RED DATA BIRD HABITAT ASSESSMENT

REPORT COMPILED FOR:
Tharia Zenobia Labuschagne

ON THE FARM(S):
A Portion of the Remainder of Portion 1 of the Farm Tweefontein 19IR

MUNICIPALITY:
Ekurhuleni Municipality

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EXECUTIVE SUMMARY

The prospecting site is located approximately 15km north-east of Kemptonpark and 15km north-north-east of Benoni. The prospecting area is situated over a portion of the remainder of Portion 1 of the farm Tweefontein 19IR, within the Ekurhuleni Municipality. The purpose of the study was to assess the habitat on-site and determine whether it is suitable for foraging, roosting and / or breeding habitat for the sixteen Gauteng's Priority Red Data bird species.

Habitat Assessment

PRIORITY SPECIES	POTENTIAL FOR OCCURRENCE ON-SITE	POTENTIAL USE OF HABITAT		
		Foraging	***Roosting***	***Breeding***
Gorsachius leuconotus White-backed Night Heron	very LOW			
Gyps coprotheres Cape Vulture	very LOW			
Polemaetus bellicosus Martial Eagle	very LOW			
Cirus ranivorus African Marsh Harrier	MEDIUM to HIGH	HIGH		
Falco naumanni Lesser Kestrel	LOW to MEDIUM	LOW to MEDIUM	LOW	LOW
Anthropoides paradiseus Blue Crane	LOW			
Podica senegalensis African Finfoot	very LOW			
Eupodotis senegalensis White-bellied Korhaan	very LOW			
Tyto capensis African Grass-Owl	HIGH	HIGH	HIGH	HIGH
Ciconia nigra Black Stork	very LOW			
Phoenicopterus rubber Greater Flamingo	HIGH	HIGH		
Phoenicopterus minor Lesser Flamiongo	HIGH	HIGH		
Sagittarius serpentarius Secretarybird	LOW to HIGH	MEDIUM		
Alcedo semitorquata Half-collared Kingfisher	very LOW			
Mirafra cheniana Melodious Lark	very LOW			
Buphagus erythrorhynchus Redbilled Oxpecker	very LOW			

Impacts and Mitigation

Impacts and mitigation for prospecting include:

Impact: Habitat disturbance through excavation of pits and drilling of boreholes.

- In the cultivated lands, the impacts are considered to be of LOW *significance* and potential impact on Lesser Kestrel, Blue Crane, and Secretary bird.
- In the grasslands, the impacts are considered to be of LOW *significance* and potential impact on Lesser Kestrel, Blue Crane, and Secretary bird.
- In the wetlands, HIGH to LOW *significance*, depending on the time of year when activities are undertaken. Species most likely to be impacted include African Marsh Harrier, African Grass-owl, Greater Flamingo, and Lesser Flamingo.

Management: Management of impacts on wetlands.

- Delineate buffers in conjunction with a wetland survey in order to protect both the habitat required by the priority bird species and those required for the continued functioning of the wetlands. At no time may prospecting activities take place within the areas marked as HIGH sensitivity.
- Prospecting in the vicinity of the "wetland" habitat (outside of the areas of HIGH sensitivity) must be undertaken between September and February (outside the African Grass-owl breeding period).

Impact: Impacts associated with the increased potential for hunting and poaching are considered to have a HIGH *significance ranking* if not controlled.
Management: Preventing hunting / poaching can only be achieved through increased awareness.

Management: Additional management measures not linked to specific impacts.

- *Audit / Site Inspections*: In order to ensure that concurrent rehabilitation is being undertaken, the prospecting operation must be audited by an independent environmental auditor on a quarterly basis for the duration of the prospecting operation.
- *Use of Herbicides or Chemicals*: The use of insecticides, herbicides and other chemicals that could poison invertebrates, small mammals, reptiles and amphibians (a source of food for birds) should not be permitted, unless crucial to the prospecting activities. If the latter is the case, the type of insecticides, herbicides and other chemicals use must be approved by the Endangered Wildlife Trust Poison Working Group. They can be contacted on Tel: 011 486 1102, Fax: 011 486 1506, or e-mail: ewt@ewt.org.za.

Impacts and mitigation for mining are provided in the report but must be reconsidered when more detail regarding proposed mining activities is available.

Ecological Management Plan

Fire: A fire break must be maintained around the areas of HIGH sensitivity in order to reduce the potential for too frequent burning. Burning should **not** be permitted in this area more frequently than every three years and no burning may be permitted between September and January (outside the breeding season of the African Grass-owl).

Cattle Grazing: Areas of HIGH sensitivity may only be used for grazing between September and February (outside the breeding season of the African Grass-owl).

Management of Storm Water Run-off: In order to maintain the habitat structure for the African Grass-owl, no prospecting activities may take place within the wetlands (areas of HIGH sensitivity) and any buffer zones delineated by the wetland survey. In order to reduce the potential for erosion within the catchment impacting on the wetlands, it is essential to implement a storm water management plan.

Additional Surveys

- A wetland survey must be undertaken to determine if prospecting and future mining will have an impact on the wetlands which would result in a change in habitat.
- Before mining is undertaken, another bird specialist survey must be undertaken in conjunction with the wetland survey to determine the potential impacts of mining and if / how these can be managed.

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1 INTRODUCTION

Umhlaba Environmental Consulting was commissioned by Tharia Zenobia Labuschagne to undertake a Bird Specialist Survey for a Prospecting Right Application for sand and clay over a portion of the remainder of Portion 1 of the farm Tweefontein 19IR, in the Ekurhuleni Municipality. The commissioning of this survey was outlined as part of the prospecting activities (see Section 2.2) in the approved Environmental Management Plan (EMPlan).

