

larger threat to the natural biodiversity of a region is represented by the influx of invasive exotic species that can effectively sterilise large tracts of remaining natural habitat.

The study area is situated within the Lekwa Municipality, which comprises a total of 458,519ha. The BGIS (2007) assessment indicates that approximately 63.8% of the municipality are currently considered untransformed. This figure is however regarded an overestimation of the true extent of remaining natural (pristine) grassland habitat in the region. This statement is based on the following:

- The current land cover, as presented in ENPAT does not accurately reflect the current land cover status in all instances; in particular, recent agricultural activities and localised stands of exotics are not captured within the existing data (pers. obs.); and
- It is well established that the status of much of the remaining portions of 'natural grassland' is not accurately summarized in the assessment. These 'natural grasslands' frequently comprehend poor quality grassland or even pastures that exhibit severely altered species compositions and depleted diversity that does not reflect the natural grassland of the region (pers. obs.).

By inclusion of portions of land cover categories that do not reflect the natural status of the ecological environment, with particular reference to sub-climax grassland types, in the category of 'Natural Grassland' a fallacious view is created of the extent of remaining natural habitat in the region. It is therefore extremely likely that remaining untransformed habitat within the municipality is much lower than initially anticipated. Ultimately, the greater region is characterised by high levels of habitat transformation, isolation and habitat fragmentation, resulting from persistent increases in mining and agricultural activities, urban developments, linear infrastructure and poor management practices.

Severity of impacts that commercial agriculture (maize production) has had on the natural environment are evident from the mosaical appearance of land cover in the immediate region. Limited natural habitat remains within the greater area, reflecting similar trends on a municipality and provincial level. These pockets of natural grassland are in a relative advanced state of fragmentation and habitat isolation and connectivity in some parts are low. Other limited land transformation effects result from industrial and urban development. Road and railway infrastructure in the region caused a high degree of habitat fragmentation and isolation.

