. 6
Table 2. Plant species of past conservation importance recorded in the area. 7
Table 3. Mammal species of conservation importance recorded in the area. 9
Table 4. Bird species observed during the site visit..... 10
Table 5. Bird species of conservation importance recorded in the area. 10
Table 6. Impact assessment table for the Hlabisa site. 14

List of Addendums

- Addendum A – CV
- Addendum B – Declaration of Independence
- Addendum C – Mammal species observed in the area (ADU database)
- Addendum D – Bird species observed in the area (SABAP2 database)
- Addendum E – Herpetofauna species observed in the area (ADU database)
- Addendum F – Butterfly species observed in the area (ADU database)

1. Introduction

Pachnoda Consulting (and Kyllinga Consulting) has been appointed by SE Solutions to conduct an ecological assessment of the site including:

- Desktop analyses and literature reviews of existing ecology-related information, including available recent and historic aerial photographs.
- Site surveys to identify ecology-related risk features at each site by a Pr. Sci. Nat. Specialist, who will also delineate and assess sensitive areas.
- The creation of an ecological sensitivity spatial data (e.g. shapefiles) based on site surveys and desktop assessments, which can be used for map production.
- Description of identified sensitive areas/ species and other ecological indicators.
- Description of the conservation status and threat status of all vegetation types and faunal species identified on each site.

1.1. Uncertainties and limitations

The site visit was conducted at the end of the dry season, during a drought period. Some of the species could therefore not be identified up to species level. It is also likely that some species were not recorded during the site visit, due to lack of inflorescences or poor growth. The time spent on site was also limited and no trapping took place. The fauna assessment therefore mainly focussed on the available habitat.

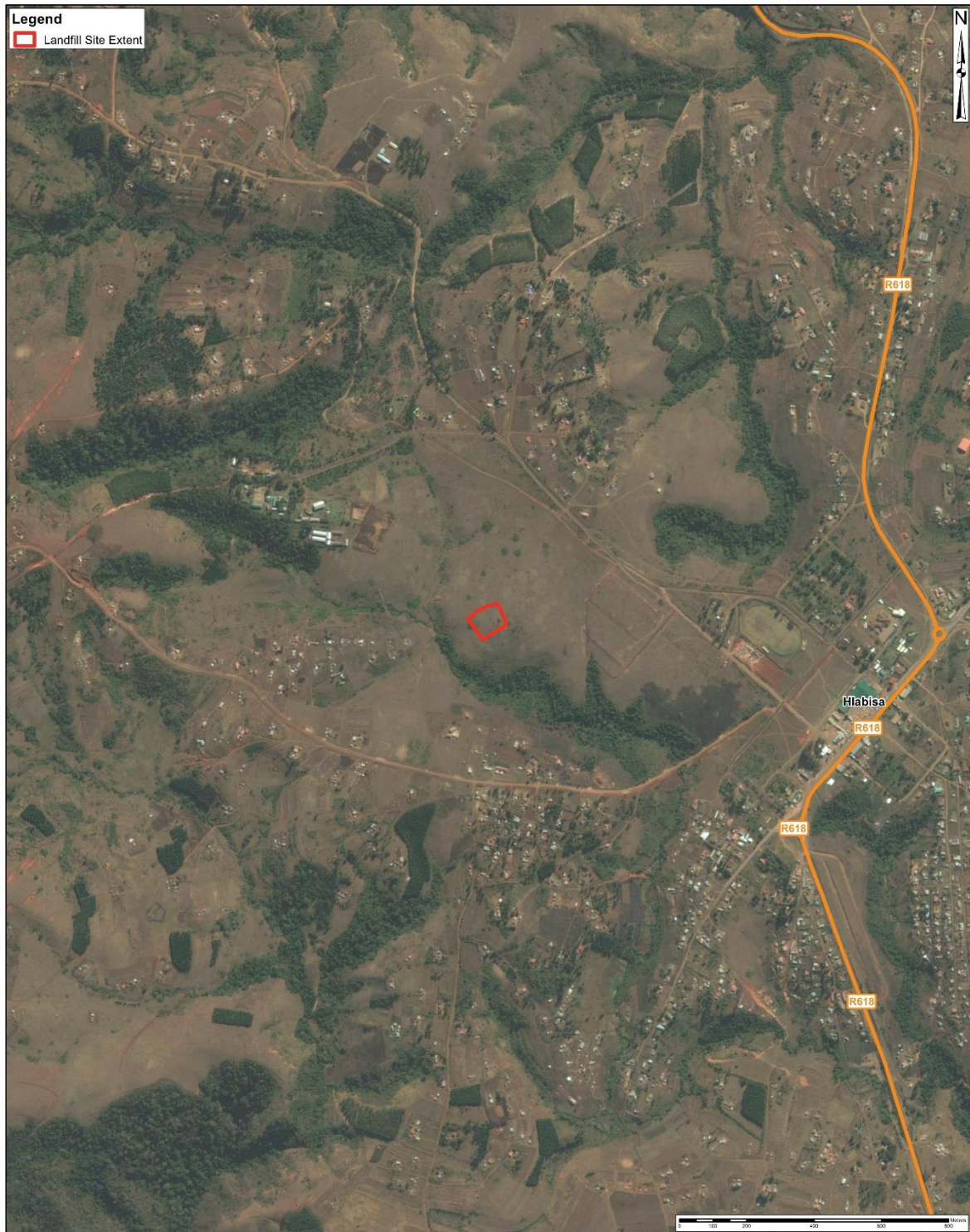
2. Site

2.1. Location

The site is located to the east of the centre of Hlabisa. The site is located to the south of road D1907 and to the north of a drainage line and road A2145. A substation is also located to the north of the site.

2.2. Site description

The site is an active landfill and is used for the dumping of household waste. Most of the vegetation on the site and to the north of the site has been destroyed. It appears that the bare area to the north of the site is also used by a driving school. Some of the dumped material has spread from the site to the east. The vegetation was mostly destroyed on site and the remaining vegetation has a high grazing pressure and is very short (Figure 2).



Project Title:	DEA Waste Licenses 2015	Scale 1:10 000 <small>(When each side is A3 format)</small>	Figure
Map Title:	Detailed Locality Map of Hlabisa Landfill Site	Projection: Transverse Mercator Datum: Hartbeesthoek 1994 Central Meridian: 31.0 Compiled By: GA Maseko GIS QC By: TBD Approved By: J Hayes Date Saved: 2015/08/18 Project Number: 00437185 Map Ref: DetailedLocalityMap.mxd Revision: 00 DDP Ref.: 9 of 13	Sources: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, GeoEye, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community © OpenStreetMap & contributors
<small>Whilst every care has been taken in compiling the information on this map, AECOM cannot accept responsibility for any inaccuracies. © Copyright</small>			
			
<small>Y:\7_Projects\00437185_DEA_Waste_Licenses_2015\mxd\DetailedLocalityMap.mxd</small>			

Figure 1. Location of the Hlabisa landfill site.



Figure 2. View of the site.



Figure 3. Active landfill portion of the site.



3. Background information

3.1. Vegetation

The site is located in the Northern Zululand Sourveld vegetation type. The vegetation is a wooded grassland at an altitude between 450m and 900m. The vegetation type varies from pure Sourveld to dense thickets. The terrain is mostly low, undulating mountains, to moderately undulating plains. The soil is mostly shallow, well-drained soil forms, such as Glenrosa and Mispah. The vegetation type is classified as Vulnerable, but can be viewed as a northern extension of the Ngongoni Veld vegetation type (Mucina & Rutherford 2006).

The vegetation type is protected under the following endangered ecosystems as listed under the National Environmental Management Act:

- Ngome Mistbelt Grassland and Forest (KZN 31)
- Black Rhino Range (KZN 41)
- Hluhluwe Scarp Forest (KZN 58)
- Imfolosi Savanna and Sourveld (KZN 59)

3.2. Centres of floristic endemism

The site falls within the Maputaland-Pondoland Region, which is a floristic unit with a number of centres of floristic endemism. The site does not however fall into any of the centres of floristic endemism within this region.

3.3. C-Plan

A Conservation Plan (C-Plan) was developed for KwaZulu-Natal and includes all sensitive features expected on site. The sites are prioritised as follows:

- Critical Biodiversity Area 1 Mandatory (R2)
 - Planning area contains one or more feature that is irreplaceable.
- Critical Biodiversity Area 2 Mandatory (R1)
 - Planning area contains one or more feature with high irreplaceability.
- Critical Biodiversity Area 3 Mandatory (R0)
 - The area contains one or more feature with low irreplaceability.
- Biodiversity Area (OCO)
 - These areas are located close priority areas (R0, R1 and R2) and still contain features of conservation importance. These areas are therefore not priority areas, but still contain species of conservation importance, that should be taken into account.

The site is listed as a Biodiversity Area (OCO). The landfill site is however an existing landfill. The area is therefore already largely transformed. The sensitive features of the site indicated on C-Plan include:

- Vegetation
 - Northern Zululand Sourveld – Least Threatened
 - Eastern Scarp Forests : Northern Zululand Lebombo Scarp Forest – Least Threatened
 - *Albizia suluensis*
- Millipedes
 - *Allawrencius gladiator*



- *Allawrencius nodulosus*
- *Centrobolus rugulosus*
- *Doratogonus hoffmani*
- *Orthoporoides laccatus*
- Mollusca
 - *Gulella aliciae*
 - *Edouardia conulus*

4. Methods

4.1. Vegetation Assessment

Aerial photographs of the site were investigated and habitat units identified. A list of the species that has been recorded in the quarter degree grid (2831BB) has been downloaded from SIBIS (<http://sibis.sanbi.org/>). From this list, a list of Red Data species, medicinal plant species and invasive plant species were extracted. These lists were used to inform the assessment.

