BLOODHOUND SPEEDWEEK HAKSKEEN PAN TERRESTRIAL IMPACT ASSESSMENT

For the

Proposed development on the Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD

DAWID KRUIPER LOCAL MUNICIPALITY

NORTHERN CAPE PROVINCE

Submitted by

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Title:
Bloodhound Speedweek Hakskeen Pan: Terrestrial Impact Assessment for the proposed development on the Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD, Dawid Kruiper Local Municipality, Northern Cape Province.

Client:

Department of Economic Development and Tourism

Rietfontein

Mier Municipality Offices

Report No.:
HAKSKEENBIO/2016

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Date:
November 2016

EXECUTIVE SUMMARY

This document has been prepared and submitted by Prescali Environmental Consultants (Pty) Ltd (Prescali) to the Department of Economic Development & Tourism (hereinafter referred to as the Client) in response to a request for a biodiversity study of the proposed project in the Hakskeen Pan area.

It is our understanding that the client is in the process of applying for authorisation in terms of the National Environmental Management Act, 1998 (Act 108 of 1998) (NEMA) 2014 regulations and the National Water Act, 36 of 1998 for Hakskeen Pan, in order to begin preparing to establish itself as the worldwide extreme land speed destination.

In addition to the above, the project will be evaluated for the biodiversity study in terms of the requirements of the National Biodiversity Act, 2004 (Act 10 of 2004) and amendments. A field assessment was conducted on the 24th to the 27th October 2016.

The desktop study indicated that species of conservation importance might occur in the area (avifauna); however, seven (7) species found during the field assessment had a conservation importance status. The seven (7) red data species (either ToPS protected or IUCN, or both) were found in the region for the area in which Hakskeen Pan is located. However, most of these species had focused activity on the western border of the pan where the development is minimal and in most cases the habitat there will remain undamaged, if well mitigated.

The fauna field assessment included mostly traversing areas on foot and movement by vehicle and special investigation of places designated from infrastructure development on the Hakskeen Pan as investigated. From the investigation, the western borders of the pan seem mostly the sensitive areas better to avoid. This was particularly important in terms of specialisation of the niche (dunes) and the associated species sensitivity that will occur as a result, another factor is the increased vegetation and drainage lines located there. This was also the area which received more water (for longer periods) in comparison and drainage lines transected the western border of the Hakskeen Pan. This data is included in this document, although no impacts are thought to arise due to the proposed developments within the pan as most activities are centralized in the eastern and northern border and the racetracks are located within the pan itself.

The larger area and the center of the Hakskeen Pan were investigated as thoroughly as possible due to movement restraints to protect the integrity of the soil of the pan.

The habitat integrity was found to be in an intact manner for the area and especially on the western side signs of movement and activity were sighted. No animals or movement were observed on the pan itself, as it is extremely dry and hot, reaching temperatures above 40 degrees. The soil was found to be compacted, which is expected from a pan, which in essence is a closed system.

To the eastern side of the pan, there are signs of human intervention, particularly where the cellphone tower and ablution buildings are located. The field visit was held approximately a week after a large camping event and after a week minimal signs of human disturbance were visible due to the hardy nature of the soil and the environment.

Limitations and Assumptions

The desktop study was conducted with up to date resources and the site visit was conducted as thoroughly as possible. It might however be possible that additional information become available in time, because environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the report be viewed and acted upon with these limitations in mind. Prescali Environmental Consultants (Pty) Ltd cannot be held responsible for conclusions and pro-active mitigation measures that are made in good faith based on the available resources and information provided at the time of the directive.

To perform an exhaustive fauna survey of a study area requires an extensive amount of time (years) due to the very secretive and unpredictable movements of most reptile and mammal species and the migratory movements of bird species across seasons and time scales. Results of fauna field surveys are limited by time and funding availability as well as the movement/activity patterns of the herpetofauna, avifauna and mammalian community during the survey period. As a result, typical herpetofauna, avifauna and mammalian communities found within the study should/can therefore only be used as a general guideline.

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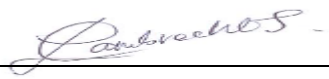
Abbreviations

SANBI	South African National Biodiversity Institute
QDS	Quarter Degree Square
IUCN	International Union for the Conservation of Nature
ToPS	Threatened and Protected Lists under NEMBA

Declaration of Independence

I declare that I, Corlien Lambrechts, act as the independent specialist for the fauna assessment of this application. I conduct assessments in an objective manner, even when the views and findings might not be favourable to the Applicant. I have the expertise to conduct the assessment and will comply with the Act, regulations and other applicable legislation. I do not have conflicting interests in the undertaking of the activity. I undertake to disclose all material information in my possession that has or may have the potential of influencing any decision to be taken in respect to the application.

Signature of Specialist	
Name of Company	Prescali Environmental Consultants (Pty) Ltd
Date	25 November 2016

1 INTRODUCTION

Prescali Environmental Consultants (Pty) Ltd was commissioned by Department of Economic Development and Tourism to undertake a baseline assessment of the Biodiversity: fauna and flora at the Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD, The area in question falls under the jurisdiction of the Dawid Kruiper Local Municipality and is located within the Northern Cape Province.

Mier Local Municipality was disestablished and merged with Khara Hais Local Municipality to establish Dawid Kruiper Local Municipality on 3 August 2016. The information contained in the table below is historical information relating to the municipality before being merged.

The focus of this project is to aid the Bloodhound Super Sonic Car (SSC) and its developers to temporary utilise and develop Hakskeen Pan, and possibly begin preparing to establish itself as the worldwide extreme land speed destination. To stage this event, a high speed facility has to be developed on and around Hakskeen Pan which include the following infrastructure:

- A dedicated track of 20km (for Bloodhound);
- A trackside Airstrip;
- Corporate Hospitality Area;
- A technical Camp;
- A domestic Camp;
- A Fuel Depot.

For the purposes of this study it is necessary to assess the fauna and flora of the Hakskeen Pan project to determine the potential impact further development may have on the environment.

2 SCOPE OF WORK

Prescali Environmental Consultants (Pty) Ltd was appointed to conduct a flora and fauna assessment as one of the specialist studies required for the inclusion in the EIA/EMP. Due to the limited timeframe associated to the project and the fact that the activities to prepare the Hakskeen Pan has already started, the project will be authorized under a Section 24G and a Basic Assessment and Environmental Management Plan. The flora study and findings is addressed within a separate report. The fauna study included the following:

- A desktop invertebrate and mammal study, which included determining the:
    - Endemic species; and
    - IUCN Red Data species

- Field surveys to:
    - Determine the likelihood of ecologically significant invertebrates and mammals occurring in the area based on status of the environment;
    - Determine presence of endemic species;
    - Determine presence of exotic and invasive species;
    - Determine presence of IUCN Red Data species; and
    - Determine presence of culturally significant species.
    - Determine sensitivity of certain areas against the proposed layout of the Boodhound speed week infrastructure.

2.1 OBJECTIVES OF STUDY

The aim of this study includes the following objectives on the Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD:

- Identify sensitive areas and species that should be avoided during the proposed development of the Boodhound speedweek development on Hakskeen Pan. These issues will be identified, evaluated and discussed.
- Make use of the South African Biodiversity Institute Database to obtain specialized information and previous surveys within the area. This will supplement the field survey and support findings.
- To determine and complete an impact assessment and risk evaluation. Relevant mitigation measures and a management plan will be proposed to reduce severity of impacts to the flora and fauna in the region.
- To provide recommendations that will support the proposed management actions.

3 OVERVIEW OF STUDY AREA

3.1 LOCALITY OF PROPOSED ACTIVITIES

The nearest towns to Hakskeen Pan are located 9 km towards the north east and the town Philandersbron which is located approximately 12 km south west. The town Loubos is located 13 km towards the North West (Fig 3-1). Rietfontein, which may be considered as the biggest town of the vicinity is located 20 km towards the south of the pan.

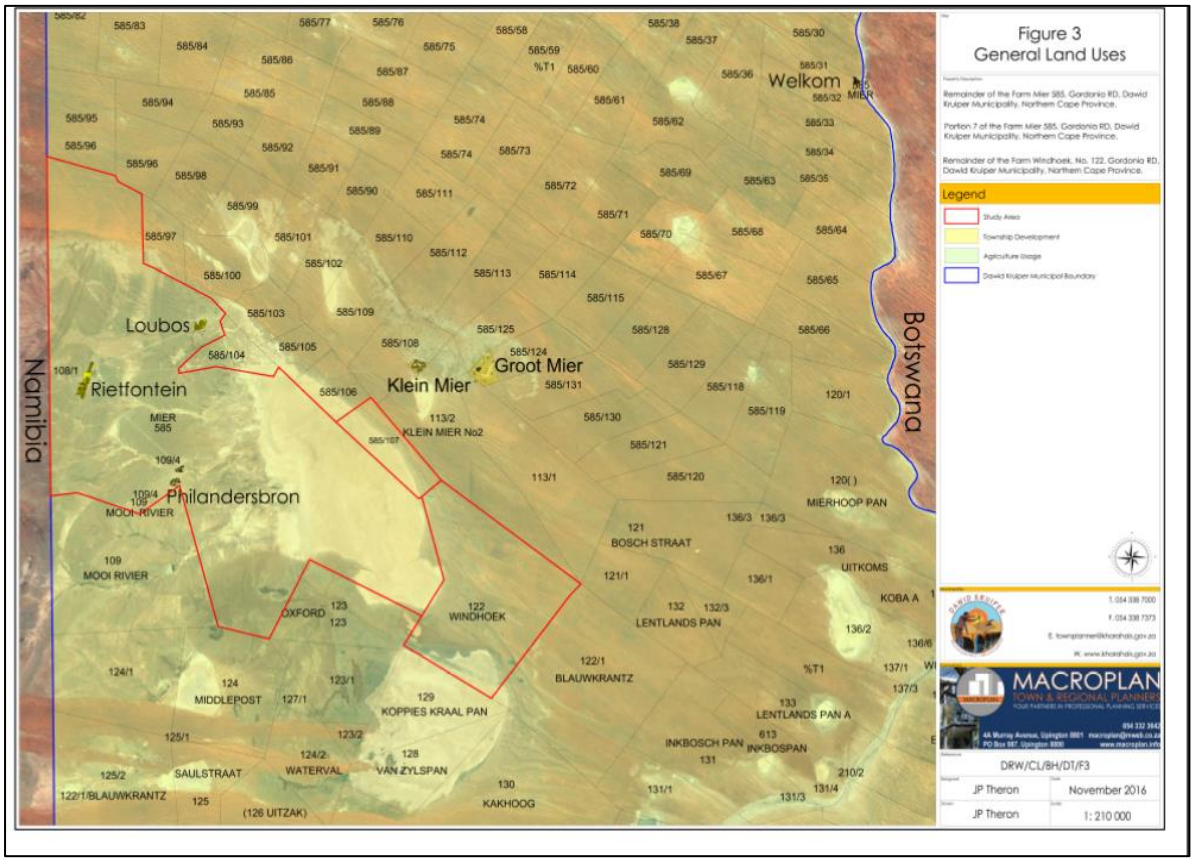


Figure 3-1: The farm Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD as situated in the Northern Cape province, South Africa

3.2 BRIEF OVERVIEW OF PROPOSED ACTIVITIES

The Dawid Kruiper Local Municipality is in the process of applying for the necessary authorisations for the construction of infrastructure for the speed events held/to be held on Hakskeen Pan. The activities have commenced and therefore a Section 24G application has been launched.

From the 24G application, the infrastructure includes the following:

- a 20km long, 500m wide track has been constructed, including a 300m wide safety buffer on either side of the track. Construction comprises of the following:
- 317 workers have cleared by hand an area of 20km x 1,1km of all surface stones and pebbles.
- Rehabilitation of the pan in the form of removing an existing causeway which was previously the main road between Mier and Rietfontein has taken place. This road which was 1m high was removed and the pan restored to its original surface and level.
- Material removed from the road was placed back in the borrow pits created many years ago when this road was first built.
- In certain areas it was necessary to remove stones which protruded above the surface but which extended to below the surface of the pan. These cases only represent a total estimated area of 500m x 300m when combined thus only 0,68% of the total amount of stones removed unearthed by machines, the rest was removed by hand.
- The only place where grading has and will take place is to repair manmade indentations and elevations in the form of old tracks created by locals or in the case of the elevated causeway which was removed.
- Temporary structures (mostly shipping containers) placed on the edge of the pan for various functions such as control, storage, hospitality, showers and toilets etc. located at the landside camp.
- An 110kVa diesel generator, with a 3,500l diesel tank and bund, also housed within a portable shipping container on site.
- Two telecommunications masts placed at the landside camp and next to the R31 - 6 x 10 000l jo-jo tanks have been constructed for the storage of water on site.
- Water is sourced from local borehole near the site, via a 16m long, 40mm diameter pipeline. - There is also an 110kVa diesel generator, with a 3,500l diesel tank and bund, also housed within a portable shipping container on site.
- A 44,000l sewerage septic/holding tank has also been constructed on the site for the temporary storage of all effluent. The tank is emptied by a honey sucker by the Dawid Kruiper Local Municipality when it is full, and the effluent disposed of at the Mier Sewerage Works.
- No new roads were constructed for the activities, and only existing tracks on the pan were used.
- Farm boundary fencing was also moved to accommodate the track.