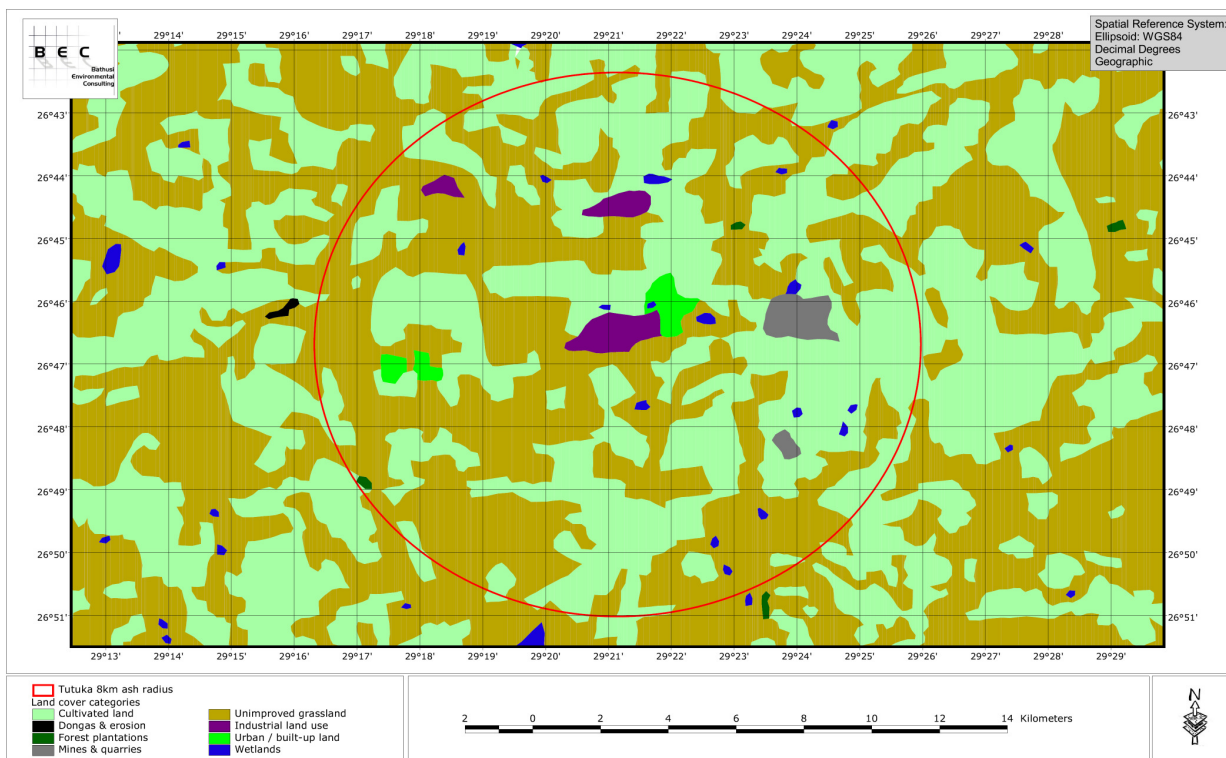


Figure 6.9: Land cover categories for the study area

6.3.5 Land Type

The existing ash disposal facility is situated within the Ea17 land type unit (Figure 6.10). E land type units indicate land with a high base status, dark coloured and/ or red soils, usually clayey, associated with basic parent materials. A land type more than half of which is covered by soil forms with vertic, melanic and red structured diagnostic horizons qualifies for inclusion in unit Ea, provided that it does not qualify for inclusion in units A, B or C. Land types in which these soils cover less than half of the area may also qualify for inclusion (i) where duplex soils occur in the non-rock land but where unit Ea soils cover a larger area than the duplex soils, or (ii) where exposed rock cores more than half the land type.



Figure 6.10: Land type units with the study area

6.3.6 Natural Vegetation

- **Regional Vegetation - VEGMAP**

The study site corresponds to the Grassland Biome as defined by Mucina & Rutherford (VegMap, 2006). This unit is found in the eastern, precipitation-rich regions of the Highveld. Grasslands of these parts are regarded 'sour grasslands'. The vegetation of the study area corresponds to an ecological type known as Soweto Highveld Grassland.

- *Soweto Highveld Grassland*

The Soweto Highveld Grassland comprises a gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. Only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover in undisturbed areas. This vegetation type is regarded '**Endangered**' with a target of 24%. Only a handful of patches are statutorily conserved, including Wadrift, Krugersdorp, Leeuwkuil, Suikerboschrand and Rolfe's Pan Nature Reserve. Almost half of the area is already transformed by cultivation, urban sprawl, mining and building of road infrastructure. Some areas have been flooded by dams (Grootdraai, Leeuwkuil, Trichardtsfontein, Vaal, Willem Brummer). Erosion is generally very low.

- **MBCP Categories**

The local and regional designation of Mpumalanga Terrestrial Biodiversity Conservation Categories (MBCP) is illustrated in **Figure 6.11**.

The mandate for conserving biodiversity lies with state agencies at national, provincial and local levels of government, forming part of a wider responsibility for the environment and the sustainable use of natural resources. Constitutional and national laws require these environmental issues to be dealt with in cooperative, participatory, transparent and integrated ways. The MBCP is the first spatial biodiversity plan for Mpumalanga that is based on scientifically determined and quantified biodiversity objectives. The purpose of the MBCP is to contribute to sustainable development in Mpumalanga.

The MBCP maps the distribution of Mpumalanga Province's known biodiversity into seven categories (Lötter & Ferrar, 2006). These are ranked according to ecological and biodiversity importance and their contribution to meeting the quantitative targets set for each biodiversity feature. The categories are:

- **Protected areas** - already protected and managed for conservation;
- **Irreplaceable areas** - no other options available to meet targets--protection crucial;

- **Highly Significant areas** - protection needed, very limited choice for meeting targets;
- **Important and Necessary areas** - protection needed, greater choice in meeting targets;
- **Ecological Corridors** – mixed natural and transformed areas, identified for long term connectivity and biological movement;
- **Areas of Least Concern** – natural areas with most choices, including for development;
- **Areas with No Natural Habitat Remaining** – transformed areas that do not contribute to meeting targets.