The site visit took place on 26 October 2015. The vegetation in each of the habitat units on site were recorded along random transect walks, on site and adjacent to the site. The habitat adjacent to the site is assumed to be similar to the habitat prior to commissioning of the landfill. A search for the Red Data species was also conducted on site and adjacent to the site.

4.2. Fauna Assessment

Species lists of species that have been recorded on site were downloaded from the Virtual Museum on the Animal Demography Unit website (<http://vmus.adu.org.za/>), and a bird species list was downloaded from the South African Bird Atlas Project (SABAP2) website (<http://sabap2.adu.org.za/>). A list of the threatened bird species from the area has also been downloaded from SIBIS. These lists include species that were recorded in the area by various observers and which may therefore be present on site.

The site visit took place on 26 October 2015. Species were recorded along random walks, mainly on the edges of the landfill and adjacent to the landfill, but also in the surrounding areas. The site was mostly investigated for available habitat and species observed on site during the site visit were noted. Potential habitat for Red Data species were also noted in the surrounding area. No trapping took place.

5. Results

5.1. Vegetation

5.1.1. Description

The site visit was conducted at the end of the dry season, during a drought. The vegetation on site was grazed very short and high grazing pressure is present. Species were recorded on site and adjacent to the site, but identification of a few of the species were problematic due to the heavy grazing pressure. The vegetation on site is very disturbed and large portions of the vegetation on site has been destroyed. Several alien and invasive plant species are also present. It is however clear that the vegetation consisted of grassland vegetation in the past. The remaining species on site is common to the area, with no species of particular significance present. The vegetation unit is largely disturbed on site and not considered to be sensitive.



Table 1. Plant species observed on site.

Species	Alien / Invasive	Growth form	IUCN status
<i>Alternanthera pungens</i>	Alien	Forb	Not listed
<i>Amaranthus hybridus</i>	Alien	Forb	Not listed
<i>Berkeya cf speciosa</i>		Forb	Not listed
<i>Bidens sp</i>	Alien	Forb	Not listed
<i>Centella asiatica</i>		Forb	Least Concern
<i>Chenopodium sp</i>	Alien	Forb	Not listed
<i>Cirsium vulgare</i>	Category 1b	Forb	Not listed
<i>Commelina sp</i>		Forb	Not listed
<i>Cotula sp</i>		Forb	Not listed
<i>Cynodon dactylon</i>		Grass	Least Concern
<i>Datura stramonium</i>	Category 1b	Shrub	Not listed
<i>Dichrostachys cinerea</i>		Shrub	Not listed
<i>Eragrostis cf plana</i>		Grass	Not listed
<i>Eragrostis sp</i>		Grass	Not listed
<i>Gomphocarpus physocarpus</i>		Shrub	Least Concern
<i>Haplocarpa sp</i>		Forb	Not listed
<i>Hypochaeris radicata</i>	Alien	Forb	Not listed
<i>Lippia javanica</i>		Forb	Least Concern
<i>Panicum cf coloratum</i>		Grass	Not listed
<i>Paspalum sp</i>		Grass	Not listed
<i>Psidium guajava</i>	Category 3	Shrub	Not listed
<i>Searsia sp</i>		Tree	Not listed
<i>Senecio cf madagascariensis</i>		Forb	Not listed
<i>Senecio latifolius</i>		Forb	Least Concern
<i>Senecio sp</i>		Forb	Not listed
<i>Senna didymobotrya</i>	Category 1b	Shrub	Not listed
<i>Solanum sisymbriifolium</i>	Category 1b	Shrub	Not listed
<i>Solanum panduriforme</i>		Shrub	Least Concern
<i>Sporobolus africanus</i>		Grass	Least Concern
<i>Stenotaphrum secundatum</i>		Grass	Least Concern
<i>Taraxacum officinale</i>	Alien	Forb	Not listed
<i>Themeda triandra</i>		Grass	Least Concern
<i>Tribulus terrestris</i>	Alien	Forb	Least Concern
<i>Vachellia karroo</i>		Tree	Not listed
<i>Wahlenbergia sp</i>		Forb	Not listed
<i>Zornia capensis</i>		Forb	Not listed



5.1.2. Invasive species

A list of alien and invasive species has been published in the Government Gazette of 1 August 2014 in the Alien and Invasive Species Regulations (AIS) under the National Environmental Management Biodiversity Act (Act 10 of 2004). Invasive species are divided into the following four categories:

- “Category 1a: Invasive species which must be combatted and eradicated. Any form of trade or planting is strictly prohibited.
- Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form of trade or planting is strictly prohibited.
- Category 2: Invasive species, or species deemed to be potentially invasive, in that a permit is required to carry out a restricted activity. Category 2 species include commercially important species such as pine, wattle and gum trees. Plants in riparian areas are Category 1b.
- Category 3: Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade, is however prohibited. Plants in riparian areas are Category 1b.”

Five invasive plant species were recorded during the site visit (Table 1). Four of these plant species are in Category 1b and needs to be controlled on site, and preferably eradicated. The fifth species is in Category 3, and may not be propagated or allowed to spread from the site. Several alien species not listed as invaders and not requiring control are also present on site. These species are all indicators of disturbance. The density of *Psidium guajava* is lower on site than for the surrounding areas. This may be partially due to the disturbance from the landfill and the removal of tree species from the site.

5.1.3. Species of conservation importance

A number of plant species of conservation importance were recorded in the area (Table 2). The only species with habitat present close to the site is *Boophone disticha* and *Aloe cooperi* subsp. *pulchra*. These species are listed as Declining and Data Deficient respectively. The species were not observed on site or around the site. The possible presence of these species are therefore not considered to be of concern. In addition the species *Albizia suluensis* is indicated on C-Plan as occurring in the habitat unit. The species is Endangered and it occurs in open woodland, scarp forest and riverine thicket. It is often present along streams, often on the upper (altitudinal) perimeter and on steep slopes. Habitat is available for the species along the streams close to the site. The habitat is however not ideal and no individuals of *Albizia suluensis* were observed.

Table 2. Plant species of past conservation importance recorded in the area.

Family Name	Species Name	IUCN status	NEMBA status	Habitat	Habitat on site
AMARYLLIDACEAE	<i>Boophone disticha</i>	Declining	Not listed	Grassland, in rocky areas	Habitat present in surroundings, none observed
APOCYNACEAE	<i>Ceropegia cimiciodora</i>	Vulnerable	Not listed	Savanna, thorn scrub on turf and sandy loam soils	No



Family Name	Species Name	IUCN status	NEMBA status	Habitat	Habitat on site
ASPHODELACEAE	<i>Aloe cooperi</i> subsp. <i>pulchra</i>	Data Deficient	Not listed	Wide variety of habitats in grasslands, from marshy areas to dry and well-drained, often wedges in shallow pockets among rocks, but also on hillsides in open grasslands.	Habitat present in surroundings, none observed
CANELLACEAE	<i>Warburgia salutaris</i>	Endangered	Not listed	Coastal, riverine, dune and montane forest as well as open woodland and thickets.	No
CELASTRACEAE	<i>Elaeodendron transvaalense</i>	Near Threatened	Not listed	Savanna or bushveld, from open woodland to thickets, often on termite mounds.	No
FABACEAE	<i>Aspalathus gerrardii</i>	Vulnerable	Not listed	Coastal grasslands, forest margins, often in damp or marshy sites, on sandstones and Msikaba Formation Sandstone in the south, 0-500 m.	No
FABACEAE	<i>Erythrophleum lasianthum</i>	Near Threatened	Not listed	Sand forest.	No
MYRSINACEAE	<i>Rapanea melanophloeos</i>	Declining	Not listed	Coastal, swamp and mountain forest, on forest margins and bush clumps, often in damp areas from coast to mountains.	No
ORCHIDACEAE	<i>Habenaria culveri</i>	Rare	Not listed	Deep shade in subtropical forest, 150-1000 m.	No
RHIZOPHORACEAE	<i>Cassipourea gummiflua</i> var. <i>verticillata</i>	Vulnerable	Not listed	Evergreen forest, riverine and swamp forest. Moist scarp forest and coastal lowland forest.	No



Family Name	Species Name	IUCN status	NEMBA status	Habitat	Habitat on site
RHIZOPHORACEAE	<i>Cassipourea malosana</i>	Declining	Not listed	In the understorey of Afromontane forest or in thickets on rocky outcrops in Mpumalanga, also in coastal and midland forests in KwaZulu-Natal.	No
ROSACEAE	<i>Prunus africana</i>	Vulnerable	Not listed	Evergreen forests near the coast, inland mistbelt forests and afromontane forests up to 2100 m.	No

5.2. Fauna

5.2.1. Mammals

The only mammal species observed during the site visit were domestic animals, including dogs and cattle. A number of small mammal species are however expected to be present occasionally. These species are however being hunted by the domestic dogs.

Two mammal species of conservation importance were recorded in the area in the past. The species are however unlikely to be present on site due to the close location of the site to development and human presence on and around the site. The Blue Duiker (*Philantomba monticola*) may however utilise the site occasionally.