There was also a 7km, 500m wide track for the speedweek events; however, no preparation of this track was required. Only a dust-suppressant was applied to the speedweek track.

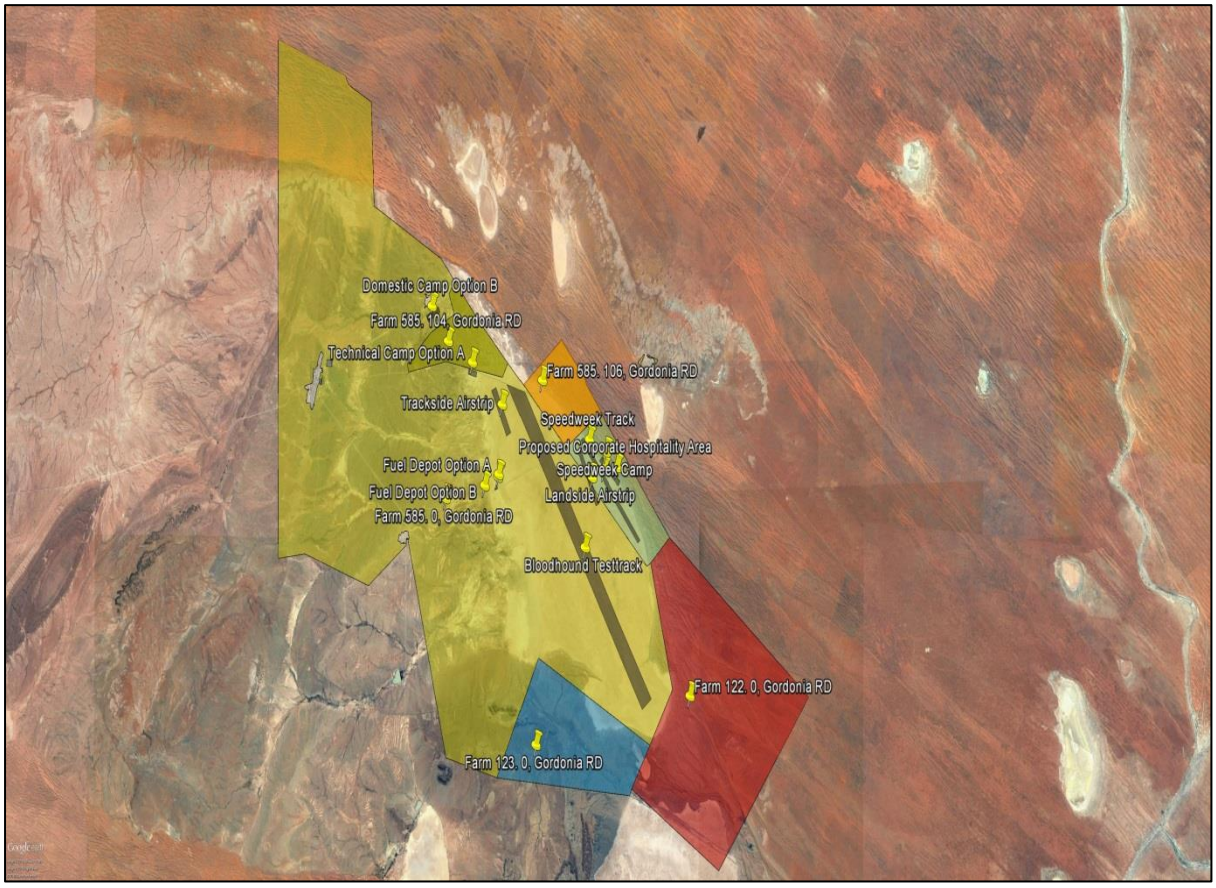


Figure 3-2: Proposed infrastructure positioning on the Hakskeen Pan

Figure 3-3: Hakskeen Pan photograph of where the main activities are proposed

3.3 LOCATION SYNOPSIS

The study area is situated within the Northern Cape Province. From an Ecological point of view, the Northern Cape includes the Kalahari Gemsbok National Park and part of the Kgalagadi Transfrontier Park, which is an international park shared with Botswana. In the northeast, Kuruman is famous as a mission station and also for its "eye". The Orange River flows through the province, forming the borders with the Free State in the southeast and with Namibia to the northwest. The river is also used to irrigate the many vineyards in the arid region near Upington.

SANBI's interactive website was used to locate any critical biodiversity areas in or surrounding the proposed Hakskeen Pan development on the Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD (Figure 3-4). The Hakskeen Pan is located within a Southern Kalahari Salt pan zone, Azonal Vegetation Biome and Inland Saline Vegetation group with a Least threatened, but poorly protected status according to the National Database. The Vegetation group surrounding the Hakskeen Pan is given as Kalahari Karroid Shrubland, Nama-Karoo Biome and within the Bushmanland bioregion group. The conservation status of Kalahari Karroid Shrubland is given as Least Threatened and not/hardly protected. Gordonia Duneveld, Kalahari Duneveld Bioregion is also present especially to the north and eastern borders of Hakskeen Pan. Gordonia Duneveld has a conservation status of Least Threatened and moderately protected.

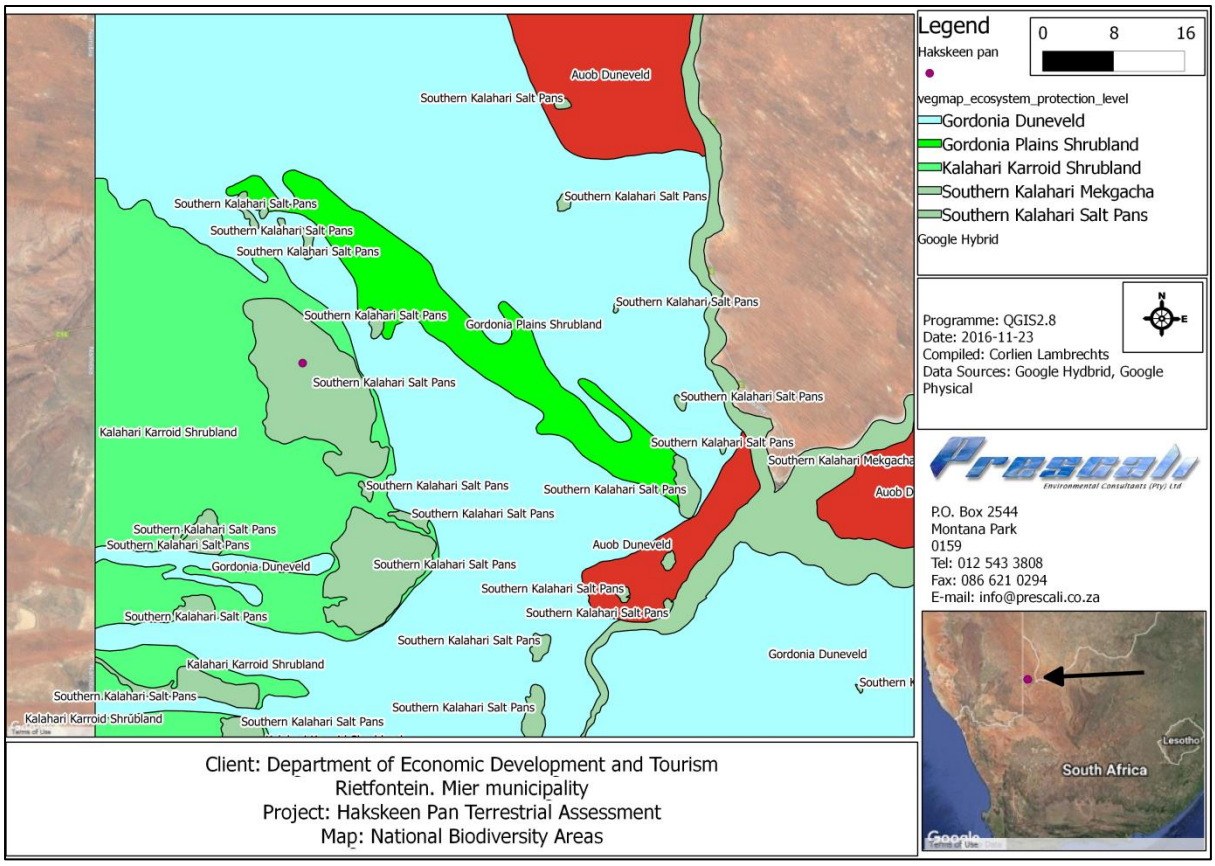


Figure 3-4: Map indicating the critical biodiversity areas in or surrounding the Hakskeen Pan project

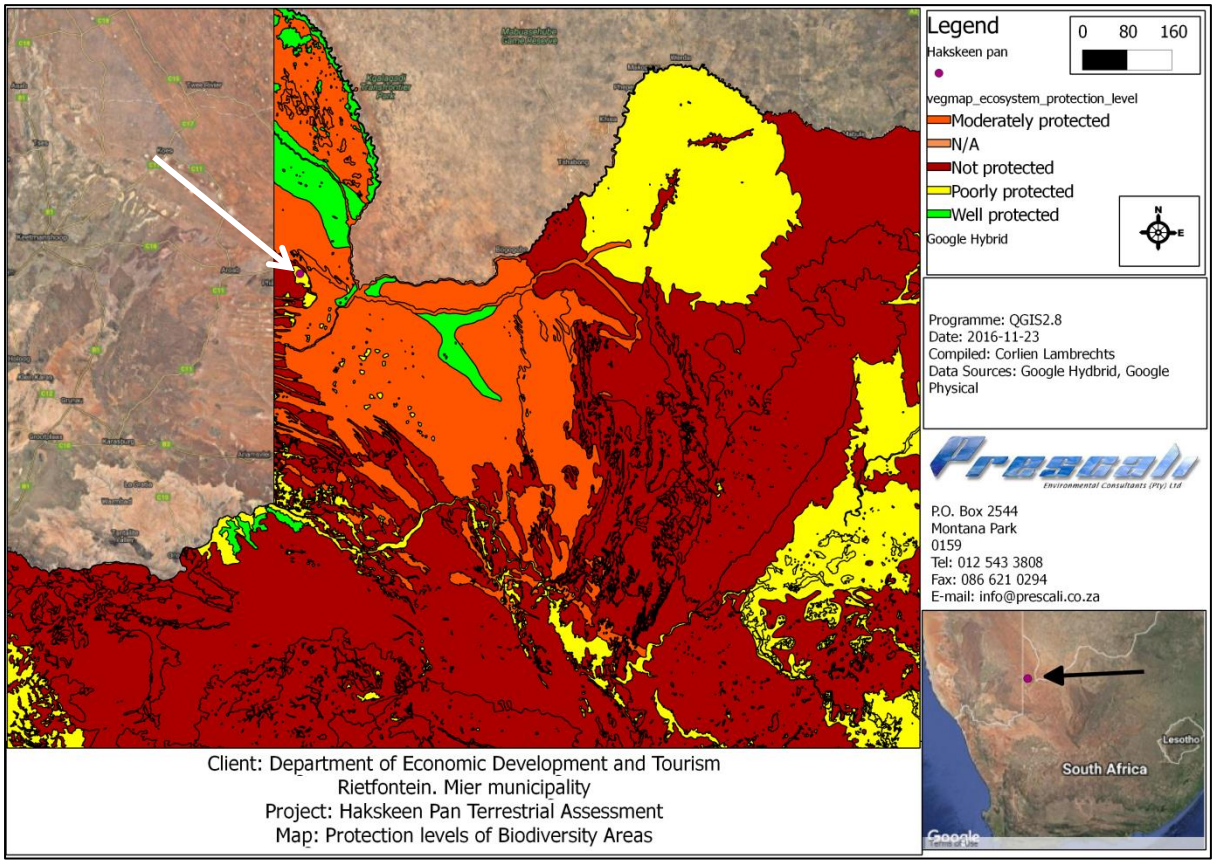


Figure 3-5: Map showing the protection levels of these vegetation units found around Hakskeen Pan

The Southern Kalahari Salt pans may be described as a system of endorheic, closed depressions (pans) in the southern Kalahari as defined by Thomas & Shaw (1991) south of the Bakalahari Schwelle. The largest concentrations of such pans in South Africa are found near Groot-Mier in western Gordonia. This is where the Hakskeen Pan is located. Altitude ranging from 800–1 500 m

Conservation at status of the Southern Kalahari Salt pans is Least threatened with a conservation target of 24%. About 8% is already statutorily conserved in the Kgalagadi Transfrontier Park. The vegetation of the pans is subject to natural degradation/regeneration cycles controlled by concentration of grazing animals (antelopes in particular) (SANBI Strelitzia 2006).