The study area comprises four of these categories (**Figure 6.11**), namely:

- Highly Significant (red);
- Important & Necessary (green);
- No Natural Habitat Remaining (grey); and
- Least Concern (yellow).

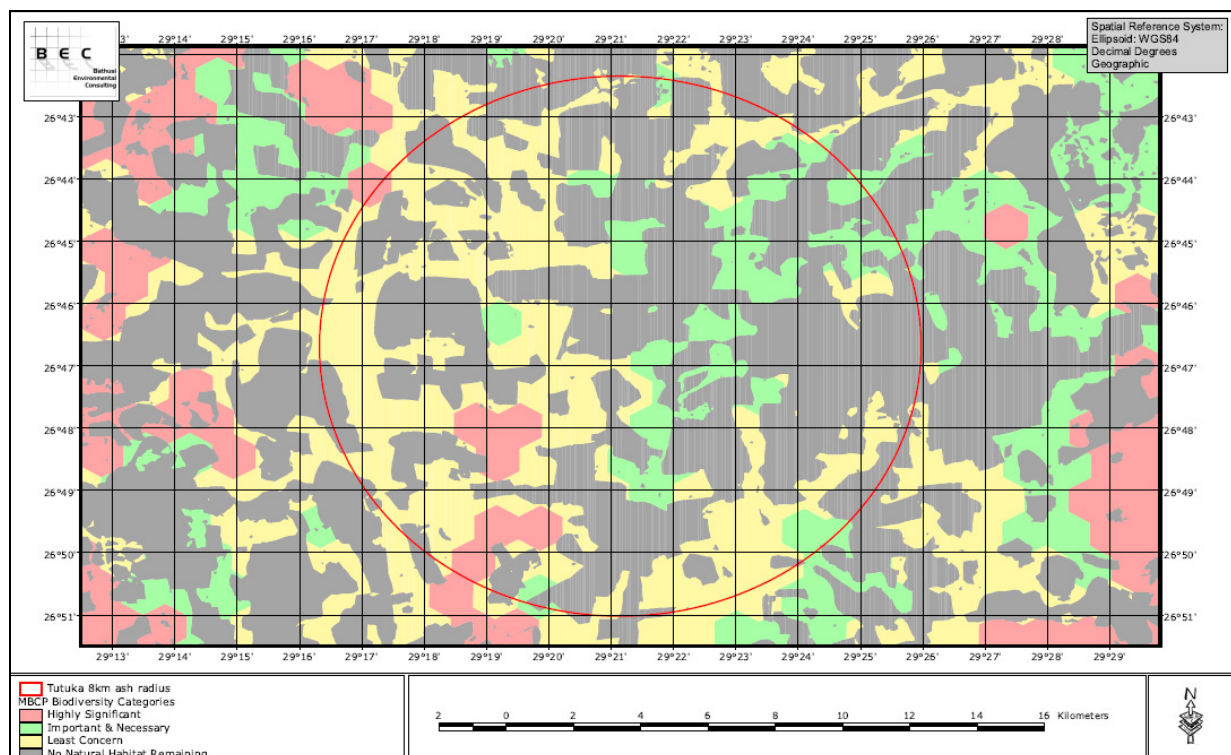


Figure 6.11: The MBCP categories as they relate to the study area.