Table 3. Mammal species of conservation importance recorded in the area.

Species	Common name	Red list category	Habitat	Habitat on site
<i>Philantomba monticola</i>	Blue Duiker	Vulnerable		Marginal habitat
<i>Crocuta crocuta</i>	Spotted Hyena	Near Threatened		No. Needs larger foraging area.

A number of mammal species were recorded in the quarter degree catchment and are listed in Addendum C.

5.2.2. Avifauna

Only three bird species were observed on site during the site visit (Table 4). Observation time was however limited and the site visit took place during a short rain shower.

Table 4. Bird species observed during the site visit.

Species	Common name
<i>Corvus albus</i>	Pied Crow
<i>Malaconotus blanchoti</i>	Grey-headed Bush-shrike
<i>Passer domesticus</i>	House Sparrow



Figure 4. Short grassland surrounding the site and providing habitat for a number of bird species.

Several bird species of conservation importance were recorded in the area and are listed in Table 5 below. A few bird species of conservation importance may occasionally utilise the site and surroundings for foraging habitat. None of the species are however likely to breed on site.

Table 5. Bird species of conservation importance recorded in the area.

Common name	Taxon name	Regional Red List Status 2014	Regional Red List Status 2000	Habitat	Habitat on site
Eagle, Tawny	<i>Aquila rapax</i>	Endangered	Vulnerable	Thornveld and semi-desert areas.	Occasional foraging visitor
Ground-hornbill, Southern	<i>Bucorvus leadbeateri</i>	Endangered	Vulnerable	Savanna, woodland and grassland, with adjacent forest.	No



Common name	Taxon name	Regional Red List Status 2014	Regional Red List Status 2000	Habitat	Habitat on site
Falcon, Lanner	<i>Falco biarmicus</i>	Vulnerable	Near Threatened	Occur in wide range of habitats but avoids forests.	Occasional foraging visitor
Ibis, Southern Bald	<i>Geronticus calvus</i>	Vulnerable	Vulnerable	Breeds of cliffs. Short-grazed or burned upland grassland.	Occasional foraging visitor
Vulture, White-backed	<i>Gyps africanus</i>	Endangered	Vulnerable	Savanna. Nest in small colonies on tree-tops.	No
Vulture, Cape	<i>Gyps coprotheres</i>	Endangered	Vulnerable	Nests in colonies on cliff ledges. Grassland, savanna and semi-desert.	Occasional foraging visitor
Stork, Yellow-billed	<i>Mycteria ibis</i>	Endangered	Near Threatened	Lakes, estuaries and large rivers.	No
Stork, Black	<i>Ciconia nigra</i>	Vulnerable	Near Threatened	Streams, ponds, estuaries and lagoons.	No
Eagle, Martial	<i>Polemaetus bellicosus</i>	Endangered	Vulnerable	Savanna, but present in any habitat from desert to forest edge.	Occasional foraging visitor
Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable	Near Threatened	Savanna and open grassland.	Occasional foraging visitor
Eagle, African Crowned	<i>Stephanoaetus coronatus</i>	Vulnerable	Near Threatened	Evergreen and riverine gallery forest.	No
Bateleur	<i>Terathopius ecaudatus</i>	Endangered	Vulnerable	Savanna.	No
Crane, Grey Crowned	<i>Balearica regulorum</i>	Endangered	Vulnerable	Marshes, dams and adjacent grassland.	Occasional foraging visitor
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	Near Threatened	Near Threatened	Wooded streams and coastal lagoons.	No
Black-bellied Bustard	<i>Lissotis melanogaster</i>	Near Threatened	Near Threatened	Woodland and tall open grassland.	Occasional foraging visitor, marginal habitat.

5.2.3. Herpetofauna

1.1.1.1. Reptiles

Several reptile species were recorded in the area and are include in Addendum E. Only two reptile species of conservation importance were recorded in the quarter degree catchment, *Python*



natalensis (Python) and *Crocodylus niloticus* (Nile Crocodile), neither of which are likely to be present on site or adjacent to the site.

1.1.1.2. Frogs

Several frog species have been recorded in the quarter degree catchment and are listed in Addendum E. No frog species of conservation importance have been recorded in the area.

5.2.4. Invertebrates

A few butterfly species were recorded on site (Addendum F), none of which are threatened. According to C-Plan several millipede and mollusc (snail) species may be present in the area. The species potentially occurring on site include:

- Millipedes
 - *Allawrencius gladiator*
 - *Allawrencius nodulosus*
 - *Centrobolus rugulosus*
 - *Doratogonus hoffmani*
 - *Orthoporoides laccatus*
- Mollusca
 - *Gulella aliciae*
 - *Edouardia conulus*

Very little is known about most of these species, but they generally occur in the shade, in forest litter. The species are unlikely to be present on site, especially given the disturbance on site. Continued use of the site will therefore not have a significant impact on any of the species. There is however a slight chance that some of the species may be present in the drainage line area adjacent to the site.

6. Buffer recommendations

A buffer zone is intended as an area to mitigate the impact of the development on sensitive features on site. Since the landfill is already in use and closure is planned within 5 year, no buffer zone is applicable to the site.

7. Sensitivity

The site is considered to be of low sensitivity, while the surrounding grassland is of moderate sensitivity. The drainage lines in the vicinity of the site should be considered to be of moderate to high sensitivity.

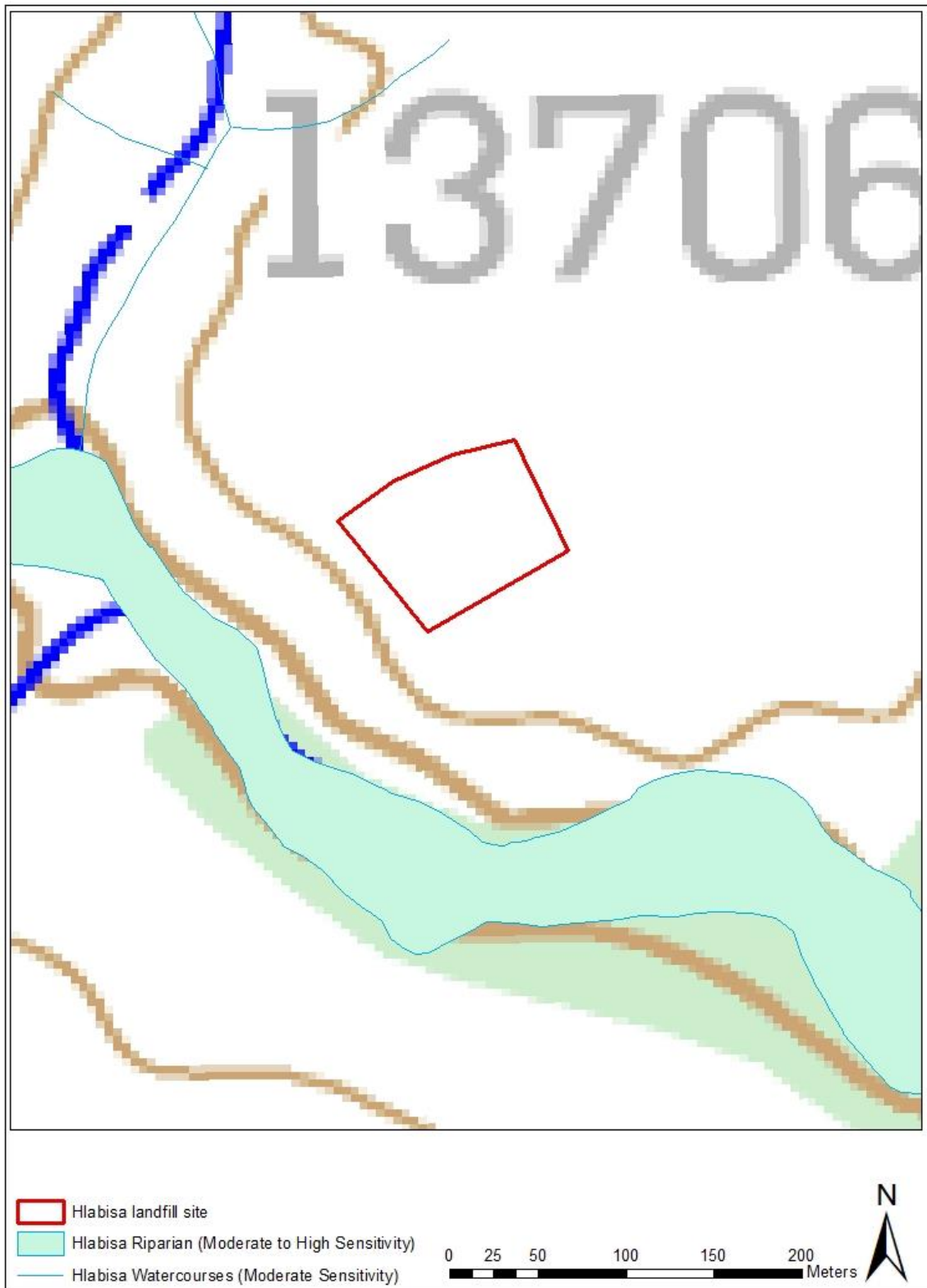


Figure 5. Riparian areas and other watercourses in proximity to the Hlabisa landfill site.



8. Impact assessment and mitigation recommendations

Table 6. Impact assessment table for the Hlabisa site.