4 METHODS

4.1 DESKTOP ASSESSMENT

4.1.1 Terrestrial assessment

A baseline assessment was conducted to establish whether any potentially sensitive species/receptors might occur on site. The South African National Biodiversity Institute's (SANBI) online biodiversity tool was used to query a species list for the 2620CC, 2620CA, 2620CB quarter degree grid cells. This was supplemented by researching all available books and peer reviewed websites.

The importance of a baseline study is to provide a reference condition to determine the current state of the environment and to draw comparisons between the potential of the area and current degradation from surrounding land uses. This will be conducted in terms of the future changes due to the proposed development by the client.

Aerial photographs and satellite imagery was used to delineate potential vegetation types and areas before the field visit. This served as the foundation for selecting various sample sites for field surveying.

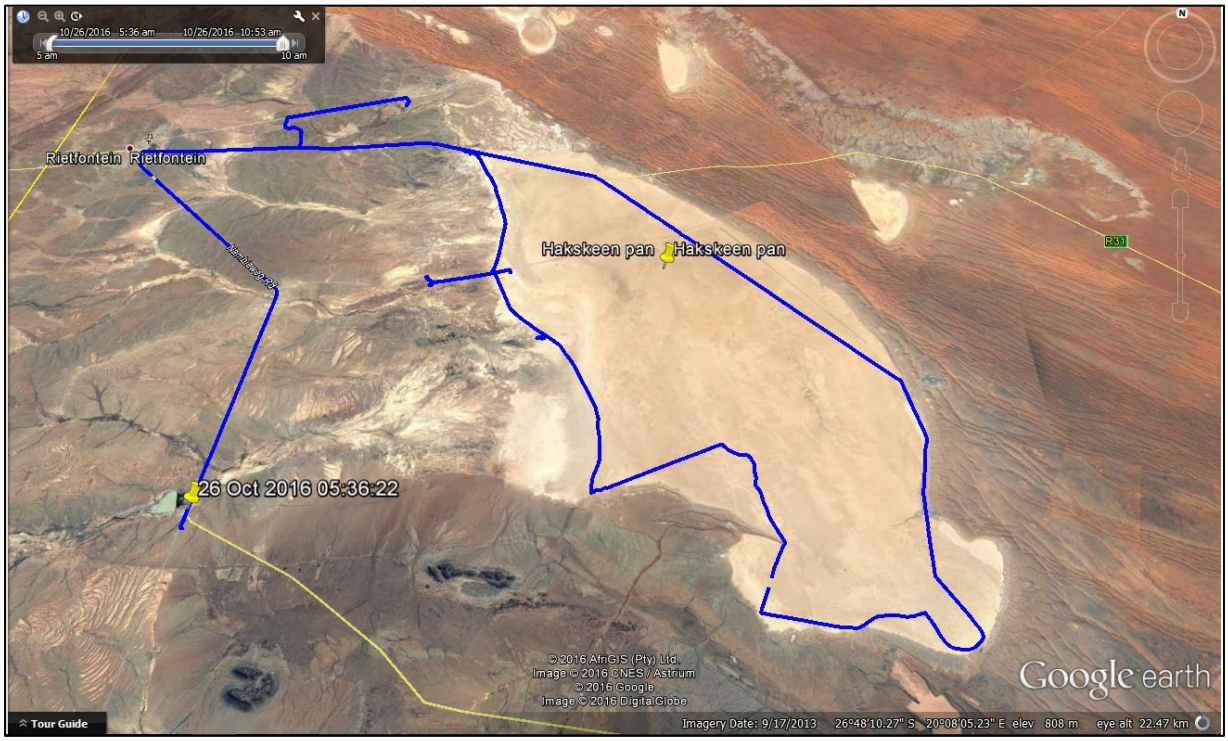
4.1.2 Field Survey

A field assessment was conducted on the 24th to the 27th October 2016. The field investigation was conducted to supplement and confirm several findings during the desktop analysis. This mainly served as a fatal flaw analysis to determine whether there are any major ecological concerns with regards to the site selected for the proposed development on Hakskeen Pan.

The ecological integrity of the area was described within this report based upon strategic selected sampling sites allocated by studying aerial photographs and satellite imagery. Areas with unique biophysical attributes and sensitivity were chosen (Fig 4-1). The information gathered is presented under the results section of this document. The placement of the infrastructure and activities were also used to guide the field assessment as to assess the areas that are to be impacted on during the project as may be seen below, also refer to Figure 3-2 for the placement of the infrastructure.

Figure 4-1: Site where the ablution facilities are already on-site, next to MTN Tower

Figure 4-2: Start of measured mile point for the Speedweek track



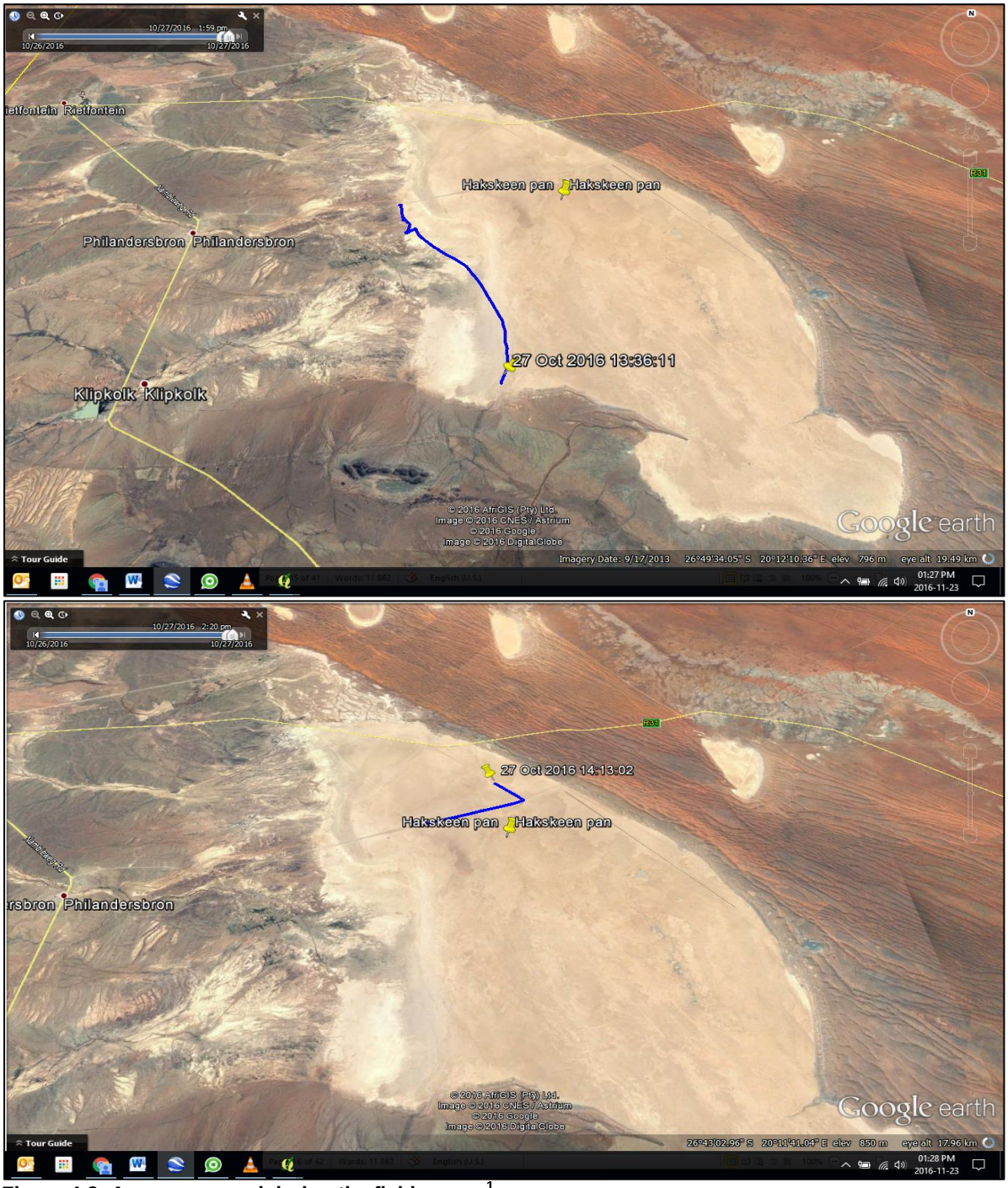


Figure 4-3: Areas assessed during the field survey[1]

5 RESULTS

5.1 FAUNA EVALUATION

The faunal investigation provides a description of the ecological diversity in terms of species identification as well as the occurrence of threatened/sensitive species that is dependent on available habitat. During the analysis, it was preliminary determined that 7 Red Data species were confirmed

[1] http://www.paulillsley.com/GoogleEarth/

for the specific area. These species are listed within this document body as well as the complete baseline study that is included within Appendix A for reference.

The National Environmental Biodiversity Act (Act 10 of 2004) has also included several species that have to be protected if they occur in the proposed development Area; these lists have been published in the Government Gazette, Vol. 574 Pretoria, 16 April 2013 No. 36375 and have been incorporated into the Fauna study that was conducted at the Hakskeen Pan. The new Threatened or Protected Species (ToPS List) have been published in the Government Gazette Notice 255 of 2015, Vol. 597 Pretoria, 31 March 2015 No. 38600. This has also been included within the document.

During the Desktop study, a list of potential avifauna species occurring in the area were compiled and included in the base of the document. Please refer to Appendix A for a complete species list as part of the baseline assessment for the Hakskeen Pan area and the specific quarter degree grid cell.

It is important to note that only one species for mammals were listed in the SANBI database for the specific area. A baseline mammalian description of the area was created through comparing mammal populations in vegetation types similar to the vegetation unit on the farms where Hakskeen Pan is located. Habitat analysis provided indications to which species would possibly inhabit this area during the desktop study. The field survey was important to confirm or dispute these findings.

5.1.1 Ad hoc Sensitive species and areas

Water means life and in this instance the increase in habitat is evident towards the western side of the pan where the drainage lines are located. This area was identified as more sensitive due to increase in numbers and diversity of species within the framework of this study. The sensitive areas were determined based on the close relationship and dependence faunal species will have with their habitat and in this case, the increase of the shrub and tree layer, means the increase in shelter and food resources. These increases were mostly consisting of invertebrates, several bird species and butterflies which all depend on the shelter and food source provided during some stage of their lifecycle. Increase in invertebrates, reptiles, small mammals and birds are all favorable for the occurrence for predatory species as well.

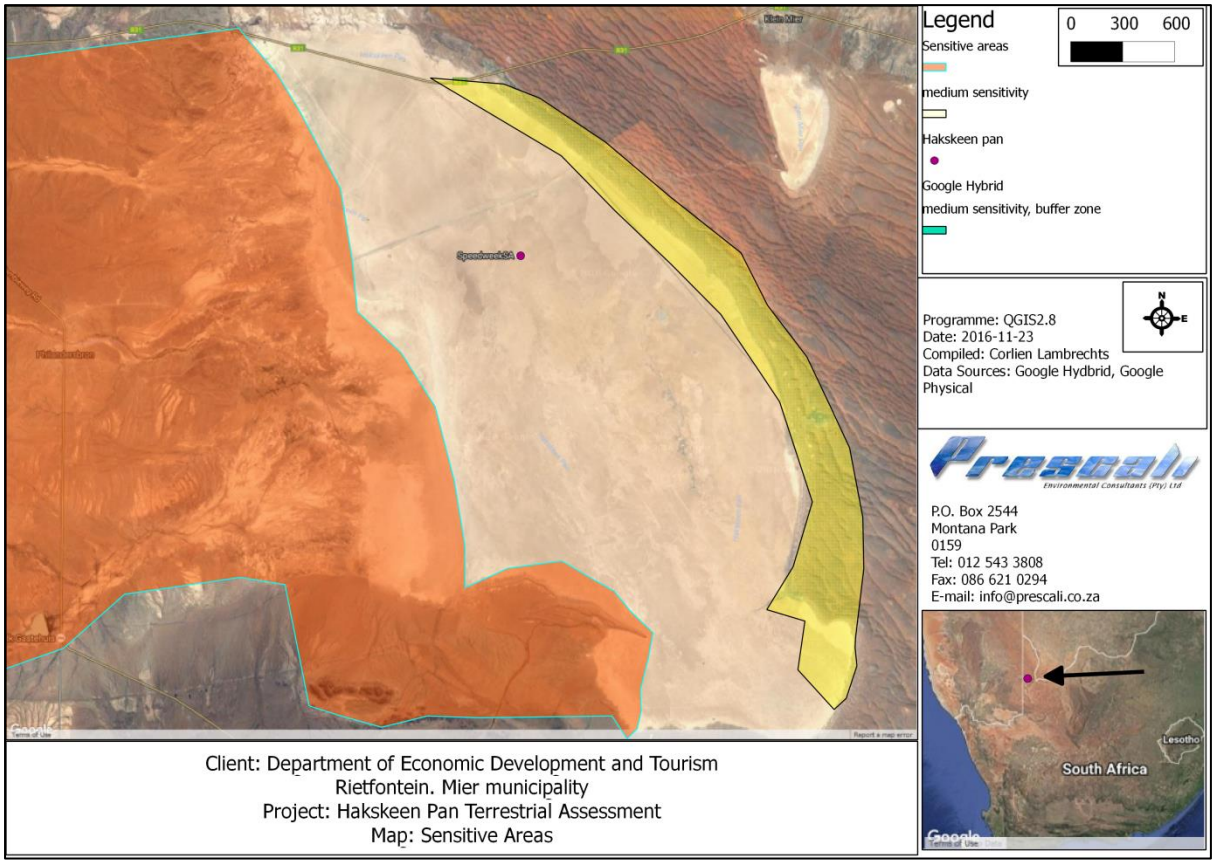


Figure 5-1: Sensitivity map produced to give an indication of sensitive drainage areas and the dunes

Figure 5-2: Area where the Fuel depot is proposed

Fuel Depot Option B is closest to the drainage areas and therefore, the area proposed for the Fuel storage Option A is deemed more plausible from an ecological point of view, although it is important that the area be bunded or other protection measures be implemented to protect the pan when flooding occurs. The fairy shrimp that hatches when the pan is under water will become extinct if fuel and oils are allowed to enter the surface water.