- **Species of Conservation Importance**

South Africa's Red List system is based on the IUCN Red List Categories and Criteria Version 3.1 (finalized in 2001), amended to include additional categories to indicate species that are of local conservation concern. The IUCN Red List system is designed to detect risk of extinction. Species that are at risk of extinction, also known as threatened or endangered species are those that are classified in the categories Critically Endangered

(CR), Endangered (EN) and Vulnerable (VU). Taking the habitat that is available as well as the status thereof into consideration, it is regarded likely that plant species included in the Threatened category might be present within the study areas.

Mpumalanga Province comprises 4,256 plant species of which 276 are included in the following conservation categories:

- 1 Extinct;
- 2 Critically Rare;
- 30 Endangered;
- 80 Vulnerable;
- 36 Near Threatened;
- 47 Rare;
- 25 Declining;
- 19 Data Deficient – insufficient information (DDD); and
- 36 Data Deficient – taxonomical problem (DDT).

Data records indicate the presence of only two plant species of conservation importance within the ¼-degree grids that are sympatric to the study area, including.

- *Drimia elata* (Data Deficient); and
- *Cineraria austrotransvaalensis* (Near Threatened).

In addition to the species currently captured in the SANBI infobase (POSA, 2011), the following provincially protected plants are known to occur within the region of the study area (Mpumalanga Nature Conservation Act No.10 of 1998) (**Table 6.3**).

Table 6.3: Protected plant species within the region of the study area

| Species Name | Family | Status |
|---|----------------|------------------------|
| <i>Eucomis autumnalis</i> subsp. <i>clavata</i> | Hyacinthaceae | Provincially protected |
| <i>Eulophia ovalis</i> var. <i>ovalis</i> | Orchidaceae | Provincially protected |
| <i>Gladiolus dalenii</i> subsp. <i>dalenii</i> | Iridaceae | Provincially protected |
| <i>Gladiolus elliotii</i> | Iridaceae | Provincially protected |
| <i>Gladiolus longicollis</i> subsp. <i>platypetalus</i> | Iridaceae | Provincially protected |
| <i>Haemanthus humilis</i> subsp. <i>hirsutus</i> | Amaryllidaceae | Provincially protected |
| <i>Haemanthus montanus</i> | Amaryllidaceae | Provincially protected |

Further detail can be obtained from the Biodiversity Specialist Report in **Appendix I**.

6.3.7 Animal Life

A total of 109 Red Data species from five categories (IUCN) are known to occur in Mpumalanga (Invertebrates, Reptiles, Frogs and Mammals) and the Q-grids 2629CB and 2629CD (birds), included in the following conservation categories:

- 22 species are listed as Data Deficient (DD);

- 41 species are listed as Near Threatened (NT);
- 30 species are listed as Vulnerable (VU);
- 11 species are listed as Endangered (EN); and
- 4 species are listed as Critically Endangered (CR)

Estimations for the probability of occurrence (PoC) for Red Data fauna taxa for the study area yielded the following results (**Table 6.4**):

- 40 species have a low PoC;
- 21 species have a moderate-low PoC;
- 25 species have a moderate PoC;
- 8 species have a moderate-high PoC; and
- 15 species have a high PoC.