Nature	Extent	Duration	Intensity	Probability	Status	Significance without mitigation	Significance with mitigation	Confidence	Reversibility	Replaceability
Loss of habitat and indigenous species	Site	Long term	Medium - High	Definite	Negative	Medium - High	Medium	High	Partially reversible	Moderate - High
Loss of habitat for species of conservation importance	Site	Long term	Medium - High	Possible	Negative	Medium	Low	Medium	Largely reversible	Moderate - High
Loss of ecological corridors	Footprint	Medium term	Low - Medium	Improbable	Negative	No Impact	No Impact	Medium	Reversible	High
Infestation by invasive plant species	Local	Long term	Medium	Likely	Negative	Medium	Low	High	Reversible with management	Moderate - High
Infestation by pest species	Local	Long term	Medium	Highly likely	Negative	Medium - High	Medium	Medium	Reversible with management	Moderate - High
Pollution of habitat by hazardous materials from the site	Local	Permanent	Low - Medium	Likely	Negative	Medium	Low	Medium	Partially reversible	Low - Moderate
Spreading of rubbish from site	Site	Long term	Low - Medium	Definite	Negative	Medium - High	Low	High	Reversible with management	High



Loss of habitat and indigenous species

The habitat on site is partially transformed by the active landfill in place. Some habitat and indigenous species remain on site and adjacent to the site. The remaining habitat and indigenous species on site will likely be altered by the landfill. In addition, the vegetation adjacent to the site may also be affected by the activities on site. Litter is currently spreading from the site to the north and east of the site. The landfill will be rehabilitated and closed in the next 5 years. The vegetation may then partially recover on site.

Mitigation:

- Dumping activities must be confined to the fenced area.
- Vehicle movement must be restricted to the fenced area and the road to the landfill.
- Confine the litter to the site.
- Maintain the fence around the site.
- Clear litter from the surrounding areas.
- Confine all soil works related to rehabilitation to the site.

Loss of habitat for species of conservation importance

A few species of conservation importance may potentially be present in the area as discussed in Section 5 of this report. Several foraging visitors may potentially visit the site.

Mitigation:

- Dumping activities must be confined to the fenced area.
- Vehicle movement must be restricted to the fenced area and the road to the landfill.
- Confine the litter to the site.
- Maintain the fence around the site.

Ecological corridors

Given the relatively small size of the site and the large undeveloped area surrounding it, the impact is negligible. No mitigation is therefore required.

Infestation by invasive plant species

Invasive plant species tend to establish in disturbed areas. The species must however be transported to these areas in some way. Several invasive species are present on site and in the surroundings. The dominant invasive species is *Psidium guajava*. The species is already widespread in the area and the landfill does not have a significant impact on the distribution of the species. The other species are present in lower densities.

Mitigation:

- Populations of invasive species on site must be controlled according to an eradication plan.
- The spread of invasive and weedy species from the site must be prevented.
- Care must be taken not to control indigenous species.



Infestation by animal pest species

Landfill sites can potentially provide habitat and food to several indigenous and alien pests and scavengers, including rats (*Rattus rattus* & *Rattus norvegicus*), mice (*Mus musculus*), jackals (*Canis* sp.), feral dogs (*Canis domesticus*) and feral cats (*Felis catus*). Several bird species including crows (*Corvus* sp.), as well as insect species such as flies (*Musca domestica*) may also become a problem. At present, the site does not appear to have large numbers of pest species present.

Mitigation:

- Cover newly dumped rubbish containing food scraps at least once a week.
- If excessive numbers of flies are present the rubbish must be covered at the end of each day.

Pollution of habitat by effluent from the site

Hazardous materials are associated with several waste products, which may end up in a landfill site. Common sources of hazardous materials are old batteries, fluorescent (energy saver) light bulbs, motor oil etc. These products should not be disposed of at a normal landfill site, but should rather be recycled. If not, these hazardous materials must be disposed of at a facility registered to dispose of hazardous waste.

Mitigation:

- Provide bins for recycling in the town.
- Educate people on the value and need for recycling.
- Cover any food waste etc. to prevent pest insects breeding on site and scavenging.

Spreading of rubbish from site

Rubbish can spread from the site either by wind, run-off or informal dumping. Rubbish are currently present in the area to the east of the site. This appears to be due to spreading by wind.

Mitigation:

- Maintain the fence around the site.
- Take measures to prevent informal dumping, if necessary.

9. Conclusion

The site is largely modified by the landfill. Grazed grassland surrounds the site. Several species of conservation importance may occasionally utilise the site, but are unlikely to breed or forage on site or very close to the site. The site is considered to be of low sensitivity, while the surrounding grassland is of moderate sensitivity. The drainage lines in the vicinity of the site should be considered to be of moderate to high sensitivity.



10. References & further reading

- Bromilow, C. 2010. *Problem Plants and Alien Weeds of South Africa*. Briza Publications, Pretoria.
- Chittenden, H. *Roberts Bird Guide. A comprehensive field guide to over 950 bird species in southern Africa*. John Voecker Bird book Fund, Cape Town.
- Court, D. 2010. *Succulent Flora of Southern Africa*. Struik Nature, Cape Town.
- Crouch, N.R.; Klopper, R.R.; Burrows, J.E. & Burrows, S.M. 2011. *Ferns of Southern Africa. A Comprehensive Guide*. Struik Nature, Cape Town.
- Gerber, A.; Cilliers, C.J.; van Ginkel, C. & Glen, R. 2004. *Easy identification of Aquatic Plants. A guide for the identification of water plants in and around South African impoundments*. Department of Water Affairs, Pretoria.
- Gordon-Gray, K.D. 1995. *Cyperaceae in Natal*. South African National Biodiversity Institute, Strelitzia 2, Pretoria.
- Kirby, G. 2013. *Wild Flowers of Southeast Botswana*. Struik Nature, Cape Town.
- Le Roux, A. & Schelpe, E.A.C.L.E. 1981. *South African Wild Flower Guide. Namaqualand and Clanwilliam*. Botanical Society of South Africa, Pretoria.
- Macfarlane, D.; Kotze, D.; Ellery, W.; Walters, D.; Koopman, V.; Goodman, P. & Goge, M. 2009. *Wetland Management Series. WET-Health. A technique for rapidly assessing wetland health*. WRC report no. TT340/09, Pretoria.
- McMurtry, D.; Grobler, L.; Grobler, J. & Burns, S. *Field Guide to the Orchids of Northern South Africa and Swaziland*. Umdauss Press, Pretoria.
- Mucina, L. & Rutherford, M.C. 2006. *The Vegetation of South Africa, Lesotho and Swaziland*. South African National Biodiversity Institute, Strelitzia 19, Pretoria.
- Oberprieler, U & Cillie, B. 2002. *SAPPI Raptor Identification Guide for Southern Africa*. Random House, Cape Town.
- Pooley, E. 1998. *A Field Guide to Wild Flowers. KwaZulu-Natal and the Eastern Region*. Natal Flora Publications Trust, Durban.
- Sinclair, I., Hocky, P. & Tarbot, W. 2002. *Sasol Birds of Southern Africa*. Third edition. Struik Publishers, Cape Town.
- Smit, N. 1999. *Guide to the Acacias of South Africa*. Briza Publications, Pretoria.
- Van Ginkel, C.E.; Glen, R.P.; Gordon-Gray, K.D.; Cilliers, C.J.; Muasya, M. & van Deventer, P.P. 2011. *Easy identification of some South African Wetland Plants*. WRC report no TT479/10, Pretoria.
- Van Oudtshoorn, F. 1999. *Guide to Grasses of Southern Africa*. Briza Publications, Pretoria.
- Van Wyk, B. & Malan, S. 1997. *Field Guide to the Wild Flowers of the Highveld*. Struik Publishers, Cape Town.



Kyllinga
CONSULTING

Van Wyk, A.E. & Smith, G. 2001. *Regions of Floristic Endemism in Southern Africa. A Review with Emphasis on Succulents*. Umdaus Press, Pretoria.

Van Wyk, B. & Smith, G.F. 2014. *Guide to the Aloes of South Africa*. Briza Publications, Pretoria.

Van Wyk, B; Van Oudtshoorn, B. & Gericke, N. 1997. *Medicinal Plants of South Africa*. Briza Publications, Pretoria.

Van Wyk, B. & van Wyk, P. 2013. *Veldgids tot Bome van Suider-Africa*. Struik Nature, Cape Town.



Addendum A – CV

CURRICULUM VITAE

Name: **Catharina Elizabeth Venter** trading as Kyllinga Consulting
Position: Senior Ecologist and Wetland Scientist
Date of Birth: 29 December 1979
Nationality: South African
Languages: Afrikaans, English

EDUCATIONAL QUALIFICATIONS

- M.Sc (Botany), University of Pretoria (2003)
- B.Sc Hons (Botany), University of Pretoria (2001)
- B.Sc (Environmental Sciences), University of Pretoria (2000). Majored in Geography and Botany
- Matriculated, Sasolburg High School (1997)

Additional

- Introduction to ArcGIS 1 (2006)
- Bringing your data into ArcGIS (2006)
- Introduction to ArcView 3.x (2003).