Domestic Camp option B had more tree and shrub habitat, therefore higher incidence of invertebrates sighted, skinks, mice and more avi-fauna species than Domestic Camp Option A, therefore Option A is recommended from a habitat availability point of view. Both option A and option B did not have high plant diversity and species within both options were not of conservation importance.

Figure 5-3: Photograph of landscape characteristic of Domestic camp option A

Figure 5-4: Photograph of landscape characteristic of Domestic camp option B

Figure 5-5: Photograph characteristic of landscape towards the western side of the pan

5.1.2 Mammalian evaluation

There was only one species listed on the National database as recorded in this area, namely *Lepus capensis* (Cape Hare) Least Concern, which shows that there has not been a lot of research done or available for this specific region. This is consistent with the fieldwork assessment indicating that there is minimal faunal movement on the pan itself, except for certain species, mainly antelope species. Generally, mostly avi-faunal species, reptiles and small mammals may be expected within this study area. The western border of the pan had signs of several faunal species and this is given below.

5.1.2.1 Mammals recorded

The habitat type suggests low/moderate species diversity in terms of mammalian groups. The surrounding farms has several game listed and is also used for hunting activities in some areas. Several burrows were sighted during the field survey, which suggests jackal, ground squirrel and aardvark activity. They are expected within the area and specific habitat type. Dung pellets, spoor and carcasses were investigated, due to the lack of sightings for larger animals during the field visit.

The following species was obtained from SANBI Virtual museum for 2620CA, 2620CD:

- *Felix nigripes* (Black-footed cat)
- *Melivora capensis* (Honey badger)
- *Procavia capensis* (Rock Hyrax)

Mammal species recorded during the field survey were:

- *Canidae canis* (presumably *Canis mesomelas*) Jackal activity and droppings were sighted)
- *Caracal caracal* (Caracal droppings)
- *Pedetes capensis* (Spring hare)
- *Xerus inauris* (Cape ground squirrel)
- *Lemniscomys spp.* (Striped grass mouse)
- *Rhabdomys pumilio* (Four-striped grass mouse)
- *Sylvicapra grimmia* (Common duiker) (Duiker species identified through droppings and spoor)
- *Raphicerus campestris* (Steenbok)
- *Aepyceros melampus* (Impala)
- *Antidorcas marsupialis* (Springbok)
- *Suricata suricatta (*Suricate)
- *Cynictis penicillata* (Yellow mongoose)
- *Orycteropus afer* (Aardvark*)*

Domestic animals:

- *Equus ferus caballus* (Horse)
- *Equus africanus asinus* (Donkeys)
- *Ovis aries* (Sheep, specifically Dorper variety)

These species listed above are all considered typical species communities which inhabit Kalahari vegetation types. The areas to the west where most of the species activities were seen or signs located, indicate the western areas has more shelter available and did have increased shrub and thorn tree habitat which attracted more animal species than those found on the eastern borders. The western area of the pan is characterized by drainage lines and water will occur longer here after rain events. This is where most of the diggings and droppings were found along the dry drainage channels and more root-rich areas.

Several carcasses of antelope were found in the eastern borders, indicating the harsh environment and the suspected problematic fencing leading to the early demise of these animals. As nature intends, carcasses was visibly utilized by the predatory species in the area.

In accordance with the 2015 ToPS listing[2], several mammals are listed under "The Protected Species Species", listed because of their high conservation value and of national importance. The Aardvark, *Orycteropus afer*, is listed within this category with restricted activities requiring permits given as follows:

"In relation to an extensive wildlife system:

- *Having in possession or exercising physical control over specimens, excluding having in possession of specimens in a controlled environment;*
- *Causing specimens to multiply*"

5.1.2.2 Mammalian richness

An evaluation of the habitat type and the state of the environment leads to the assumption that there is moderate wildlife diversity and richness within this area. This is however typical of the Kalahari environment and animals living here are adapted for this conditions and lifestyle. The site investigation was conducted before summer rains, but this is typical conditions for the Kalahari. This might explain why most animals were in hiding and sightings were limited, due to harsh temperatures and climatic conditions predominant during the site visit (end October) in the Hakskeen Pan area. The presence and diversity assumption was mostly made on quantity of droppings and spoors found in bare patches and visible routes travelled by these animals.

The richness of all animals found during the study seemed to be highest in the western areas declining toward the eastern dryer parts of the pan.

5.1.3 Aves evaluation

The birds noted in the baseline study show that the species richness is high within the area. Most birds expected to be seen within the area are Near Passerine birds and Birds of Prey. This may be because of the sparse vegetation layer, and the availability of only shrub or tree layer within the area, mostly *Acacia* species, which provide suitable feeding and nesting possibilities for some tree dwelling species.

Important Avi-fauna was sighted in the field assessment, with protected statuses, refer below. These were only located to the far north of the site and to the western border. A rich avi-faunal community was captured in the Desktop assessment, which is attached as Appendix A to this report.

[2] Government Gazette Vol 597, 31 March 2015, No. 38600

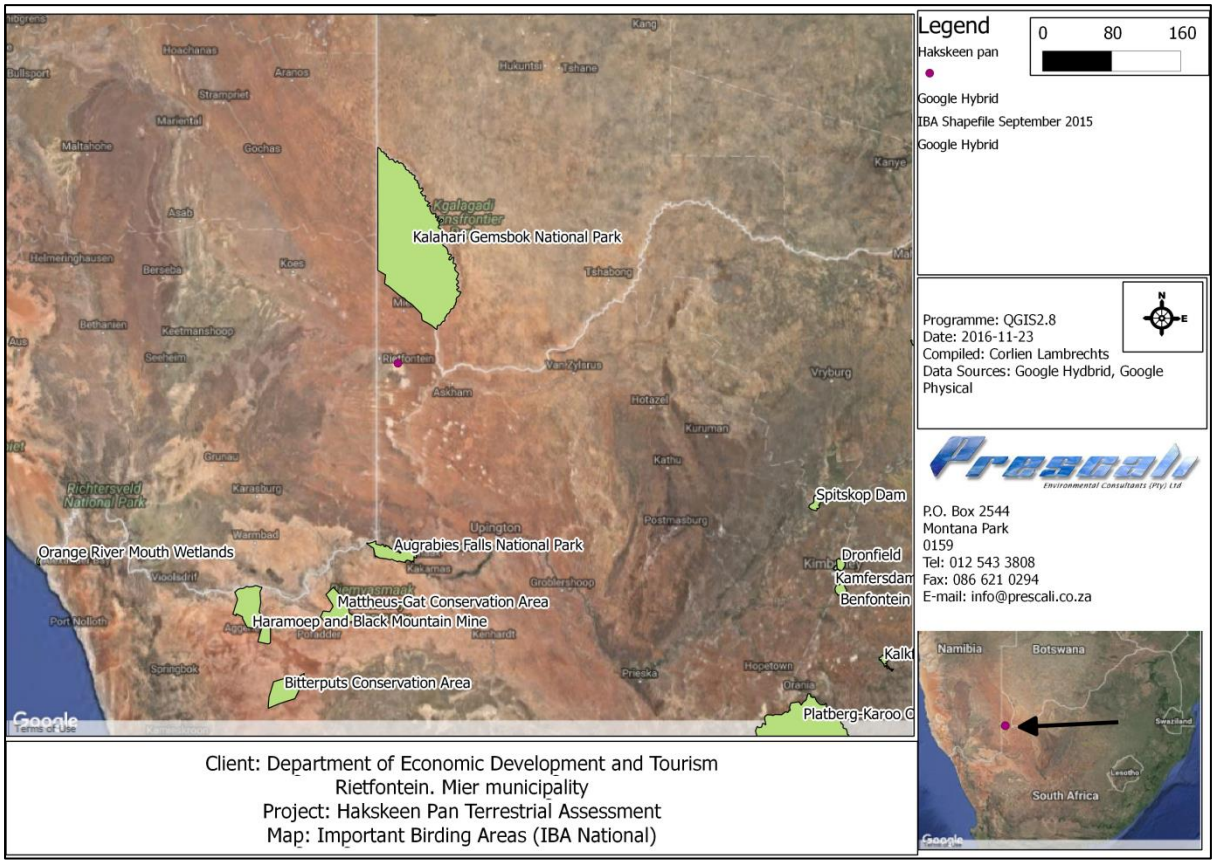


Figure 5-6: Nationally declared Important Birding Areas (IBA) 2016

5.1.3.1 Birds recorded

Specific and important bird species were recorded during the field survey:

- *Gyps africanus* (White-backed vulture) (Critically Endangered IUCN 3.1) and Endangered ToPS listed, 2015
- *Ardeotis kori* (Kori bustard) (Near-Threatened status in IUCN 3.1) and Protected ToPS 2013[3]
- *Phoenicopterus ruber* Flamingos, presumably Greater Flamingo apparently come to feed on the fairy shrimp when the pan is flooded.

General species of non-conservation concern:

- *Eremopterix griseus* (Ashy-crowned sparrow-lark)
- *Pterocles Namaqua* (Namaqua sandgrouse)
- *Philetairus socius* (Sociable weaver)
- *Ploceus cucullatus* (Village weaver)
- *Numida meleagris* (Helmeted or Common Guinea fowl)
- *Coturnix coturnix* (Common Quail)
- *Corythaixoides concolor* (Grey go-away bird, “Kwêhvoël”)
- *Falco amurensis* (Amur Falcon)
- *Tricholaema leucomelas* (Acacia pied Barbet)
- *Streptopelia semitorquata* (Red eyed dove)
- *Burhinus capensis* (The spotted thick-knee)
- *Corvus albus* (Pied Crow)
- *Dicrurus adsimilis* (Fork-Tailed Drongo)
- *Lamprotornis nitens* (Cape glossy starling)

[3] Seems it has been removed in the 2015 ToPS list

5.1.3.2 Birds that could occur in the area

A complete list of potential bird species occurring in the quarter degree cell was included at the foot of the document. Please refer to Appendix A.