Table 6.4: Red Data assessment for the study area

| Species Details | | | Probability |
|--------------------------------------|----------------------------|-----------------|---------------|
| Biological Name | English Name | RD | Assessment |
| Butterflies | | | |
| <i>Aloeides barbara</i> | Barbara's Copper | Endangered | low |
| <i>Aloeides merces</i> | Wakkerstroom Copper | Vulnerable | moderate-low |
| <i>Aloeides nubilus</i> | Cloud Copper | Endangered | low |
| <i>Aloeides rossouwi</i> | Rossouw's Copper | Endangered | low |
| <i>Chrysothrix aureus</i> | Heidelberg Opal | Vulnerable | low |
| <i>Chrysothrix phosphor borealis</i> | Scarce Scarlet | Data Deficient | moderate-low |
| <i>Lepidochrysops irvingi</i> | Irving's Blue | Vulnerable | low |
| <i>Lepidochrysops jefferyi</i> | Jeffrey's Blue | Endangered | low |
| <i>Lepidochrysops swanepoeli</i> | Swanepoel's Blue | Vulnerable | low |
| <i>Metisella meninx</i> | Marsh Sylph | Vulnerable | moderate |
| Frogs | | | |
| <i>Breviceps sopranus</i> | Whistling Rain Frog | Data Deficient | low |
| <i>Hemisus guttatus</i> | Spotted Shovel-nosed Frog | Vulnerable | moderate-low |
| <i>Pyxicephalus adspersus</i> | Giant Bullfrog | Near Threatened | moderate |
| <i>Strongylopus wageri</i> | Plain Stream Frog | Near Threatened | low |
| Reptiles | | | |
| <i>Acontias breviceps</i> | Short-headed Legless Skink | Near Threatened | moderate-low |
| <i>Afroedura major</i> | Swazi Flat Gecko | Near Threatened | low |
| <i>Chamaesaura aenea</i> | Coppery Grass Lizard | Near Threatened | moderate |
| <i>Chamaesaura macrolepis</i> | Large-scaled Grass Lizard | Near Threatened | low |
| <i>Homoroselaps dorsalis</i> | Striped Harlequin Snake | Near Threatened | moderate-low |
| <i>Kininyx natalensis</i> | Natal Hinged Tortoise | Near Threatened | low |
| <i>Lamprophis fuscus</i> | Yellow-bellied House Snake | Near Threatened | moderate-low |
| <i>Smaug giganteus</i> | Giant Girdled Lizard | Vulnerable | moderate |
| <i>Tetradactylus breyeri</i> | Breyer's Long-tailed Seps | Vulnerable | moderate-low |
| Birds | | | |
| <i>Phoenicopus roseus</i> | Greater Flamingo | Near Threatened | moderate-high |
| <i>Phoenicopus minor</i> | Lesser Flamingo | Near Threatened | moderate-high |
| <i>Mycteria ibis</i> | Yellow-billed Stork | Near Threatened | moderate-low |
| <i>Ciconia nigra</i> | Black Stork | Near Threatened | moderate |
| <i>Leptoptilos crumeniferus</i> | Marabou Stork | Near Threatened | moderate-low |
| <i>Geronticus calvus</i> | Southern Bald Ibis | Vulnerable | moderate |
| <i>Botaurus stellaris</i> | Eurasian Bittern | Critically Rare | moderate |
| <i>Sagittarius serpentarius</i> | Secretarybird | Near Threatened | high |