FIELDS OF EXPERTISE

- **Ecological Assessment:**
Ecological Assessments as part of the Environmental Impact Assessment Process
- **Wetland Assessment:**
Wetland Assessments as part of the Environmental Impact Assessment Process and Water Use Applications, as well as rehabilitation plans for wetlands, including planning or the Working for Wetlands programme. Large scale wetland assessments (catchment scale).
- **GIS:**
Compilation of maps for submission as part of Environmental Impact Assessment Process. Creating spatial databases and large scale wetland maps (catchment scale). Projection conversions and matching/overlying different format GIS maps.
- **Environmental Impact Assessment**
Undertaken numerous Environmental Scoping Reports, as required by the Environment Conservation Act, 1989 (Act 73 of 1989), the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the Development Facilitation Act, 1995 (Act 67 of 1995). Project experience includes the establishment of various housing typologies, golf courses, commercial and industrial projects, infrastructure development (roads), resorts and/or game lodges as well as filling stations.
- **Public Participation:**
Undertaken numerous public participation processes, ranging from basic to extensive, as required by relevant environmental legislation.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Professional Natural Scientist (Pr.Sci.Nat) in the field of Botanical Science (Reg no. 400048/08)
- Member of the Botanical Society of South Africa



EMPLOYMENT HISTORY EXPERIENCE

Kyllinga Consulting (July 2015 - present)

Senior Ecologist responsible for wetland and ecological specialist assessments.

Spatial Ecological Consulting (February 2010 – June 2015)

Senior Ecologist responsible for wetland and ecological specialist assessments.

- Wetland Related Assessments
More than 40 wetland assessments conducted between 2010 and 2015.
- Vegetation Assessments
Approximately 16 vegetation assessments between 2010 and 2015.
- Management Plans
Completed two ecological management plans.

MSA Group Services (previously Exigent Environmental CC) (August 2004 – January 2010)

Environmental Scientist responsible for ecological and wetland assessments and the compilation of maps. Also conducted various scoping and EIA applications and EMPRs.

- Ecological Assessments
In excess of 50 ecological assessments conducted between 2004 and 2010, including managing the inclusion of the fauna specialist assessments.
- Wetland Assessments
More than 60 wetland verification projects, wetland delineations and wetland assessments, completed between 2004 and 2010.
- As well as:
Rehabilitation Projects; Fatal Flaw / Screening Assessments; National Department of Agriculture Authorisations; Mining Related Assessments; Private, Public Partnership Projects; Resource Management Plans (RMP); Environmental Management Plans; Environmental Management Programme; Environmental Exemption Processes; Basic Assessments; Environmental Impact Assessments

Part-time employment (2002-2004)

Tutor for botany practicals; Assisting Wildlife management students with Braun-Blanquette analysis; Researcher for a project on the vegetation communities and ecology of the Kruger National Park; Research assistant for the analysis of street trees in Tshwane urban forest; Various part time projects related to vegetation and wetlands

COUNTRIES OF WORK EXPERIENCE

- South Africa
- Lesotho
- Botswana
- Mozambique

PAPERS AND PUBLICATIONS

Co-author and data contributor to: SIEBEN, E. *et al.* The vegetation of inland wetlands with salt-tolerant vegetation in South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Feb 2015.



Co-author and data contributor to: SIEBEN, E. *et al.* The herbaceous vegetation of subtropical freshwater wetlands in South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Feb 2015.

Co-author and data contributor to: SIEBEN, E. *et al.* The vegetation of grass lawn wetlands of floodplains and pans in semi-arid regions of South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Jan 2015.

Co-author of several vegetation descriptions in: MUCINA, L. & RUTHERFORD, M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

VENTER, C.E. & BREDEKAMP, G.J. In prep. Major plant communities on the Mfabeni swamp, St Lucia. *Bothalia*.

VENTER, C.E.; BREDEKAMP, G.J. & GRUNDLING, P-L. 2003. Plant community types, and their association with habitat factors as ecosystem driving forces, of Mfabeni swamp. Proceedings of the congress: *Environment of the St Lucia Wetland: Processes of Change*, Cape Vidal, September 4th- 7th, 2003.

VENTER, C.E.; BREDEKAMP, G.J.; GRUNDLING P-L. 2002. Vegetation change on rehabilitated peatland on Rietvlei Nature Reserve. *Kudu* 46(1):53-63.

PRESENTATIONS

Venter, C.E.; Bredenkamp, G.J. & Grundling, P-L. 2003. Plant community types, and their association with habitat factors as ecosystem driving forces, of Mfabeni Swamp. *Environment of the St Lucia Wetland: Processes of Change*, Cape Vidal, September 4th- 7th, 2003.

Poster Presentations

Venter, C.E.; Bredenkamp, G.J.; Grundling P-L. 2002. Baseline vegetation surveys of rehabilitated peatland on Rietvlei Nature Reserve. SAAB Convergence. Grahamstown.

Venter, C.E.; Bredenkamp, G.J.; Grundling P-L. 2003. Vegetation change on rehabilitated peatland on Rietvlei Nature Reserve. SAAB Convergence. Pretoria.



Addendum B – Declaration of Independence

Specialist:	Ina Venter, trading as Kyllinga Consulting		
Nature of specialist study compiled:	Wetland Assessment		
Contact person:	Ina Venter		
Postal address:	53 Oakley street, Rayton		
Postal code:	1001	Cell:	083 370 0850
Telephone:	012 734 5642	Fax:	
E-mail:	i.venter@telkomsa.net		
Qualifications relevant experience:	& M.Sc. Botany		
Professional affiliation(s) (if any)	South African National Association of Scientific Professions		



I, CE Venter (Ina) , declare that -

General declaration:

- 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 will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of specialist:

Ina Venter, trading as Kyllinga Consulting

Name of company:

30 October 2015

Date:



Addendum C – Mammal species observed in the area (ADU database)

Family	Species	Common name	Red list category	Atlas region endemic
Bovidae	<i>Aepyceros melampus</i>	Impala	Least Concern	Yes
Bovidae	<i>Antidorcas marsupialis</i>	Springbok	Least Concern	Yes
Bovidae	<i>Cephalophus natalensis</i>	Red Duiker	Least Concern	Yes
Bovidae	<i>Connochaetes taurinus subsp. taurinus</i>		Least Concern	
Bovidae	<i>Damaliscus pygargus subsp. phillipsi</i>	Blesbok	Least Concern	
Bovidae	<i>Kobus ellipsiprymnus subsp. ellipsiprymnus</i>		Least Concern	
Bovidae	<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern	Yes
Bovidae	<i>Philantomba monticola</i>	Blue Duiker	Vulnerable	Yes
Bovidae	<i>Raphicerus campestris</i>	Steenbok	Least Concern	Yes
Bovidae	<i>Redunca arundinum</i>	Southern Reedbuck	Least Concern	Yes
Bovidae	<i>Redunca fulvorufula</i>	Mountain Reedbuck	Least Concern	Yes
Bovidae	<i>Sylvicapra grimmia</i>	Bush Duiker	Least Concern	Yes
Bovidae	<i>Tragelaphus angasii</i>	Nyala	Least Concern	Yes
Bovidae	<i>Tragelaphus scriptus</i>	Bushbuck	Least Concern	Yes
Bovidae	<i>Tragelaphus strepsiceros</i>	Greater Kudu	Least Concern	Yes
Canidae	<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern	Yes
Equidae	<i>Equus quagga</i>	Plains Zebra	Not listed	Yes
Felidae	<i>Caracal caracal</i>	Caracal	Least Concern	Yes
Felidae	<i>Panthera pardus</i>	Leopard	Least Concern	Yes
Giraffidae	<i>Giraffa camelopardalis subsp. camelopardalis</i>	Nubian Giraffe	Least Concern	
Herpestidae	<i>Atilax paludinosus</i>	Marsh Mongoose	Least Concern	Yes
Herpestidae	<i>Ichneumia albicauda</i>	White-tailed Mongoose	Least Concern	Yes
Hyaenidae	<i>Crocuta crocuta</i>	Spotted Hyena	Near Threatened	Yes
Hyaenidae	<i>Proteles cristata</i>	Aardwolf	Least Concern	Yes
Muridae	<i>Aethomys ineptus</i>	Tete Veld Aethomys	Least Concern	Yes
Muridae	<i>Otomys angoniensis</i>	Angoni Vlei Rat	Least Concern	Yes
Orycteropodidae	<i>Orycteropus afer</i>	Aardvark	Least Concern	Yes
Suidae	<i>Phacochoerus africanus</i>	Common Wart-hog	Least Concern	Yes
Suidae	<i>Potamochoerus porcus</i>	Red River Hog	Not listed	Yes



Addendum D – Bird species observed in the area (SABAP2 database)