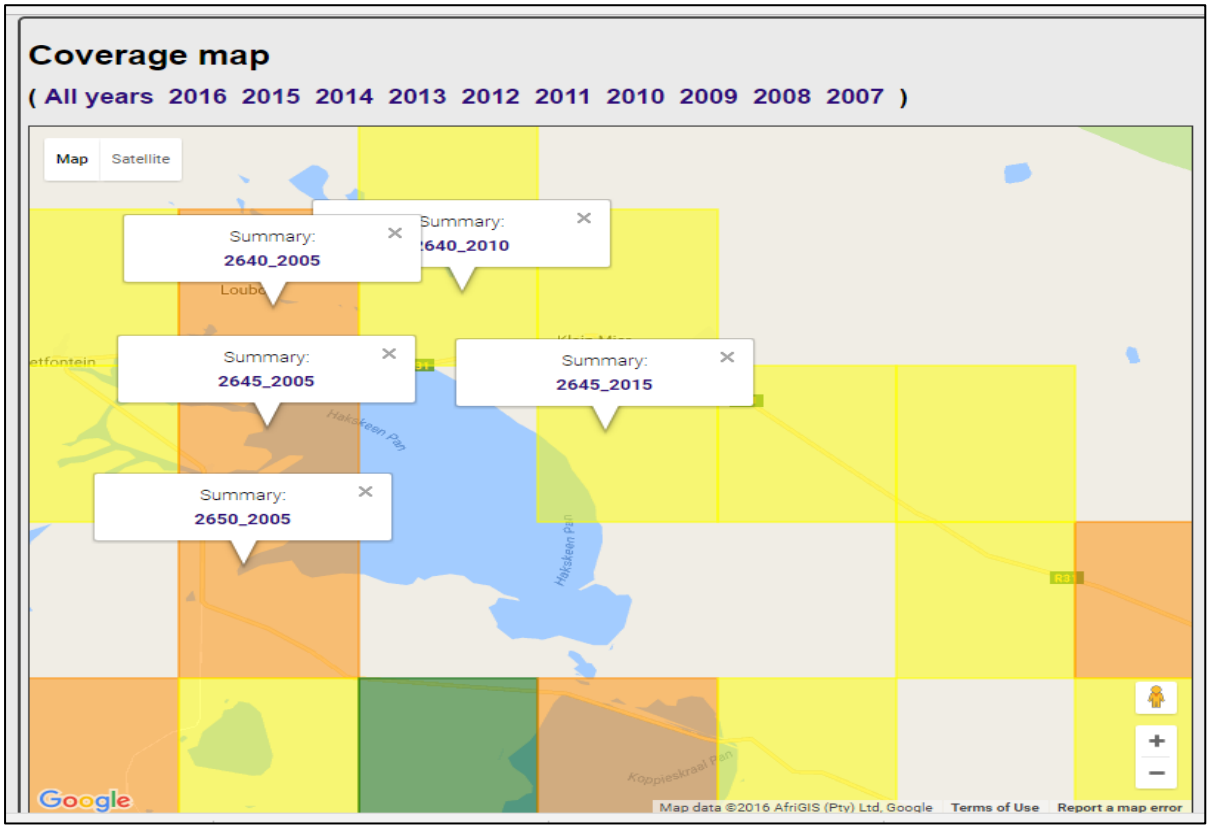


Figure 5-7: Coverage used to access SABAP 2 Database records

Several Birds of prey was sighted to the North, closer to the Kgalagadi Transfrontier Park. It is probable that the birds sighted will also have range within the area throughout Hakskeen Pan. The following birds were sighted and could therefor occur in the area:

- *Aquila rapax* (Tawny Eagle)
- *Terathopius ecaudatus* (Bateleur)
- *Polemaetus bellicosus* (Martial Eagle)
- *Sagittarius serpentarius* (Secretary bird) (Vulnerable in IUCN 3.1) and

5.1.4 Amphibian evaluation

The following limitations are associated with the finding in this regard:

- The survey was done during the summer months in the Southern hemisphere; the Hakskeen Pan environment was dry with no water. The fact that it is a salt pan, also suggest only the occurrence of reptiles, and presumably not amphibians.

The habitat type within the area implies that there are not many suitable areas or niches for these types of species. No surface water is present within the project site or near the Hakskeen Pan development. Sites with water is located toward the western border and further upstream associated with the river and various wetlands. None of these are close to the project area.

It is however important to note that the broader area mat contain other farm surface water areas which is not salt dominated, and therefore will be habitat for amphibians. These areas will not be impacted by the activities on Hakskeen Pan

5.1.5 Reptile evaluation[4]

During the field visit the following species was encountered in the field:

- *Trachylepsis spilogaster* (Kalahari tree skink),
- *Trachylepis sparsa* (Karasburg Tree Skink)
- Amphisbaenidae, spp unknown. (Round headed worm lizard)

It is however important to note that no Red data species occur within this area (according to SANBI database) and all species recorded during the baseline study is of the Least Concern status within the IUCN list. Below find a potential list of reptiles that have been recorded within the area during previous surveys and captured on the SANBI database.

Table 5-1: Reptile lists from SANBI ADU Virtual Museum (2620CA, 2620CD, 2620CC)

Family	Genus	Species	Common name	Red list category
Agamidae	*Agama*	*anchietae*	Anchieta's Agama	Least Concern
Lacertidae	*Pedioplanis*	*lineoocellata*	Spotted Sand Lizard	Least Concern
Scincidae	*Trachylepis*	*sulcata*	Western Rock Skink	Least Concern
Viperidae	*Bitis*	*xeropaga*	Desert Mountain Adder	Least Concern
Viperidae	*Bitis*	*schneideri*	Namaqua Dwarf Adder	Least Concern
Viperidae	*Bitis*	*cornuta*	Many-horned Adder	Least Concern
Viperidae	*Bitis*	*caudalis*	Horned Adder	Least Concern
Agamidae	*Agama*	*aculeata*	Common Ground Agama	Least Concern
Cordylidae	*Karusasaurus*	*polyzonus*	Karoo Girdled Lizard	Least Concern
Lacertidae	*Meroles*	*suborbitalis*	Spotted Desert Lizard	Least Concern
Lacertidae	*Nucras*	*tessellata*	Western Sandveld Lizard	Least Concern
Lacertidae	*Pedioplanis*	*lineoocellata*	Spotted Sand Lizard	Least Concern

5.1.6 Insect evaluation

Insects will not be considered within this document due to their abundance in the veld and low importance in the framework and objective of this study. Insects are considered to remain if habitat stays favorable. Insects are an important food source for other animals, such as the Aardvark burrows that was seen towards the western side of the pan. Insects are also mostly dependent on smaller scale variations and habitats and are unlikely to be disturbed due to activities happening in Hakskeen Pan. As activities on Hakskeen Pan will not result in significant vegetation destruction, minimal impacts are foreseen on insects in the regional sense.

Also, no species within the area are known to be threatened or listed on the global conservancy list (IUCN). All species should be protected by ensuring the EMP makes provision for adequate habitat protection to protect the various micro-habitats of these insects.

Only one group of the Insecta Class is considered within this report due to their importance and ecological significance within ecosystems and is easily impacted due to their sensitive nature.

5.1.6.1 Butterflies

Only one butterflies previously recorded within the area is mentioned within The South African LepiMAP: Atlas of African Lepidoptera.

[4] : Animal Demography Unit (2016). ReptileMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ReptileMAP on 2016-11-11

Table 5-2: Butterflies for 2620CC

Family	Genus	Species	Common name	Red list category
Pieridae	*Belenois*	*aurota*	Brown-veined white	Least Concern

Expanding the search to 2620 for the complete grid cell, the following list of records was produced. This will be representative of the larger area, including Hakskeen Pan. Please note that these species is not expected to occur on the pan itself, only in the surrounding areas as there are limited to no vegetation on the pan. These species will be dependent on their food source plants, which is mostly trees and shrubs, all located towards the northern and western areas of the Hakskeen Pan.

Table 5-3: Butterflies for the larger area, Degree cell 2620

Family	Genus	Species	Common name	Red list category
Arctiidae	*Utetheisa*	*pulchella*	Crimson-speckled flunkey	Not Evaluated (NE)
Crambidae	*Diaphania*	*indica*	Cucumber moth or cotton caterpillar	Not Evaluated (NE)
Geometridae	*Rhodometra*	*sacraria*	Vestal	Not listed
Hesperiidae	*Spialia*	*diomus*	Common sandman	Least Concern
Hesperiidae	*Spialia*	*mafa*	Mafa sandman	Least Concern
Lycaenidae	*Aloeides*	*damarensis*	Damara copper	Least Concern
Lycaenidae	*Aloeides*	*simplex*	Dune copper	Least Concern
Lycaenidae	*Azanus*	*jesous*	Topaz babul blue	Least Concern
Lycaenidae	*Azanus*	*ubaldus*	Velvet-spotted babul blue	Least Concern
Lycaenidae	*Chilades*	*trochylus*	Grass jewel	Least Concern
Lycaenidae	*Cigaritis*	*phanes*	Silvery bar	Least Concern
Lycaenidae	*Crudaria*	*leroma*	Silver spotted grey	Least Concern
Lycaenidae	*Lampides*	*boeticus*	Pea blue	Least Concern
Lycaenidae	*Zizeeria*	*knysna*	African grass blue	Least Concern
Noctuidae	*Cerocala*	*vermiculosa*	Vermiculous	Not Evaluated (NE)
Noctuidae	*Cyligramma*	*latona*	Cream-striped owl	Not Evaluated (NE)
Noctuidae	*Eustrotia*	*genuflexa*		Not Evaluated (NE)
Noctuidae	*Grammodes*	*stolida*	The geometrician	Not Evaluated (NE)
Noctuidae	*Sphingomorpha*	*chlorea*	Sundowner moth or Banana hawk	Not Evaluated (NE)
Nymphalidae	*Acraea*	*neobule*	Wandering donkey acraea	Least Concern
Nymphalidae	*Danaus*	*chrysippus alcippus*	African monarch (subspp. alcippus)	Not listed
Nymphalidae	*Danaus*	*chrysippus orientis*	African monarch, Plain tiger	Least Concern
Nymphalidae	*Junonia*	*hierta cebrene*	Yellow pansy	Least Concern
Nymphalidae	*Vanessa*	*cardui*	Painted lady	Least Concern
Papilionidae	*Papilio*	*demodocus*	Citrus swallowtail	Least Concern
Pieridae	*Belenois*	*aurota*	Brown-veined white	Least Concern
Pieridae	*Catopsilia*	*florella*	African migrant	Least Concern
Pieridae	*Colotis*	*euippe omphale*	Smoky orange tip	Least Concern
Pieridae	*Colotis*	*evenina*	Orange tip	Least Concern
Pieridae	*Pinacopteryx*	*eriphia*	Zebra white	Least Concern
Pieridae	*Pontia*	*helice*	Common meadow white	Least Concern
Pieridae	*Teracolus*	*agoye bowkeri*	Speckled sulphur tip	Least Concern
Pieridae	*Teracolus*	*eris*	Banded gold tip	Least Concern
Pieridae	*Teracolus*	*subfasciatus*	Lemon traveller	Least Concern

These are all species captured within the baseline study and was listed on SANBI database. All species are of Least Concern status according to the IUCN listing definitions.

Butterflies are sensitive due to small changes in habitat and climatic differentiations will affect the success of butterflies within the area. Vast clearances or change in vegetation may be detrimental for the species that reside here. The result will be that butterflies will migrate to avoid adverse environmental conditions, but only for short distances, thus suitable habitat should remain in close range of development activities. Butterflies are important contributors to pollination and are considered important biodiversity indicators, since many species have specific relationships with plant hosts and may give an indication of intact communities within habitat types.

It is important to note that many groups of invertebrates actually have the tendency to increase their overall diversity and abundance in disturbed areas such as edges around natural areas. This is because edge environments tend to have a high density of potential food plants as well as providing niches for other species that are not frequently recorded within the sampling area itself. This is the opposite of what one would expect in disturbed situations and is only noted in invertebrate species.

Species sighted during the assessment:

- Rhodometra sacraria (Vestal)
- *Danaus chrysippus orientis* (African monarch, Plain tiger)
- Colotis evenina (Orange tip)

5.1.7 Spiders and Scorpions

No scorpions were encountered during the field survey, but the area is expected to have a high density of spiders and scorpions. The following spiders were encountered during the field survey.:

- Agelenidae (Funnel-web spiders)
- *Theuma schultzei* (Free living ground dwelling spiders)

Baboon and Trapdoor spiders are also known to occur within these areas as well as several medicinally important spiders are known to occur, although not encountered during the field survey:

- *Loxosceles parramae* (Violin spider spp.)
- *Sicarius hahni* (Six-eyed sand spiders)

5.1.8 Crustacea

Branchinella is a crustacean genus in the family Thamnocephalidae. This Fairy shrimp genus is found across many parts of the world, but especially western Australia and southern Africa. The Hakskeen Pan is home to the Fairy shrimps and they are extremely sensitive to pollution and easily affected by habitat destruction.

Several species are threatened by habitat destruction, and *B. latzi* might be extinct. The latter species was formerly found in waterholes at Uluru, but these have become polluted with urine and faeces of hikers, and the shrimp was absent in a recent survey. This should be taken account into the water management on the Hakskeen Pan as to not contaminate the area in such a way that may affect the fairy shrimp populations when the pan is flooded.