| Species Details | | | Probability |
|-------------------------------------|------------------------------------|--------------------|--------------------|
| Biological Name | English Name | RD | Assessment |
| <i>Gyps coprotheres</i> | Cape Vulture | Vulnerable | moderate |
| <i>Circus ranivorus</i> | African Marsh Harrier | Vulnerable | high |
| <i>Circus maurus</i> | Black Harrier | Vulnerable | high |
| <i>Circus macrourus</i> | Pallid Harrier | Near Threatened | high |
| <i>Hieraaetus ayresii</i> | Ayres's Hawk-Eagle | Near Threatened | moderate-low |
| <i>Polemaetus bellicosus</i> | Martial Eagle | Vulnerable | moderate-high |
| <i>Falco naumanni</i> | Lesser Kestrel | Vulnerable | high |
| <i>Falco biarmicus</i> | Lanner Falcon | Near Threatened | high |
| <i>Eupodotis caerulescens</i> | Blue Korhaan | Near Threatened | high |
| <i>Crex crex</i> | Corn Crake | Vulnerable | moderate |
| <i>Balearica regulorum</i> | Grey Crowned Crane | Vulnerable | moderate-high |
| <i>Anthropoides paradisea</i> | Blue Crane | Vulnerable | high |
| <i>Charadrius pallidus</i> | Chestnut-banded Plover | Near Threatened | moderate-low |
| <i>Rostratula benghalensis</i> | Greater Painted-snipie | Near Threatened | moderate-low |
| <i>Glareola nordmanni</i> | Black-winged Pratincole | Near Threatened | moderate |
| <i>Hydroprogne caspia</i> | Caspian Tern | Near Threatened | moderate-low |
| <i>Tyto capensis</i> | African Grass-owl | Vulnerable | high |
| <i>Alcedo semitorquata</i> | Half-collared Kingfisher | Near Threatened | moderate |
| <i>Mirafra cheniana</i> | Melodious Lark | Near Threatened | moderate |
| <i>Heteromirafra ruddi</i> | Rudd's Lark | CR Critically Rare | moderate-low |
| <i>Spizocorys fringillaris</i> | Botha's Lark | Endangered | moderate-low |
| Mammals | | | |
| <i>Chrysoxalax villosus</i> | Rough-haired Golden Mole | Critically Rare | moderate-low |
| <i>Amblysomus hottentotus</i> | Hottentot's Golden Mole | Data Deficient | moderate-low |
| <i>Amblysomus robustus</i> | Robust Golden Mole | Endangered | low |
| <i>Amblysomus septentrionalis</i> | Highveld Golden Mole | Near Threatened | high |
| <i>Neamblysomus julianae</i> | Juliana's Golden Mole | Vulnerable | low |
| <i>Atelerix frontalis</i> | South African Hedgehog | Near Threatened | moderate |
| <i>Elephantulus brachyrhynchus</i> | Short-snouted Elephant-shrew | Data Deficient | low |
| <i>Myosorex cafer</i> | Dark-footed Forest Shrew | Data Deficient | moderate-low |
| <i>Myosorex varius</i> | Forest Shrew | Data Deficient | high |
| <i>Crocidura cyanea</i> | Reddish-grey Musk Shrew | Data Deficient | high |
| <i>Crocidura flavescens</i> | Greater Musk Shrew | Data Deficient | moderate-high |
| <i>Crocidura fuscomurina</i> | Tiny Musk Shrew | Data Deficient | moderate |
| <i>Crocidura hirta</i> | Lesser Red Musk Shrew | Data Deficient | moderate |
| <i>Crocidura maquassiensis</i> | Maquassie Musk Shrew | Vulnerable | low |
| <i>Crocidura mariquensis</i> | Swamp Musk Shrew | Data Deficient | high |
| <i>Crocidura silacea</i> | Lesser Grey-brown Musk Shrew | Data Deficient | moderate-high |
| <i>Suncus infinitesimus</i> | Least Dwarf Shrew | Data Deficient | moderate |
| <i>Suncus lixus</i> | Greater Dwarf Shrew | Data Deficient | low |
| <i>Suncus varilla</i> | Lesser Dwarf Shrew | Data Deficient | moderate |
| <i>Cloeotis percivali</i> | Percival's Short-eared Trident Bat | Vulnerable | moderate-low |
| <i>Rhinolophus blasii</i> | Blasius's Horseshoe Bat | Near Threatened | moderate |
| <i>Rhinolophus swinnyi</i> | Swinny's Horseshoe Bat | Near Threatened | moderate-low |
| <i>Miniopterus natalensis</i> | Natal Long-fingered Bat | Near Threatened | moderate-high |
| <i>Scotophilus nigrita</i> | Giant Yellow House Bat | Near Threatened | low |
| <i>Cercopithecus mitis</i> | Samango Monkey | Vulnerable | low |
| <i>Cercopithecus mitis labiatus</i> | Samango Monkey | Endangered | low |
| <i>Manis temminckii</i> | Ground Pangolin | Vulnerable | low |
| <i>Graphiurus platyops</i> | Rock Dormouse | Data Deficient | low |
| <i>Mystromys albicaudatus</i> | White-tailed Rat | Endangered | moderate |
| <i>Tatera leucogaster</i> | Bushveld Gerbil | Data Deficient | low |
| <i>Lemniscomys rosalia</i> | Single-striped Mouse | Data Deficient | moderate |