Common name	Taxon name	Regional Red List Status 2014	Regional Red List Status 2000
Sparrowhawk, Black	<i>Accipiter melanoleucus</i>	Not listed	Not listed
Sparrowhawk, Little	<i>Accipiter minullus</i>	Not listed	Not listed
Goshawk, African	<i>Accipiter tachiro</i>	Not listed	Not listed
Myna, Common	<i>Acridotheres tristis</i>	Not listed	Not listed
Reed-warbler, Great	<i>Acrocephalus arundinaceus</i>	Not listed	Not listed
Reed-warbler, African	<i>Acrocephalus baeticatus</i>	Not listed	Not listed
Swamp-warbler, Lesser	<i>Acrocephalus gracilirostris</i>	Not listed	Not listed
Sandpiper, Common	<i>Actitis hypoleucos</i>	Not listed	Not listed
Jacana, African	<i>Actophilornis africanus</i>	Not listed	Not listed
Kingfisher, Malachite	<i>Alcedo cristata</i>	Not listed	Not listed
Goose, Egyptian	<i>Alopochen aegyptiacus</i>	Not listed	Not listed
Weaver, Thick-billed	<i>Amblyospiza albifrons</i>	Not listed	Not listed
Greenbul, Sombre	<i>Andropadus importunus</i>	Not listed	Not listed
Pipit, Bushveld	<i>Anthus caffer</i>	Not listed	Not listed
Pipit, African	<i>Anthus cinnamomeus</i>	Not listed	Not listed
Pipit, Striped	<i>Anthus lineiventris</i>	Not listed	Not listed
Apalis, Yellow-breasted	<i>Apalis flavida</i>	Not listed	Not listed
Apalis, Rudd's	<i>Apalis ruddi</i>	Not listed	Not listed
Apalis, Bar-throated	<i>Apalis thoracica</i>	Not listed	Not listed
Trogon, Narina	<i>Apaloderma narina</i>	Not listed	Not listed
Swift, Little	<i>Apus affinis</i>	Not listed	Not listed
Swift, African Black	<i>Apus barbatus</i>	Not listed	Not listed
Swift, White-rumped	<i>Apus caffer</i>	Not listed	Not listed
Eagle, Tawny	<i>Aquila rapax</i>	Endangered	Vulnerable
Hawk-eagle, African	<i>Aquila spilogaster</i>	Not listed	Not listed
Eagle, Wahlberg's	<i>Aquila wahlbergi</i>	Not listed	Not listed
Heron, Grey	<i>Ardea cinerea</i>	Not listed	Not listed
Heron, Goliath	<i>Ardea goliath</i>	Not listed	Not listed
Heron, Black-headed	<i>Ardea melanocephala</i>	Not listed	Not listed
Hawk, African Cuckoo	<i>Aviceda cuculoides</i>	Not listed	Not listed
Batis, Cape	<i>Batis capensis</i>	Not listed	Not listed
Batis, Chinspot	<i>Batis molitor</i>	Not listed	Not listed
Ibis, Hadedda	<i>Bostrychia hagedash</i>	Not listed	Not listed
Flycatcher, Pale	<i>Bradornis pallidus</i>	Not listed	Not listed
Egret, Cattle	<i>Bubulcus ibis</i>	Not listed	Not listed
Ground-hornbill, Southern	<i>Bucorvus leadbeateri</i>	Endangered	Vulnerable
Oxpecker, Red-billed	<i>Buphagus erythrorhynchus</i>	Not listed	Not listed
Thick-knee, Spotted	<i>Burhinus capensis</i>	Not listed	Not listed
Thick-knee, Water	<i>Burhinus vermiculatus</i>	Not listed	Not listed
Buzzard, Jackal	<i>Buteo rufofuscus</i>	Not listed	Not listed
Buzzard, Steppe	<i>Buteo vulpinus</i>	Not listed	Not listed
Heron, Green-backed	<i>Butorides striata</i>	Not listed	Not listed
Hornbill, Trumpeter	<i>Bycanistes bucinator</i>	Not listed	Not listed
Lark, Sabota	<i>Calendulauda sabota</i>	Not listed	Not listed
Camaropectera, Green-backed	<i>Camaropectera brachyura</i>	Not listed	Not listed



Cuckoo-shrike, Black	<i>Campephaga flava</i>	Not listed	Not listed
Woodpecker, Golden-tailed	<i>Campethera abingoni</i>	Not listed	Not listed
Nightjar, Fiery-necked	<i>Caprimulgus pectoralis</i>	Not listed	Not listed
Coucal, Burchell's	<i>Centropus burchellii</i>	Not listed	Not listed
Chat, Familiar	<i>Cercomela familiaris</i>	Not listed	Not listed
Scrub-robin, White-browed	<i>Cercotrichas leucophrys</i>	Not listed	Not listed
Scrub-robin, Brown	<i>Cercotrichas signata</i>	Not listed	Not listed
Kingfisher, Pied	<i>Ceryle rudis</i>	Not listed	Not listed
Sunbird, Amethyst	<i>Chalcomitra amethystina</i>	Not listed	Not listed
Sunbird, Scarlet-chested	<i>Chalcomitra senegalensis</i>	Not listed	Not listed
Plover, Common Ringed	<i>Charadrius hiaticula</i>	Not listed	Not listed
Plover, Three-banded	<i>Charadrius tricollaris</i>	Not listed	Not listed
Greenbul, Yellow-bellied	<i>Chlorocichla flaviventris</i>	Not listed	Not listed
Cuckoo, Diderick	<i>Chrysococcyx caprius</i>	Not listed	Not listed
Cuckoo, African Emerald	<i>Chrysococcyx cupreus</i>	Not listed	Not listed
Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>	Not listed	Not listed
Stork, White	<i>Ciconia ciconia</i>	Not listed	Not listed
Stork, Woolly-necked	<i>Ciconia episcopus</i>	Not listed	Not listed
Starling, Violet-backed	<i>Cinnyricinclus leucogaster</i>	Not listed	Not listed
Sunbird, Purple-banded	<i>Cinnyris bifasciatus</i>	Not listed	Not listed
Sunbird, Marico	<i>Cinnyris mariquensis</i>	Not listed	Not listed
Sunbird, White-bellied	<i>Cinnyris talatala</i>	Not listed	Not listed
Snake-eagle, Brown	<i>Circaetus cinereus</i>	Not listed	Not listed
Snake-eagle, Black-chested	<i>Circaetus pectoralis</i>	Not listed	Not listed
Cisticola, Rattling	<i>Cisticola chiniana</i>	Not listed	Not listed
Cisticola, Red-faced	<i>Cisticola erythropis</i>	Not listed	Not listed
Neddicky, Neddicky	<i>Cisticola fulvicapilla</i>	Not listed	Not listed
Cisticola, Rufous-winged	<i>Cisticola galactotes</i>	Not listed	Not listed
Cisticola, Zitting	<i>Cisticola juncidis</i>	Not listed	Not listed
Cisticola, Croaking	<i>Cisticola natalensis</i>	Not listed	Not listed
Cuckoo, Jacobin	<i>Clamator jacobinus</i>	Not listed	Not listed
Mousebird, Speckled	<i>Colius striatus</i>	Not listed	Not listed
Olive-pigeon, African	<i>Columba arquatrix</i>	Not listed	Not listed
Pigeon, Speckled	<i>Columba guinea</i>	Not listed	Not listed
Dove, Rock	<i>Columba livia</i>	Not listed	Not listed
Roller, Lilac-breasted	<i>Coracias caudatus</i>	Not listed	Not listed
Roller, European	<i>Coracias garrulus</i>	Near Threatened	Least Concern
Raven, White-necked	<i>Corvus albicollis</i>	Not listed	Not listed
Crow, Pied	<i>Corvus albus</i>	Not listed	Not listed
Crow, Cape	<i>Corvus capensis</i>	Not listed	Not listed
Robin-chat, Cape	<i>Cossypha caffra</i>	Not listed	Not listed
Robin-chat, White-browed	<i>Cossypha heuglini</i>	Not listed	Not listed
Robin-chat, White-throated	<i>Cossypha humeralis</i>	Not listed	Not listed
Robin-chat, Red-capped	<i>Cossypha natalensis</i>	Not listed	Not listed
Quail, Common	<i>Coturnix coturnix</i>	Not listed	Not listed
Starling, Wattled	<i>Creatophora cinerea</i>	Not listed	Not listed
Seed-eater, Streaky-headed	<i>Crithagra gularis</i>	Not listed	Not listed
Canary, Yellow-fronted	<i>Crithagra mozambicus</i>	Not listed	Not listed
Canary, Brimstone	<i>Crithagra sulphuratus</i>	Not listed	Not listed