5.1.9 Summary of Field Assessment Result

Table 5-4: Summary of species sighted during field assessment

Family	Genus	Species	Subspecies	Common name	Status
Canidae	*Canidae*	*canis*		Jackal	LC
Felidae	*Caracal*	*Caracal*		Caracal	LC
Pedetidae	*Pedetes*	*capensis*		(Spring hare)	LC
Sciuridae	*Xerus*	*inauris*		(Cape ground squirrel	LC
Muridae	*Lemniscomys*	*spp*		(Striped grass	LC

Family	Genus	Species	Subspecies	Common name	Status
				mouse	
Muridae	*Rhabdomys*	*pumilio*		(Four-striped grass mouse	LC
Bovidae	*Sylvicapra*	*grimmia*		(Common duiker	LC
Bovidae	*Raphicerus*	*campestris*		(Steenbok)	LC
Bovidae	*Aepyceros*	*melampus*		(Impala)	LC
Bovidae	*Antidorcas*	*marsupialis*		(Springbok)	LC
Herpestidae	*Suricata*	*suricatta*		(Suricate)	LC
Cynictis	*penicillata*	*penicillata*		(Yellow mongoose)	LC
Orycteropodidae	*Orycteropus*	*afer*		(Aardvark)	LC, Tops Protected
Equidae	*Equus*	*ferus*	*caballus*	(horse)	Domestic
Equidae	*Equus*	*africanus*	*asinus*	(Donkeys)	Domestic
Bovidae	*Ovis*	*aries*		(Sheep)	Domestic
Accipitridae	*Gyps*	*africanus*		(white-backed vulture)	CE (IUCN 3.1) and ToPs EN
Otididae	*Ardeotis*	*kori*		(kori bustard)	NT (IUCN 3.1) and ToPS Protected
Sagittariidae	*Sagittarius*	*serpentarius*		(Secretary bird)	VU (IUCN 3.1)
Phoenicopteridae	*Phoenicopterus*	*ruber*		Presumably greater flamingo	LC
Alaudidae	*Eremopterix*	*griseus*		(ashy-crowned sparrow-lark)	LC
Pteroclididae	*Pterocles*	*Namaqua*		(Namaqua sandgrouse)	LC
Passeridae	*Philetairus*	*socius*		(sociable weaver	LC
Passeridae	*Ploceus*	*cucullatus*		(Village weaver	LC
Numididae	*Numida*	*meleagris*		(Helmeted Guinefowl	LC
Phasianidae	*Coturnix*	*coturnix*		(Common Quail)	LC
Musophagidae	*Corythaixoides*	*concolor*		(Grey go-away bird	LC
Falconidae	*Falco*	*amurensis*		(Amur Falcon)	LC
Lybiidae	*Tricholaema*	*leucomelas*		(Acacia pied barbet	LC
Columbidae	*Streptopelia*	*semitorquata*		(Red eyed dove)	LC
Burhinidae	*Burhinus*	*capensis*		(The spotted thick-knee)	LC
Corvidae	*Corvus*	*albus*		Pied Crow	LC
Dicruridae	*Dicrurus*	*adsimilis*		Fork-Tailed Drongo	LC
Sturnidae	*Lamprotornis*	*nitens*		Cape glossy starling	LC
Accipitridae	*Aquila*	*rapax*		Tawny Eagle	LC, ToPS VU
Accipitridae	*Terathopius*	*ecaudatus*		(Bateleur)	NT (IUCN 3.1), ToPS VU
Accipitridae	*Polemaetus*	*bellicosus*		(Martial Eagle)	VU (IUCN 3.1) ToPS VU
Order: Anostraca	*Spp unknown*			Fairy shrimp	LC
Scincidae	*Trachylepsis*	*spilogaster*		Kalahari tree skink	LC
Scincidae	*Trachylepis*	*sparsa*		Karasburg Tree Skink	LC
Amphisbaenidae	*Amphisbaenidae*	*spp*		Round headed worm lizzard	LC
Geometridae	*Rhodometra*	*sacraria*		Vestal	LC
Nymphalidae	*Danaus*	*chrysippus*	*orientis*	African Monarch	LC
Pieridae	*Colotis*	*evenina*			LC
Agelenidae	*Agelenidae*	*spp*		Funnel weavers	LC
Sparassidae	*spp*			Huntsman	LC
Gnaphosidae	*spp*			Ground spiders	LC

6 ENVIRONMENTAL IMPACT ASSESSMENT

All forms of development, albeit for mining, industrial, urban or residential purposes, will have an immediate effect on the natural environment. It is therefore of utmost importance to provide information on the environmental consequences these activities will have and to inform the decision-makers thereof.

This assessment will determine the potential impacts on the fauna and habitat of the proposed Bloodhound activities at the Hakskeen project and the aspects that will be determined are the:

- Future impacts on the fauna and habitat required to sustain ecological wellbeing deriving from the proposed activities.
- Mitigation procedures that need to be followed for all significant impacts.
- Proposed factors that would require further study and/or more specialized studies.

An explanation of the impact assessment criteria is defined below in Table 6 1.

6.1 Methodology

The results of the specialist studies were analysed and interpreted in order to assess the potential impacts, which the proposed development may inflict on bio-physical and social systems, devise potential alternatives with respect to selected activities and the development of necessary mitigation measures in order to minimise negative impacts and optimise positive impacts. The specialist recommendations were also incorporated into the Environmental Management Programme (**Part B**). The activities were described in the project description were assessed in terms of direct, indirect as well as cumulative impacts, where possible.

6.1.1 Specialist Impact Identification and Assessment

The specialist specifically differentiated between the environmental impacts associated with the construction, operation and maintenance of the Hakskeen Pan development. As far as possible, the specialists were required to quantify the suite of potential environmental impacts identified in their studies and assess the significance of the impacts. Each impact was assessed and rated. For the purposes of this scoping process, the term ‘assessment’ refers to “the process of collecting, organising, analysing, interpreting and communicating data relevant to some decisions” (Stauth, Sowman, & Grindley, 1993). The assessment of the data was, where possible, based on accepted scientific techniques, failing which, the specialists made judgements based on their professional expertise and experience.

6.1.2 Assessment Criteria

The criteria for the description and assessment of environmental impacts were drawn from the EIA Guidelines (DEAT, Environmental Impact Assessment Guidelines., 1998) and as amended from time to time (DEAT, Impact Significance, Integrated Environmental Management, Information series 5., 2002).

The level of detail as depicted in the EIA Guidelines (DEAT, Environmental Impact Assessment Guidelines., 1998) (DEAT, Impact Significance, Integrated Environmental Management, Information series 5., 2002)) was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

An explanation of the impact assessment criteria is defined below.

Table 6-1: Explanation of the EIA criteria

EXTENT	
Classification of the physical and spatial scale of the impact	
Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
Site	The impact could affect the whole, or a significant portion of the site.
Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
National	The impact could have an effect that expands throughout the country (South Africa).
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
DURATION	
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.	
Short term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.
Short to Medium term	The impact will be relevant through to the end of a construction phase (1.5 years)
Medium term	The impact will last up to the end of the development phases, where after it will be entirely negated.
Long term	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
INTENSITY	
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as	
Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
PROBABILITY	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.
Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

The status of the impacts and degree of confidence with respect to the assessment of the significance must be stated as follows:

- **Status of the impact** - A description as to whether the impact would be positive (a benefit), negative (a cost), or neutral.
- **Degree of confidence in predictions** - The degree of confidence in the predictions, based on the availability of information and specialist knowledge.

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the proposed development, including construction, operation and decommissioning.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and

cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

6.1.3 Mitigation

The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

6.1.3.1 Determination of Significance – Without Mitigation

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as "positive". Significance is rated on the following scale:

NO SIGNIFICANCE	The impact is not substantial and does not require any mitigation action.
LOW	The impact is of little importance, but may require limited mitigation.
MEDIUM	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
HIGH	The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

6.1.3.2 Determination of Significance – With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

NO SIGNIFICANCE	The impact will be mitigated to the point where it is regarded as insubstantial.
LOW	The impact will be mitigated to the point where it is of limited importance.
LOW TO MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.
MEDIUM	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
MEDIUM TO HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
HIGH	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

6.1.4 Assessment Weighting

Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it was necessary to weigh and rank all the criteria.

6.1.4.1 Ranking, Weighting and Scaling

For each impact under scrutiny, a scaled weighting factor is attached to each respective impact (refer to Table 6-2). The purpose of assigning weights serves to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is taken into

account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

Table 6-2: Description of assessment parameters with its respective weighting

EXTENT		DURATION		INTENSITY		PROBABILITY		WEIGHTING FACTOR (WF)		SIGNIFICANCE RATING (SR)	
Footprint	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19
Site	2	Short to Medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39
Regional	3	Medium term	3	Medium	3	Likely	3	Medium	3	Medium	40-59
National	4	Long term	4			Highly Likely	4	Medium to High	4	Medium to High	60-79
International	5	Permanent	5	High	5	Definite	5	High	5	High	80-100

MITIGATION EFFICIENCY (ME)		SIGNIFICANCE FOLLOWING MITIGATION (SFM)	
High	0,2	Low	0-19
Medium to High	0,4	Low to Medium	20-39
Medium	0,6	Medium	40-59
Low to Medium	0,8	Medium to High	60-79
Low	1,0	High	80-100

6.1.4.2 Identifying the Potential Impacts Without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x Weighting Factor

6.1.4.3 Identifying the Potential Impacts With Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation effectiveness (ME) rating (refer to Table 6-2). The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

or WM = WOM x ME

6.1.4.4 Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

6.1.5 Legal requirements

The specialist should identify and list the relevant South African legislation and permit requirements pertaining to the development proposals. He/she should provide reference to the procedures required to obtain permits and describe whether the development proposals contravene the applicable legislation.

7 IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 Terrestrial impact assessment for Hakskeen Pan development

The assessment was conducted with up to date resources and the site visit was conducted as thoroughly as possible. It might however be possible that additional information become available in time, because environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the report be viewed and acted upon with these limitations in mind.

To perform an exhaustive fauna survey of a study area requires an extensive amount of time (years) due to the very secretive and unpredictable movements of most reptile and mammal species and the migratory movements of bird species across seasons and time scales. Results of fauna field surveys are limited by time and funding availability as well as the movement/activity patterns of the herpetofauna, avifauna and mammalian community during the survey period. As a result, typical herpetofauna, avifauna and mammalian communities found within the study should/can therefore only be used as a general guideline.

7.1.1 Impacts of construction activities on the faunal communities

Most of the impacts on faunal species will occur during the construction phase of the campsites, the fuel depot and associated infrastructure, as most of the concentrated movement and activities will take place during this phase and thus habitat loss for the various faunal species that are dependent on floral communities for shelter and food.

As a result of the sudden increase in activities, humans, noise and vehicles, possible fragmentation, degradation or compression may occur, especially if vehicles are not kept to the demarcated roads. Roads may also lead to an increase in erosion especially on the edges. Storing of construction materials, mixing of concrete or collection and delivering could result in pollution.

Invasive and/or exotic species could become established in the area. These species may also compete with indigenous species and will degrade the surrounding condition by destroying the sparse vegetation that already characterises the area.

Possible mitigation measures:

A management plan for the control of invasive and exotic plant species needs to be implemented. Specialist advice should be used in this regard, refer to the vegetation study as to invasive identified on-site. Priority species should be identified first, in this case, the category invaders, and a management plant should be established for each of the priority species. This plan should include pre-treatment, initial treatment and follow-up treatment and should be planned and budgeted for in advance.

A control of access should be implemented for all remaining natural areas to prevent unnecessary destruction of habitats or disturbance of species. Human and vehicles movement should stay out of the dunes as well. It is also vital that no additional fragmentation occurs and that all roads are clearly demarcated and kept to a minimum without any exceptions. No vehicles or personnel are permitted outside of these demarcated roads.

Maintenance of roads should be implemented. It is vital that if any endemic, rare or vulnerable species occurs on the proposed site or encountered that these species should be protected and/or left undisturbed. Only as an exception can these species be relocated to favourable sites with the use of a specialist prior to vegetation and habitat removal. Threatened species are not allowed to be disturbed in any way.

Potential impact predicted on Fauna during construction		
	No Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	High (5)	High (5)
Probability	Definite (5)	Definite (5)
Weighting factor	Medium-High (4)	Medium-High (4) x 0.6 ME
Significance Rating (SR)	Medium (56)	Low to Medium (33.6)

7.1.2 Impacts of operational activities on the faunal communities

Once in operation the activity may have an increase of traffic in the area, but only for short bursts of time. Pathways should be clearly demarcated and kept to.

Exotic/invasive species may become established and be distributed. The category invaders that are currently within the area may be distributed to other areas as well. If not managed and eradicated before they are distributed, these species will become a serious problem in the future.

Staff and visitors will access remaining natural areas if not prohibited. Trampling and compaction is a threat in certain vegetated areas. In time prolonged activity and movement of humans into the outcrops of the pan areas will decrease the natural condition thus decreasing the already limited carrying capacity of the local environment. Bush encroachment or desertification may also become a problem if the access control is not strictly managed and applied.