| Species Details | | | Probability |
|-------------------------------|--------------------------|-----------------|---------------|
| Biological Name | English Name | RD | Assessment |
| <i>Dasymys incomtus</i> | Water Rat | Near Threatened | moderate |
| <i>Grammomys dolichurus</i> | Woodland Mouse | Data Deficient | low |
| <i>Otomys slogetti</i> | Sloggett's Rat | Data Deficient | moderate |
| <i>Panthera pardus</i> | Leopard | Near Threatened | moderate |
| <i>Panthera leo</i> | Lion | Vulnerable | low |
| <i>Leptailurus serval</i> | Serval | Near Threatened | high |
| <i>Acinonyx jubatus</i> | Cheetah | Vulnerable | low |
| <i>Felis nigripes</i> | Black-footed Cat | Vulnerable | low |
| <i>Crocuta crocuta</i> | Spotted Hyaena | Near Threatened | low |
| <i>Parahyaena brunnea</i> | Brown Hyaena | Near Threatened | high |
| <i>Paracynictis selousi</i> | Selous's Mongoose | Data Deficient | low |
| <i>Rhynchogale melleri</i> | Meller's Mongoose | Data Deficient | low |
| <i>Canis adustus</i> | Side-striped Jackal | Near Threatened | low |
| <i>Lycaon pictus</i> | African Wild Dog | Endangered | low |
| <i>Mellivora capensis</i> | Honey Badger | Near Threatened | moderate-high |
| <i>Poecilogle albinucha</i> | African Striped Weasel | Data Deficient | moderate |
| <i>Hydrictis maculicollis</i> | Spotted-necked Otter | Near Threatened | moderate |
| <i>Loxodonta africana</i> | African Savanna Elephant | Vulnerable | low |
| <i>Diceros bicornis</i> | Black Rhinoceros | Critically Rare | low |
| <i>Ceratotherium simum</i> | White Rhinoceros | Near Threatened | low |
| <i>Hippopotamus amphibius</i> | Common Hippopotamus | Vulnerable | low |
| <i>Raphicerus sharpei</i> | Sharpe's Grysbok | Near Threatened | low |
| <i>Ourebia ourebi</i> | Southern Oribi | Vulnerable | moderate-low |
| <i>Hippotragus equinus</i> | Roan Antelope | Vulnerable | low |
| <i>Hippotragus niger</i> | Southern Sable Antelope | Vulnerable | low |
| <i>Damaliscus lunatus</i> | Western Tsessebe | Endangered | low |

Mpumalanga includes 31 provincially listed protected species (www.speciesstatus.sanbi.org – NEMBA status, **Table 6.5**).

Table 6.5: Protected species of Mpumalanga

| Species Details | | | Probability |
|--------------------------------|---------------------------------|--------------|--------------|
| Biological Name | English Name | NEMBA status | Assessment |
| <i>Aonyx capensis</i> | African Clawless Otter | protected | high |
| <i>Atelerix frontalis</i> | South African Hedgehog | protected | moderate |
| <i>Bucorvus leadbeateri</i> | Southern Ground-Hornbill | protected | low |
| <i>Ceratogyrus bechuanicus</i> | Starbust Horned Baboon Spider | protected | moderate-low |
| <i>Ceratotherium simum</i> | White Rhinoceros | protected | low |
| <i>Circus ranivorus</i> | African Marsh Harrier | protected | high |
| <i>Connachaetus gnou</i> | Black Wildebeest | protected | low |
| <i>Crocuta crocuta</i> | Spotted Hyaena | protected | low |
| <i>Dromica species</i> | Flightless Tiger Beetle species | protected | moderate-low |
| <i>Felis nigripes</i> | Black-footed Cat | protected | low |
| <i>Graphipterus assimilis</i> | Velvet Ground Beetle | protected | moderate-low |
| <i>Harpactira gigas</i> | Transvaal Banded Baboon Spider | protected | moderate-low |
| <i>Hydrictis maculicollis</i> | Spotted-necked Otter | protected | moderate |
| <i>Leptailurus serval</i> | Serval | protected | high |
| <i>Loxodonta africana</i> | African Savanna Elephant | protected | low |
| <i>Manticora species</i> | Monster Tiger Beetle species | protected | moderate-low |
| <i>Megacephala asperata</i> | Tiger Beetle | protected | moderate-low |
| <i>Megacephala regalis</i> | Tiger Beetle | protected | moderate-low |
| <i>Neotis denhami</i> | Denham's Bustard | protected | moderate |