Cuckoo, Black	<i>Cuculus clamosus</i>	Not listed	Not listed
Cuckoo, Red-chested	<i>Cuculus solitarius</i>	Not listed	Not listed
Courser, Temminck's	<i>Cursorius temminckii</i>	Not listed	Not listed
Sunbird, Olive	<i>Cyanomitra olivacea</i>	Not listed	Not listed
Sunbird, Grey	<i>Cyanomitra veroxii</i>	Not listed	Not listed
Palm-swift, African	<i>Cypsiurus parvus</i>	Not listed	Not listed
Duck, White-faced	<i>Dendrocygna viduata</i>	Not listed	Not listed
Francolin, Crested	<i>Dendroperdix sephaena</i>	Not listed	Not listed
Woodpecker, Cardinal	<i>Dendropicos fuscescens</i>	Not listed	Not listed
Woodpecker, Olive	<i>Dendropicos griseocephalus</i>	Not listed	Not listed
Woodpecker, Bearded	<i>Dendropicos namaquus</i>	Not listed	Not listed
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>	Not listed	Not listed
Drongo, Square-tailed	<i>Dicrurus ludwigii</i>	Not listed	Not listed
Puffback, Black-backed	<i>Dryoscopus cubla</i>	Not listed	Not listed
Egret, Great	<i>Egretta alba</i>	Not listed	Not listed
Egret, Little	<i>Egretta garzetta</i>	Not listed	Not listed
Kite, Black-shouldered	<i>Elanus caeruleus</i>	Not listed	Not listed
Bunting, Golden-breasted	<i>Emberiza flaviventris</i>	Not listed	Not listed
Bunting, Cinnamon-breasted	<i>Emberiza tahapisi</i>	Not listed	Not listed
Eremomela, Yellow-bellied	<i>Eremomela icteropygialis</i>	Not listed	Not listed
Eremomela, Burnt-necked	<i>Eremomela usticollis</i>	Not listed	Not listed
Waxbill, Common	<i>Estrilda astrild</i>	Not listed	Not listed
Widowbird, White-winged	<i>Euplectes albonotatus</i>	Not listed	Not listed
Widowbird, Red-collared	<i>Euplectes ardens</i>	Not listed	Not listed
Widowbird, Fan-tailed	<i>Euplectes axillaris</i>	Not listed	Not listed
Bishop, Southern Red	<i>Euplectes orix</i>	Not listed	Not listed
Falcon, Amur	<i>Falco amurensis</i>	Not listed	Not listed
Falcon, Lanner	<i>Falco biarmicus</i>	Vulnerable	Near Threatened
Kestrel, Rock	<i>Falco rupicolus</i>	Not listed	Not listed
Turaco, Purple-crested	<i>Gallirex porphyreolophus</i>	Not listed	Not listed
Ibis, Southern Bald	<i>Geronticus calvus</i>	Vulnerable	Vulnerable
Guineafowl, Crested	<i>Guttera edouardi</i>	Not listed	Not listed
Vulture, White-backed	<i>Gyps africanus</i>	Endangered	Vulnerable
Vulture, Cape	<i>Gyps coprotheres</i>	Endangered	Vulnerable
Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>	Not listed	Not listed
Kingfisher, Striped	<i>Halcyon chelicuti</i>	Not listed	Not listed
Fish-eagle, African	<i>Haliaeetus vocifer</i>	Not listed	Not listed
Sunbird, Collared	<i>Hedydipna collaris</i>	Not listed	Not listed
Warbler, Icterine	<i>Hippolais icterina</i>	Not listed	Not listed
Swallow, Lesser Striped	<i>Hirundo abyssinica</i>	Not listed	Not listed
Swallow, White-throated	<i>Hirundo albigularis</i>	Not listed	Not listed
Swallow, Greater Striped	<i>Hirundo cucullata</i>	Not listed	Not listed
Martin, Rock	<i>Hirundo fuligula</i>	Not listed	Not listed
Swallow, Barn	<i>Hirundo rustica</i>	Not listed	Not listed
Swallow, Red-breasted	<i>Hirundo semirufa</i>	Not listed	Not listed
Swallow, Wire-tailed	<i>Hirundo smithii</i>	Not listed	Not listed
Honeyguide, Greater	<i>Indicator indicator</i>	Not listed	Not listed
Honeyguide, Lesser	<i>Indicator minor</i>	Not listed	Not listed
Honeyguide, Scaly-throated	<i>Indicator variegatus</i>	Not listed	Not listed
Pygmy-Kingfisher, African	<i>Ispidina picta</i>	Not listed	Not listed



Wryneck, Red-throated	<i>Jynx ruficollis</i>	Not listed	Not listed
Buzzard, Lizard	<i>Kaupifalco monogrammicus</i>	Not listed	Not listed
Firefinch, African	<i>Lagonosticta rubricata</i>	Not listed	Not listed
Firefinch, Red-billed	<i>Lagonosticta senegala</i>	Not listed	Not listed
Starling, Black-bellied	<i>Lamprotornis corruscus</i>	Not listed	Not listed
Starling, Cape Glossy	<i>Lamprotornis nitens</i>	Not listed	Not listed
Boubou, Southern	<i>Laniarius ferrugineus</i>	Not listed	Not listed
Fiscal, Common (Southern)	<i>Lanius collaris</i>	Not listed	Not listed
Shrike, Red-backed	<i>Lanius collurio</i>	Not listed	Not listed
Shrike, Lesser Grey	<i>Lanius minor</i>	Not listed	Not listed
Bustard, Black-bellied	<i>Lissotis melanogaster</i>	Near Threatened	Near Threatened
Eagle, Long-crested	<i>Lophaetus occipitalis</i>	Not listed	Not listed
Barbet, Black-collared	<i>Lybius torquatus</i>	Not listed	Not listed
Longclaw, Cape	<i>Macronyx capensis</i>	Not listed	Not listed
Longclaw, Yellow-throated	<i>Macronyx croceus</i>	Not listed	Not listed
Bush-shrike, Grey-headed	<i>Malaconotus blanchoti</i>	Not listed	Not listed
Flycatcher, Southern Black	<i>Melaenornis pammelaina</i>	Not listed	Not listed
Goshawk, Gabar	<i>Melierax gabar</i>	Not listed	Not listed
Bee-eater, European	<i>Merops apiaster</i>	Not listed	Not listed
Bee-eater, White-fronted	<i>Merops bullockoides</i>	Not listed	Not listed
Bee-eater, Little	<i>Merops pusillus</i>	Not listed	Not listed
Kite, Yellow-billed	<i>Milvus aegyptius</i>	Not listed	Not listed
Kite, Black & Yellow-billed	<i>Milvus migrans</i>	Not listed	Not listed
Lark, Rufous-naped	<i>Mirafra africana</i>	Not listed	Not listed
Lark, Flappet	<i>Mirafra rufocinnamomea</i>	Not listed	Not listed
Wagtail, African Pied	<i>Motacilla aguimp</i>	Not listed	Not listed
Wagtail, Cape	<i>Motacilla capensis</i>	Not listed	Not listed
Flycatcher, African Dusky	<i>Muscicapa adusta</i>	Not listed	Not listed
Flycatcher, Ashy	<i>Muscicapa caerulescens</i>	Not listed	Not listed
Flycatcher, Spotted	<i>Muscicapa striata</i>	Not listed	Not listed
Stork, Yellow-billed	<i>Mycteria ibis</i>	Endangered	Near Threatened
Tit-flycatcher, Grey	<i>Myioparus plumbeus</i>	Not listed	Not listed
Nicator, Eastern	<i>Nicator gularis</i>	Not listed	Not listed
Brubru, Brubru	<i>Nilaus afer</i>	Not listed	Not listed
Guineafowl, Helmeted	<i>Numida meleagris</i>	Not listed	Not listed
Dove, Namaqua	<i>Oena capensis</i>	Not listed	Not listed
Starling, Red-winged	<i>Onychognathus morio</i>	Not listed	Not listed
Oriole, Black-headed	<i>Oriolus larvatus</i>	Not listed	Not listed
Quailfinch, African	<i>Ortygospiza atricollis</i>	Not listed	Not listed
Scops-owl, African	<i>Otus senegalensis</i>	Not listed	Not listed
Tit, Southern Black	<i>Parus niger</i>	Not listed	Not listed
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>	Not listed	Not listed
Sparrow, House	<i>Passer domesticus</i>	Not listed	Not listed
Sparrow, Cape	<i>Passer melanurus</i>	Not listed	Not listed
Petronia, Yellow-throated	<i>Petronia superciliaris</i>	Not listed	Not listed
Cormorant, Reed	<i>Phalacrocorax africanus</i>	Not listed	Not listed
Cormorant, White-breasted	<i>Phalacrocorax carbo</i>	Not listed	Not listed
Wood-hoopoe, Green	<i>Phoeniculus purpureus</i>	Not listed	Not listed