Possible mitigation measures:

Priority species, such as the protected birds, specifically nests if encountered should be identified first and a management plan should be established for each of the priority species. Control access within demarcated zones and strictly implement it. This may prevent bush encroachment or desertification of the outcrops of the pan from occurring.

Maintenance of roads should be implemented. This includes soil humps to reduce speed or speed limit indication. It is recommended that no activity be on the pan after rains and until the soil has completely dried out. This will prevent the water contamination, compaction and prevent major erosion (caused by human activities and vehicles).

Continuous rehabilitation and clean-up of the area should be implemented during the operational phase.

Ensure awareness amongst all staff, contractors and visitors to site to not needlessly damage vegetation or hinder animals encountered and ensure they stay clear from the remaining natural

areas as far as possible.

Limit activities (transport etc.) to the smallest area possible. This is to prevent fragmentation that may have irreversible changes to faunal communities. It also increases the invasion of alien/foreign species.

Potential impact predicted on Fauna during operational phase		
	No Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)
Duration	Permanent (4)	Permanent (4)
Magnitude	Medium (3)	Low (1)
Probability	Definite (5)	Definite (5)
Weighting factor	Medium-High (4)	Medium-High (4) x 0.8 ME
Significance Rating (SR)	Medium-High (60)	Medium (41.6)

7.1.3 Impacts of decommissioning phase on the fauna communities

Increased activity and traffic within a shorter timeframe (closure phase) may degrade the area. The possibility exists for rehabilitation to be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance. Rehabilitation plans should be planned long before the closure phase is due. Continuous rehabilitation should also take place during the operational phase.

Most of the impacts on floral and faunal species will occur during the construction- and operational phases. Final steps in the rehabilitation process will take place. Without the necessary mitigation measures, rehabilitation will be unsuccessful and the environment will not be self-sustaining. If these mitigation measures are not planned well in advance before the rehabilitation phase commences, the rehabilitation process will be unsuccessful.

Possible mitigation measures:

To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.

Activities on site must comply with the regulations of the Animal Protection Act 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act.

Ensure that an acceptable aesthetic scenario is created post closure. This will be reached through adequate rehabilitation practices by restoring damaged and degraded habitat areas.

When closure is considered successful and rehabilitation complete, unnecessary fences should be lifted to restore larger foraging areas, especially for larger mammalian species within the area.

Potential impact predicted on Fauna during decommissioning phase		
	No Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (5)	High (5)
Probability	Highly likely (4)	Highly likely (4)
Weighting factor	Medium (3)	Medium (3) x 0.6 ME
Significance Rating (SR)	Medium (48)	Low-Medium (28.8)

7.1.4 Cumulative impacts if Hakskeen Pan becomes permanent outdoor arena

Incremental losses and fragmentation of habitat are two of the more serious cumulative impacts in terms of fauna and flora. Given the largely intact nature of the surrounding landscape, the characteristics and sensitivity of the affected area, the nature of the proposed development, the potential for cumulative impacts are expected to be high.

It was not realistically possible to perform an impact assessment for the cumulative impacts of the Hakskeen Pan as the level of activity and future plans is unknown after the Bloodhound speedweek is done. At the time of the compilation of this report recommendations for planning mitigation measures are given to alleviate long term stress on the Hakskeen Pan:

- Allow long time periods between events and especially larger events. This will give the pan and the region sufficient time to recover and communities to spread back to larger ranges. Not sufficient recovery time will lead to isolation of species to certain areas and if these areas are not favorable for long term habitation, the majority of species will move away from the pan.
- No activity should be on the Hakskeen Pan during or directly after rains and flooding of the pan. The ground should be allowed adequate time to dry out after rain events.
- Clean up and maintenance should occur after every event

8 TERRESTRIAL MANAGEMENT PLAN

8.1 CONSTRUCTION AND OPERATIONAL PHASE OF BLOODHOUND SPEEDWEEK

8.1.1 Aims and Objectives

- Prevent the needless loss of or damage to habitat particularly with regard to sensitive areas as identified to the west of the Hakskeen Pan.
- Prevent death, injury or hindrance to fauna particularly with regard to protected species.
- Prevent significant alteration to the ecosystems in the area.
- Control the introduction of alien invasive species to the area.
- Establish a monitoring programme for early detection of alien invasive species and establish an alien invasive eradication and control programme over the long run if the pan is deemed to become an permanent outdoor arena.

8.1.2 Fauna Mitigation and Management measures

8.1.2.1 Fauna Management

- Ensure awareness amongst all staff, contractors and visitors to site to not needlessly harm or hinder animals or damage flora.
- Allow animals to escape areas of activity freely and do not hinder their movement.
- Have a policy in place to prohibit hunting (rifles, snares, dogs). These conditions should be written into contractors agreements, with strict penalty clauses. Employees engaging in any of these activities should be faced with disciplinary action.
- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.
- Have a policy in place preventing domesticated animals for being kept on site.
- Domestic cats should be managed and preferably neutered to prevent large domestic cat populations that will utilize the natural bushveld as hunting and breeding areas (they will act as "unnatural predators" that is introduced with quick breeding cycles and populations will easily escalate if left unchecked). They will destroy bird populations within the area, as well as impact

smaller mammalian species which will have detrimental effects on the natural environment. Several instances are documented where domestic cats have destroyed natural areas due to unchecked numbers and will lead to degraded state of pristine areas and populations.

- Activities on site must comply with the regulations of the Animal Protection Act 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act.
- All activities should be restricted to the designated areas within the farm and activity and access into larger intact areas should be avoided at all cost. Strict measurements should be implemented. No foraging, food and wood collecting within the natural areas should be allowed.
- A strict policy should be developed and communicated to all employees in terms of injured animals and prescribed plan of action in such a case scenario.
- Activity and housing of workers should be kept out of restricted areas.
- All noisy equipment should be mitigated to lessen the sound levels as well as vibration levels should be controlled to limit impact on biodiversity and sensitive species.
- Large undisturbed natural areas should be designated from the planning phase and should remain intact throughout the lifetime of the proposed.

8.1.3 Monitoring

- Daily visual assessment of areas during the Bloodhound speed week to determine if vegetation in undisturbed areas is being impacted.
- For the long term development of the Hakskeen Pan, it is recommended to conduct annual biodiversity monitoring of areas both affected and unaffected by activities to determine annual fluctuation in species numbers and if necessary relate this to activities on site.
- Establish a monitoring programme for early detection of alien invasive species and establish and alien invasive awareness, eradication and control programme.

8.1.4 General Mitigation and Management

General

- Protect and preserve all surrounding areas by strict access control

Traffic

- Ensure trucks and vehicles remain on roads and areas designated as construction site to limit disturbance to areas unaffected by construction.
- Ensure drivers are informed that off-road travelling is prohibited
- Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits.

Spills from the Fuel Depot

- Regularly inspect and maintain equipment to reduce risk of hydrocarbon leaks, and have communication channels set up to report incidences and action plans in place to address issues immediately.
- Report all incidences immediately and have action plans in place to deal with any issues arising immediately.

Dust

- Have dust suppression mechanisms in place during the Bloodhound speed week.

Noise

- To mitigate noise during the speed week will be difficult and almost impossible. The fact that the Bloodhound speed week is a short term event will lessen the impact on the natural environment.

Housekeeping

- Ensure adequate domestic waste bins are supplied and that domestic waste is removed by a reputable contractor. Adhere to the waste management plan.
- Erect posters to educate staff about the dangers of littering and dangers of damaging sensitive and endemic plant species they may encounter.

8.2 DECOMMISIONING OF INFRASTRUCTURE

8.2.1 Aims and Objectives

- Prevent needless loss of or damage to flora particularly with regard to protected and endemic species.
- Prevent death, injury or hindrance to fauna particularly with regard to protected species.
- Prevent alien invasive species introduction.

8.2.2 Fauna Mitigation and Management measures

8.2.2.1 Fauna Management

- Ensure awareness amongst all staff, contractors and visitors to the site to not needlessly harm or hinder animals. At this stage after completion of activities and specifically speedweek, all possible infrastructures should be removed and clean up should commence removing all waste, glass and any items not on the pan before development.
- General management in terms of dust and traffic control will ensure low hindrance to the fauna communities and should be adequate.

8.2.3 Monitoring

- Continue with annual biodiversity monitoring. Include biodiversity monitoring sites in rehabilitated areas to determine if these are improving with regard to habitat.
- Continue with alien invasive monitoring, eradication and control programme.

9 CONCLUSIONS

The desktop study indicated that species of conservation importance might occur in the area (avifauna); however, seven (7) species found during the field assessment had a conservation importance status.

The faunal assessment showed that seven (7) red data species (either ToPS protected or IUCN, or both) were found in the region for the area in which Hakskeen Pan is located. However, most of these species had focused activity on the western border of the pan where the development is minimal and in most cases the habitat there will remain undamaged, if well mitigated.

The larger area and the center of the Hakskeen Pan were investigated as thoroughly as possible due to movement restraints to protect the integrity of the soil of the pan.

The habitat integrity was found to be in an intact manner for the area and especially on the western side signs of movement and activity were sighted. No animals or movement were observed on the pan itself, as it is extremely dry and hot, reaching temperatures above 40 degrees. The soil was found to be compacted, which is expected from a pan, which in essence is a closed system.

To the eastern side of the pan, there are signs of human intervention, particularly where the tower and ablution buildings are located. The field visit was held approximately a week after a larger camping

out event and after a week minimal signs of human disturbance were visible due to the hardy nature of the soil and the environment.

If all mitigation measures are adhered to and implemented, the impact is considered to be low on a regional scale. The EMP should make adequate provision to protect and control local animal populations and the impacting activities that the development will have on these community structures and habitat integrity within the Hakskeen Pan development.

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National Legislation of South Africa:

- NEMBA: National Environmental Biodiversity Act (Act 10 of 2004)
- Threatened or Protected Species (ToPS List);
- Species lists published in the Government Gazette No 29657 of 23 February 2007
- LEMA: Limpopo Environmental Act (Act No. 7 of 2003)

Internet Databases:

Web: Biodiversityexplorer.org
SANBI Database: www. sanbi.org
SANBI GIS: www.bgis.sanbi.org

Appendix A
Avi-Fauna Baseline study

QDGC	Common_name	Taxon_name
QDGC	Common_name	*Taxon_name*
2620CC	Ostrich, Common	*Struthio camelus*
2620CC	Goose, Egyptian	*Alopochen aegyptiacus*
2620CC	Teal, Cape	*Anas capensis*
2620CC	Teal, Red-billed	*Anas erythrorhyncha*
2620CC	Duck, African Black	*Anas sparsa*
2620CC	Shelduck, South African	*Tadorna cana*
2620CC	Barbet, Acacia Pied	*Tricholaema leucomelas*
2620CC	Kingfisher, Malachite	*Alcedo cristata*
2620CC	Bee-eater, European	*Merops apiaster*
2620CC	Mousebird, White-backed	*Colius colius*
2620CC	Mousebird, Red-faced	*Urocolius indicus*
2620CC	Cuckoo, Diderick	*Chrysococcyx caprius*
2620CC	Cuckoo, Jacobin	*Clamator jacobinus*
2620CC	Swift, Little	*Apus affinis*
2620CC	Swift, Common	*Apus apus*
2620CC	Swift, Bradfield's	*Apus bradfieldi*
2620CC	Palm-swift, African	*Cypsiurus parvus*
2620CC	Eagle-owl, Spotted	*Bubo africanus*
2620CC	Nightjar, Rufous-cheeked	*Caprimulgus rufigena*
2620CC	Pigeon, Speckled	*Columba guinea*
2620CC	Dove, Namaqua	*Oena capensis*
2620CC	Turtle-dove, Cape	*Streptopelia capicola*
2620CC	Dove, Laughing	*Streptopelia senegalensis*
2620CC	Korhaan, Northern Black	*Afrotis afraoides*
2620CC	Bustard, Kori	*Ardeotis kori*
2620CC	Korhaan, Karoo	*Eupodotis vigorsii*
2620CC	Bustard, Ludwig's	*Neotis ludwigii*
2620CC	Coot, Red-knobbed	*Fulica cristata*
2620CC	Moorhen, Common	*Gallinula chloropus*
2620CC	Sandgrouse, Namaqua	*Pterocles namaqua*
2620CC	Sandpiper, Wood	*Tringa glareola*
2620CC	Sandpiper, Marsh	*Tringa stagnatilis*
2620CC	Thick-knee, Spotted	*Burhinus capensis*
2620CC	Plover, Kittlitz's	*Charadrius pecuarius*
2620CC	Plover, Three-banded	*Charadrius tricollaris*
2620CC	Stilt, Black-winged	*Himantopus himantopus*
2620CC	Avocet, Pied	*Recurvirostra avosetta*
2620CC	Lapwing, Blacksmith	*Vanellus armatus*
2620CC	Lapwing, Crowned	*Vanellus coronatus*
2620CC	Eagle, Booted	*Aquila pennatus*
2620CC	Eagle, Verreaux's	*Aquila verreauxii*