| | | | |
|----------------------------------|-------------------------------------|-----------|--------------|
| <i>Nigidius auriculatus</i> | Stag Beetle | protected | moderate-low |
| <i>Oonotus adspersus</i> | Stag Beetle | protected | moderate-low |
| <i>Oonotus interioris</i> | Stag Beetle | protected | moderate-low |
| <i>Oonotus rex</i> | Stag Beetle | protected | moderate-low |
| <i>Oonotus sericeus</i> | Stag Beetle | protected | moderate-low |
| <i>Parahyaena brunnea</i> | Brown Hyaena | protected | high |
| <i>Prosopocoilus petitclerci</i> | Stag Beetle | protected | moderate-low |
| <i>Prothyma guttipennis</i> | Tiger Beetle | protected | moderate-low |
| <i>Pterinochilus breyeri</i> | Malelane Golden-brown Baboon Spider | protected | moderate-low |
| <i>Pterinochilus nigrofulvus</i> | Transvaal Golden Baboon Spider | protected | moderate-low |
| <i>Raphicerus sharpei</i> | Sharpe's Grysbok | protected | low |
| <i>Redunca arundinum</i> | Southern Reedbuck | protected | low |

It is estimated that three of the eight species listed in **Table 6.5** are unlikely to occur in the study area (low) and 16 species moderately unlikely (moderate-low). Three species are considered at least moderately likely (moderate) and four species highly likely to occur in the study area (high).

Further detail can be obtained from the Biodiversity Specialist Report in **Appendix I**.

6.3.8 Avifauna

• **Bird Micro Habitats**

It is important to understand the habitats available to birds at a smaller spatial scale, i.e. micro habitats. Micro habitats are shaped by factors other than vegetation, such as topography, land use, food sources and man-made factors. Investigation of this study area revealed the following bird micro habitats.

○ *Arable and/or cultivated lands*

Arable or cultivated lands (**Figure 6.12**) can represent significant feeding areas for many bird species in any landscape for the following reasons: through opening up the soil surface (figure 3), land preparation makes many insects, seeds, bulbs and other food sources readily accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. Relevant bird species that may be attracted to these areas include most importantly the Blue Crane, Southern Bald Ibis, Blue Korhaan and White Stork. Marsh owls will also regularly forage over agricultural lands (**Figure 6.13**), especially in the late afternoon.



Figure 6.12: Agricultural lands observed in the study area.



Figure 6.13: One of four Marsh Owls observed in close vicinity to each other, foraging over agricultural lands in the study area.

- *Open Grasslands*

The only vegetation type (Mucina & Rutherford, 2006) present is “Soweto Highveld Grassland”, which falls within the greater Grasslands Biome. It was not surprising, therefore, that the most extensive bird microhabitat available on this site is that of grasslands (**Figure 6.14** and **6.15**). Grassland may attract the Blue Crane, Black-winged Pratincole, Southern Bald Ibis, Blue Korhaan, Secretarybird, and White Stork. Pristine patches of grassland, near to water, may provide breeding habitat for the African Grass Owl, although this species has not been recorded in the SABAP data for