Brownbul, Terrestrial	<i>Phyllastrephus terrestris</i>	Not listed	Not listed
Warbler, Willow	<i>Phylloscopus trochilus</i>	Not listed	Not listed
Spoonbill, African	<i>Platalea alba</i>	Not listed	Not listed
Goose, Spur-winged	<i>Plectropterus gambensis</i>	Not listed	Not listed
Ibis, Glossy	<i>Plegadis falcinellus</i>	Not listed	Not listed
Weaver, Dark-backed	<i>Ploceus bicolor</i>	Not listed	Not listed
Weaver, Cape	<i>Ploceus capensis</i>	Not listed	Not listed
Weaver, Village	<i>Ploceus cucullatus</i>	Not listed	Not listed
Masked-weaver, Lesser	<i>Ploceus intermedius</i>	Not listed	Not listed
Weaver, Spectacled	<i>Ploceus ocularis</i>	Not listed	Not listed
Weaver, Yellow	<i>Ploceus subaureus</i>	Not listed	Not listed
Masked-weaver, Southern	<i>Ploceus velatus</i>	Not listed	Not listed
Tinkerbird, Yellow-rumped	<i>Pogoniulus bilineatus</i>	Not listed	Not listed
Tinkerbird, Red-fronted	<i>Pogoniulus pusillus</i>	Not listed	Not listed
Eagle, Martial	<i>Polemaetus bellicosus</i>	Endangered	Vulnerable
Harrier-Hawk, African	<i>Polyboroides typus</i>	Not listed	Not listed
Prinia, Tawny-flanked	<i>Prinia subflava</i>	Not listed	Not listed
Helmet-shrike, White-crested	<i>Prionops plumatus</i>	Not listed	Not listed
Honeybird, Brown-backed	<i>Prodotiscus regulus</i>	Not listed	Not listed
Saw-wing, Black (Southern race)	<i>Psaldiprocne holomelaena</i>	Not listed	Not listed
Thrush, Groundscraper	<i>Psophocichla litsipsirupa</i>	Not listed	Not listed
Spurfowl, Natal	<i>Pternistis natalensis</i>	Not listed	Not listed
Bulbul, Dark-capped	<i>Pycnonotus tricolor</i>	Not listed	Not listed
Pytilia, Green-winged	<i>Pytilia melba</i>	Not listed	Not listed
Quelea, Red-headed	<i>Quelea erythrops</i>	Not listed	Not listed
Quelea, Red-billed	<i>Quelea quelea</i>	Not listed	Not listed
Scimitarbill, Common	<i>Rhinopomastus cyanomelas</i>	Not listed	Not listed
Courser, Bronze-winged	<i>Rhinoptilus chalcopterus</i>	Not listed	Not listed
Martin, Brown-throated	<i>Riparia paludicola</i>	Not listed	Not listed
Secretarybird, Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable	Near Threatened
Stonechat, African	<i>Saxicola torquatus</i>	Not listed	Not listed
Hamerkop, Hamerkop	<i>Scopus umbretta</i>	Not listed	Not listed
Flycatcher, Fiscal	<i>Sigelus silens</i>	Not listed	Not listed
Mannikin, Bronze	<i>Spermestes cucullatus</i>	Not listed	Not listed
Barbet, White-eared	<i>Stactolaema leucotis</i>	Not listed	Not listed
Eagle, African Crowned	<i>Stephanoaetus coronatus</i>	Vulnerable	Near Threatened
Turtle-dove, Cape	<i>Streptopelia capicola</i>	Not listed	Not listed
Dove, Red-eyed	<i>Streptopelia semitorquata</i>	Not listed	Not listed
Dove, Laughing	<i>Streptopelia senegalensis</i>	Not listed	Not listed
Crombec, Long-billed	<i>Sylvietta rufescens</i>	Not listed	Not listed
Tchagra, Brown-crowned	<i>Tchagra australis</i>	Not listed	Not listed
Tchagra, Black-crowned	<i>Tchagra senegalus</i>	Not listed	Not listed
Bush-shrike, Gorgeous	<i>Telophorus quadricolor</i>	Not listed	Not listed
Bush-shrike, Orange-breasted	<i>Telophorus sulfureopectus</i>	Not listed	Not listed
Bokmakierie, Bokmakierie	<i>Telophorus zeylonus</i>	Not listed	Not listed
Bateleur, Bateleur	<i>Terathopius ecaudatus</i>	Endangered	Vulnerable
Paradise-flycatcher, African	<i>Terpsiphone viridis</i>	Not listed	Not listed
Cliff-chat, Mocking	<i>Thamnolaea cinnamomeiventris</i>	Not listed	Not listed



Ibis, African Sacred	<i>Threskiornis aethiopicus</i>	Not listed	Not listed
Hornbill, Crowned	<i>Tockus alboterminatus</i>	Not listed	Not listed
Hornbill, Red-billed	<i>Tockus erythrorhynchus</i>	Not listed	Not listed
Hornbill, Southern Yellow-billed	<i>Tockus leucomelas</i>	Not listed	Not listed
Vulture, Lappet-faced	<i>Torgos tracheliotus</i>	Not listed	Not listed
Barbet, Crested	<i>Trachyphonus vaillantii</i>	Not listed	Not listed
Green-pigeon, African	<i>Treron calvus</i>	Not listed	Not listed
Barbet, Acacia Pied	<i>Tricholaema leucomelas</i>	Not listed	Not listed
Vulture, White-headed	<i>Trigonoceps occipitalis</i>	Not listed	Not listed
Sandpiper, Wood	<i>Tringa glareola</i>	Not listed	Not listed
Greenshank, Common	<i>Tringa nebularia</i>	Not listed	Not listed
Sandpiper, Marsh	<i>Tringa stagnatilis</i>	Not listed	Not listed
Babbler, Arrow-marked	<i>Turdoides jardineii</i>	Not listed	Not listed
Thrush, Kurrichane	<i>Turdus libyanus</i>	Not listed	Not listed
Buttonquail, Kurrichane	<i>Turnix sylvaticus</i>	Not listed	Not listed
Wood-dove, Emerald-spotted	<i>Turtur chalcospilus</i>	Not listed	Not listed
Dove, Tambourine	<i>Turtur tympanistria</i>	Not listed	Not listed
Hoopoe, African	<i>Upupa africana</i>	Not listed	Not listed
Waxbill, Blue	<i>Uraeginthus angolensis</i>	Not listed	Not listed
Mousebird, Red-faced	<i>Urocolius indicus</i>	Not listed	Not listed
Lapwing, Blacksmith	<i>Vanellus armatus</i>	Not listed	Not listed
Lapwing, Crowned	<i>Vanellus coronatus</i>	Not listed	Not listed
Lapwing, Black-winged	<i>Vanellus melanopterus</i>	Not listed	Not listed
Lapwing, African Wattled	<i>Vanellus senegallus</i>	Not listed	Not listed
Indigobird, Village	<i>Vidua chalybeata</i>	Not listed	Not listed
Indigobird, Dusky	<i>Vidua funerea</i>	Not listed	Not listed
Whydah, Pin-tailed	<i>Vidua macroura</i>	Not listed	Not listed
Paradise-whydah, Long-tailed	<i>Vidua paradisaea</i>	Not listed	Not listed
White-eye, Cape	<i>Zosterops virens</i>	Not listed	Not listed



Addendum E – Herpetofauna species observed in the area (ADU database)

Reptiles

Family	Species	Common name	Red list category	Atlas region endemic
Agamidae	<i>Agama aculeata subsp. distanti</i>	Distant's Ground Agama	Least Concern (SARCA 2014)	Yes
Cordylidae	<i>Pseudocordylus melanotus subsp. melanotus</i>	Common Crag Lizard	Least Concern (SARCA 2014)	Yes
Pythonidae	<i>Python natalensis</i>	Southern African Python	Least Concern (SARCA 2014)	
Scincidae	<i>Trachylepis punctatissima</i>	Speckled Rock Skink	Least Concern (SARCA 2014)	
Scincidae	<i>Trachylepis varia</i>	Variable Skink	Least Concern (SARCA 2014)	

Frogs

Family	Species	Common name	Red list category
Bufoidea	<i>Amietophrynus gutturalis</i>	Guttural Toad	Least Concern
Hyperoliidae	<i>Hyperolius marmoratus</i>	Painted Reed Frog	Least Concern
Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina	Least Concern
Phrynobatrachidae	<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	Least Concern
Ptychadenidae	<i>Ptychadena oxyrhynchus</i>	Sharpnosed Grass Frog	Least Concern
Pyxicephalidae	<i>Amietia fuscigula</i>	Cape River Frog	Least Concern
Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	Least Concern
Pyxicephalidae	<i>Tomopterna natalensis</i>	Natal Sand Frog	Least Concern



Addendum F – Butterfly species observed in the area (ADU database)

Family	Species	Common name	Red list category	Atlas region endemic
HESPERIIDAE	<i>Coeliades pistratus</i>	Two-pip policeman	Least Concern (SABCA 2013)	
HESPERIIDAE	<i>Metisella metis subsp. paris</i>	Gold-spotted sylph	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Azanus natalensis</i>	Natal babul blue	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Cacyreus marshalli</i>	Common geranium bronze	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Chilades trochylus</i>	Grass jewel	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Cigaritis natalensis</i>	Natal bar	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Crudaria leroma</i>	Silver spotted grey	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Cupidopsis cissus subsp. cissus</i>	Common meadow blue	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Durbania limbata</i>	Natal rocksitter	Least Concern (SABCA 2013)	Yes
LYCAENIDAE	<i>Eicochrysops messapus subsp. mahallakoena</i>	Cupreous blue	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Euchrysops malathana</i>	Common smoky blue	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Lachnocnema durbani</i>	D'Urban's woolly legs	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Lepidochrysops asteris</i>	Brilliant blue	Least Concern (SABCA 2013)	Yes
LYCAENIDAE	<i>Myrina silenus subsp. ficedula</i>	Common fig tree blue	Least Concern (SABCA 2013)	
LYCAENIDAE	<i>Orachrysops subravus</i>	Grizzled blue	Least Concern (SABCA 2013)	Yes
LYCAENIDAE	<i>Zizeeria knysna subsp. knysna</i>	African grass blue	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Acraea nohara subsp. nohara</i>	Light red acraea	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Byblia ithyia</i>	Spotted joker	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Cassionympha cassius</i>	Rainforest brown	Least Concern (SABCA 2013)	Yes
NYMPHALIDAE	<i>Catacroptera cloanthe subsp. cloanthe</i>	Pirate	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Danaus chrysippus subsp. orientis</i>	African monarch, Plain tiger	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Hamanumida daedalus</i>	Guinea-fowl butterfly	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Junonia hierta subsp. cebrene</i>	Yellow pansy	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Junonia orithya subsp. madagascariensis</i>	Eyed pansy	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Precis archesia subsp. archesia</i>	Garden commodore	Least Concern (SABCA 2013)	
NYMPHALIDAE	<i>Precis ceryne subsp. ceryne</i>	Marsh commodore	Least Concern (SABCA 2013)	



NYMPHALIDAE	<i>Precis octavia subsp. sesamus</i>	Gaudy Commodore	Least Concern (SABCA 2013)	
PIERIDAE	<i>Afrodryas leda</i>	Autumn leaf vagrant	Least Concern (SABCA 2013)	
PIERIDAE	<i>Colotis euipe subsp. omphale</i>	Smoky orange tip	Least Concern (LC)	
PIERIDAE	<i>Eurema brigitta subsp. brigitta</i>	Broad-bordered grass yellow	Least Concern (SABCA 2013)	