2620CC	Snake-eagle, Black-chested	*Circaetus pectoralis*
2620CC	Vulture, White-backed	*Gyps africanus*
2620CC	Goshawk, Southern Pale Chanting	*Melierax canorus*
2620CC	Vulture, Lappet-faced	*Torgos tracheliotus*
2620CC	Falcon, Lanner	*Falco biarmicus*
2620CC	Kestrel, Greater	*Falco rupicoloides*
2620CC	Kestrel, Rock	*Falco rupicolus*
2620CC	Falcon, Pygmy	*Polihierax semitorquatus*
2620CC	Grebe, Little	*Tachybaptus ruficollis*
2620CC	Night-Heron, Black-crowned	*Nycticorax nycticorax*
2620CC	Ibis, African Sacred	*Threskiornis aethiopicus*
2620CC	Fiscal, Common (Southern)	*Lanius collaris*
2620CC	Shrike, Lesser Grey	*Lanius minor*
2620CC	Batis, Pririt	*Batis pririt*
2620CC	Brubru, Brubru	*Nilaus afer*
2620CC	Bokmakierie, Bokmakierie	*Telophorus zeylonus*
2620CC	Flycatcher, Chat	*Bradornis infuscatus*
2620CC	Flycatcher, Marico	*Bradornis mariquensis*
2620CC	Chat, Familiar	*Cercomela familiaris*
2620CC	Chat, Karoo	*Cercomela schlegelii*
2620CC	Chat, Tractrac	*Cercomela tractrac*
2620CC	Scrub-robin, Karoo	*Cercotrichas coryphoeus*
2620CC	Scrub-robin, Kalahari	*Cercotrichas paena*
2620CC	Chat, Anteating	*Myrmecocichla formicivora*
2620CC	Wheatear, Mountain	*Oenanthe monticola*
2620CC	Wheatear, Capped	*Oenanthe pileata*
2620CC	Myna, Common	*Acridotheres tristis*
2620CC	Tit, Ashy	*Parus cinerascens*
2620CC	Martin, Rock	*Hirundo fuligula*
2620CC	Bulbul, African Red-eyed	*Pycnonotus nigricans*
2620CC	Cisticola, Desert	*Cisticola aridulus*
2620CC	Warbler, Rufous-eared	*Malcorus pectoralis*
2620CC	Prinia, Black-chested	*Prinia flavicans*
2620CC	White-eye, Orange River	*Zosterops pallidus*
2620CC	Eremomela, Yellow-bellied	*Eremomela icteropygialis*
2620CC	Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*
2620CC	Crombec, Long-billed	*Sylvietta rufescens*
2620CC	Lark, Karoo Long-billed	*Certhilauda subcoronata*
2620CC	Lark, Spike-heeled	*Chersomanes albofasciata*
2620CC	Lark, Stark's	*Spizocorys starki*
2620CC	Sparrowlark, Grey-backed	*Eremopterix verticalis*
2620CC	Lark, Fawn-coloured	*Calendulauda africanoides*
2620CC	Lark, Sabota	*Calendulauda sabota*
2620CC	Lark, Eastern Clapper	*Mirafra fasciolata*

2620CC	Sunbird, Dusky	*Cinnyris fuscus*
2620CC	Finch, Red-headed	*Amadina erythrocephala*
2620CC	Wagtail, Cape	*Motacilla capensis*
2620CC	Sparrow, Southern Grey-headed	*Passer diffusus*
2620CC	Sparrow, House	*Passer domesticus*
2620CC	Sparrow, Cape	*Passer melanurus*
2620CC	Weaver, Sociable	*Philetairus socius*
2620CC	Sparrow-weaver, White-browed	*Plocepasser mahali*
2620CC	Masked-weaver, Southern	*Ploceus velatus*
2620CC	Pytilia, Green-winged	*Pytilia melba*
2620CC	Quelea, Red-billed	*Quelea quelea*
2620CC	Finch, Scaly-feathered	*Sporopipes squamifrons*
2620CC	Waxbill, Violet-eared	*Granatina granatina*
2620CC	Bunting, Lark-like	*Emberiza impetuani*
2620CC	Canary, Black-headed	*Serinus alario*
2620CC	Canary, White-throated	*Crithagra albogularis*
2620CC	Canary, Yellow	*Crithagra flaviventris*
2620CC	Ostrich, Common	*Struthio camelus*
2620CC	Goose, Egyptian	*Alopochen aegyptiacus*
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2620CC	Lark, Karoo Long-billed	*Certhilauda subcoronata*
2620CC	Lark, Spike-heeled	*Chersomanes albofasciata*
2620CC	Lark, Stark's	*Spizocorys starki*
2620CC	Sparrowlark, Grey-backed	*Eremopterix verticalis*
2620CC	Lark, Fawn-coloured	*Calendulauda africanoides*
2620CC	Lark, Sabota	*Calendulauda sabota*
2620CC	Lark, Eastern Clapper	*Mirafra fasciolata*
2620CC	Sunbird, Dusky	*Cinnyris fuscus*
2620CC	Finch, Red-headed	*Amadina erythrocephala*
2620CC	Wagtail, Cape	*Motacilla capensis*
2620CC	Sparrow, Southern Grey-headed	*Passer diffusus*
2620CC	Sparrow, House	*Passer domesticus*
2620CC	Sparrow, Cape	*Passer melanurus*
2620CC	Weaver, Sociable	*Philetairus socius*
2620CC	Sparrow-weaver, White-browed	*Plocepasser mahali*
2620CC	Masked-weaver, Southern	*Ploceus velatus*
2620CC	Pytilia, Green-winged	*Pytilia melba*
2620CC	Quelea, Red-billed	*Quelea quelea*
2620CC	Finch, Scaly-feathered	*Sporopipes squamifrons*
2620CC	Waxbill, Violet-eared	*Granatina granatina*
2620CC	Bunting, Lark-like	*Emberiza impetuani*
2620CC	Canary, Black-headed	*Serinus alario*
2620CC	Canary, White-throated	*Crithagra albogularis*
2620CC	Canary, Yellow	*Crithagra flaviventris*
2620CD	Goose, Egyptian	*Alopochen aegyptiacus*
2620CD	Woodpecker, Cardinal	*Dendropicos fuscescens*
2620CD	Barbet, Acacia Pied	*Tricholaema leucomelas*
2620CD	Mousebird, White-backed	*Colius colius*
2620CD	Pigeon, Speckled	*Columba guinea*
2620CD	Dove, Namaqua	*Oena capensis*
2620CD	Turtle-dove, Cape	*Streptopelia capicola*
2620CD	Dove, Laughing	*Streptopelia senegalensis*
2620CD	Korhaan, Northern Black	*Afrotis afraoides*
2620CD	Bustard, Kori	*Ardeotis kori*
2620CD	Korhaan, Red-crested	*Lophotis ruficrista*
2620CD	Korhaan, Karoo	*Eupodotis vigorsii*
2620CD	Sandgrouse, Namaqua	*Pterocles namaqua*

2620CD	Thick-knee, Spotted	*Burhinus capensis*
2620CD	Plover, Three-banded	*Charadrius tricollaris*
2620CD	Vulture, White-backed	*Gyps africanus*
2620CD	Goshawk, Southern Pale Chanting	*Melierax canorus*
2620CD	Vulture, Lappet-faced	*Torgos tracheliotus*
2620CD	Falcon, Pygmy	*Polihierax semitorquatus*
2620CD	Fiscal, Common (Southern)	*Lanius collaris*
2620CD	Tchagra, Brown-crowned	*Tchagra australis*
2620CD	Bokmakierie, Bokmakierie	*Telophorus zeylonus*
2620CD	Flycatcher, Chat	*Bradornis infuscatus*
2620CD	Chat, Familiar	*Cercomela familiaris*
2620CD	Scrub-robin, Kalahari	*Cercotrichas paena*
2620CD	Chat, Anteating	*Myrmecocichla formicivora*
2620CD	Tit, Ashy	*Parus cinerascens*
2620CD	Bulbul, African Red-eyed	*Pycnonotus nigricans*
2620CD	Warbler, Rufous-eared	*Malcorus pectoralis*
2620CD	Prinia, Black-chested	*Prinia flavicans*
2620CD	Eremomela, Yellow-bellied	*Eremomela icteropygialis*
2620CD	Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*
2620CD	Crombec, Long-billed	*Sylvietta rufescens*
2620CD	Lark, Spike-heeled	*Chersomanes albofasciata*
2620CD	Lark, Stark's	*Spizocorys starki*
2620CD	Sparrowlark, Grey-backed	*Eremopterix verticalis*
2620CD	Lark, Fawn-coloured	*Calendulauda africanoides*
2620CD	Lark, Sabota	*Calendulauda sabota*
2620CD	Lark, Eastern Clapper	*Mirafra fasciolata*
2620CD	Sunbird, Dusky	*Cinnyris fuscus*
2620CD	Finch, Red-headed	*Amadina erythrocephala*
2620CD	Sparrow, Cape	*Passer melanurus*
2620CD	Weaver, Sociable	*Philetairus socius*
2620CD	Sparrow-weaver, White-browed	*Plocepasser mahali*
2620CD	Masked-weaver, Southern	*Ploceus velatus*
2620CD	Finch, Scaly-feathered	*Sporopipes squamifrons*
2620CD	Waxbill, Violet-eared	*Granatina granatina*
2620CD	Bunting, Lark-like	*Emberiza impetuani*
2620CD	Canary, Yellow	*Crithagra flaviventris*
2620CA	Barbet, Acacia Pied	*Tricholaema leucomelas*
2620CA	Bee-eater, Swallow-tailed	*Merops hirundineus*
2620CA	Mousebird, Red-faced	*Urocolius indicus*
2620CA	Swift, Little	*Apus affinis*
2620CA	Dove, Namaqua	*Oena capensis*
2620CA	Turtle-dove, Cape	*Streptopelia capicola*
2620CA	Dove, Laughing	*Streptopelia senegalensis*
2620CA	Korhaan, Northern Black	*Afrotis afraoides*

2620CA	Sandgrouse, Namaqua	*Pterocles namaqua*
2620CA	Goshawk, Southern Pale Chanting	*Melierax canorus*
2620CA	Falcon, Pygmy	*Polihierax semitorquatus*
2620CA	Fiscal, Common (Southern)	*Lanius collaris*
2620CA	Bokmakierie, Bokmakierie	*Telophorus zeylonus*
2620CA	Flycatcher, Chat	*Bradornis infuscatus*
2620CA	Chat, Familiar	*Cercomela familiaris*
2620CA	Chat, Anteating	*Myrmecocichla formicivora*
2620CA	Wheatear, Mountain	*Oenanthe monticola*
2620CA	Wheatear, Capped	*Oenanthe pileata*
2620CA	Tit, Ashy	*Parus cinerascens*
2620CA	Swallow, Greater Striped	*Hirundo cucullata*
2620CA	Martin, Rock	*Hirundo fuligula*
2620CA	Bulbul, African Red-eyed	*Pycnonotus nigricans*
2620CA	Cisticola, Desert	*Cisticola aridulus*
2620CA	Warbler, Rufous-eared	*Malcorus pectoralis*
2620CA	Prinia, Black-chested	*Prinia flavicans*
2620CA	Eremomela, Yellow-bellied	*Eremomela icteropygialis*
2620CA	Tit-babbler, Chestnut-vented	*Parisoma subcaeruleum*
2620CA	Crombec, Long-billed	*Sylvietta rufescens*
2620CA	Lark, Red-capped	*Calandrella cinerea*
2620CA	Lark, Karoo Long-billed	*Certhilauda subcoronata*
2620CA	Sparrowlark, Grey-backed	*Eremopterix verticalis*
2620CA	Lark, Fawn-coloured	*Calendulauda africanoides*
2620CA	Lark, Sabota	*Calendulauda sabota*
2620CA	Lark, Eastern Clapper	*Mirafra fasciolata*
2620CA	Sunbird, Dusky	*Cinnyris fuscus*
2620CA	Finch, Red-headed	*Amadina erythrocephala*
2620CA	Waxbill, Common	*Estrilda astrild*
2620CA	Sparrow, House	*Passer domesticus*
2620CA	Sparrow, Cape	*Passer melanurus*
2620CA	Weaver, Sociable	*Philetairus socius*
2620CA	Sparrow-weaver, White-browed	*Plocepasser mahali*
2620CA	Finch, Scaly-feathered	*Sporopipes squamifrons*
2620CA	Waxbill, Violet-eared	*Granatina granatina*
2620CA	Bunting, Lark-like	*Emberiza impetuani*
2620CA	Canary, Yellow	*Crithagra flaviventris*