1.1 PURPOSE OF THE STUDY

The purpose of the study was to assess the habitat on-site and determine whether it is suitable for foraging, roosting and / or breeding habitat for the sixteen Gauteng's Priority Red Data bird species. The survey was undertaken in accordance with the Gauteng Department of Agriculture, Conservation and Environment (GDACE) Requirements for Biodiversity Assessments, released in August 2006.

1.2 OUTLINE OF THE REPORT

The report has been structured in such a way as to provide all the information requested in the GDACE Requirements for Biodiversity Assessments. The location of the site and a brief description of prospecting activities have been outlined in Section 2. The methods of the survey and the habitat assessment have been provided in Section 3, followed by a sensitivity map and a record of any red data species sitings in Section 4. Potential impacts and proposed management measures are detailed in Section 5, with a brief ecological management plan being provided in Section 6.

2 LOCATION AND DETAILS OF THE PROPOSED ACTIVITY

2.1 SITE LOCATION

A map showing the location of the proposed development site and the area that was covered by the survey.

The prospecting site is located approximately 15km north-east of Kemptonpark and 15km north-north-east of Benoni. The prospecting area is located over a portion of the remainder of Portion 1 of the farm Tweefontein 19IR, within the Ekurhuleni Municipality (Figure 2.1). The GDACE guidelines request the area investigated during the habitat assessment / survey be indicated on a map. This is provided in Section 3.1, and Figure 3.1.

2.2 DESCRIPTION OF THE PROSPECTING ACTIVITIES

A Prospecting Right Application for sand and clay was submitted and approved for the area outlined in Section 2.1 and illustrated in Figure 3.1. The objective of the prospecting activities is to determine:

- Geological and environmental information for the prospecting area.
- The exact location and extent of the sand and clay reserves.
- The extent of overburden.
- The suitability of the sand and clay for the current market.
- The extent of the demand for the products within viable distance from the property.

The time table of the prospecting activities is presented in Table 2.1, which is taken from the EMPlan submitted to the Department of Minerals and Energy (DME) in February 2006. All activities that may have an impact on fauna (particularly birds) has been marked with an ●, with explanations being provided below.

Explanations:

1) The digging of pits will be undertaken by one excavator, with activities being undertaken over a period of five months. The diesel tank and the sanitation facilities (a chemical toilet) will be on-site for the duration of the digging exercise.
2) The drilling of boreholes will be undertaken by one drill rig, with activities being undertaken over a period of twelve months. The diesel tank and the sanitation facilities (a chemical toilet) will be on-site for the duration of the drilling exercise.
3) Domestic waste will be generated for the duration of the prospecting activities (digging and drilling) – maximum of seventeen months.

Table 2.1: Prospecting programme activities.

PHASES	PROSPECTING ACTIVITY	TIME
1.	***Non Invasive Prospecting***	
1.1	Literature review and desktop survey	3 months
1.2	Geotechnical Surveys Aerial photograph and visual survey Geophysical survey Diviner	6 months
1.3	Evaluation of non invasive data	3 months
1.4	Environmental surveys	3 months
Total time for non invasive activities		*15 months*
2.	***Invasive prospecting activities.***	
2.1	Site establishment and scope of Investigation ●	3 months
2.2	Extension of existing Trail Pits (13 trial pits) ● (see explanations - 1)	1 month
2.3	Laboratory tests on samples (5 samples) Evaluation of data	6 months
2.4	Digging of addition trial pits (10 trial pits) ● (see explanations - 1)	1 month
2.5	Laboratory tests (10 samples) Evaluation of data	6 months
2.6	Drilling of boreholes and testing of samples (5 samples) ● (see explanations - 2)	
	Phase 1: 3 holes ●	6 months
	Phase 2: 2 holes ●	6 months
Total time for invasive activities		*29 months*
3.	***Non invasive research***	
3.1	Market research	4 months
3.2	Bankable feasibility study	6 months
Total time for research activities		*10 months*
	Contingency time frame	6 months
Total timeframe:		**60 months (5 yrs)**

4. Supporting Activities	
4.1 – Water Requirements	Processing water will be obtained from existing onsite borehole. Potable water will be brought onto the site daily for the employees.
4.2 – Electricity	No electrical connection will be required as the drill rig runs off diesel powered generators / engines. ● (see explanations - 2)
4.3 – Firewood	No firewood will be collected.
4.4 – Access Roads	No access roads will need to be constructed as proposed sampling points are located on existing farm roads.
4.5 – Sanitation	1 x chemical toilet will be provided for the employees of the drilling operation. ● (see explanations - 1 & 2)
4.6 – Workshop	No workshop will be required. All chemicals will be stored in the temporary shack.
4.7 – Fuel Tank	A mobile diesel tank will be brought onto the site during the prospecting. ● (see explanations - 1 & 2)
4.8 – Accommodation	None of the employees will be housed on site.
4.9 – Waste Management	Domestic waste and small amounts of used oil is the sum total of the waste anticipated during the prospecting activities. ● (see explanations - 3)
4.10 – Concurrent rehabilitation	After the drilling of each borehole the drill site will be concurrently rehabilitated during the life of the prospecting right.
4.11 – Specialist studies	Tharia Zenobia Labuschagne will commission specialist environmental surveys to determine the habitat suitability for all potential red data species. The existence of these habitats will influence the planning of any future mine.
4.12 – Administration	All administration functions for the prospecting right will be carried at an office at the applicant's house on the farm.

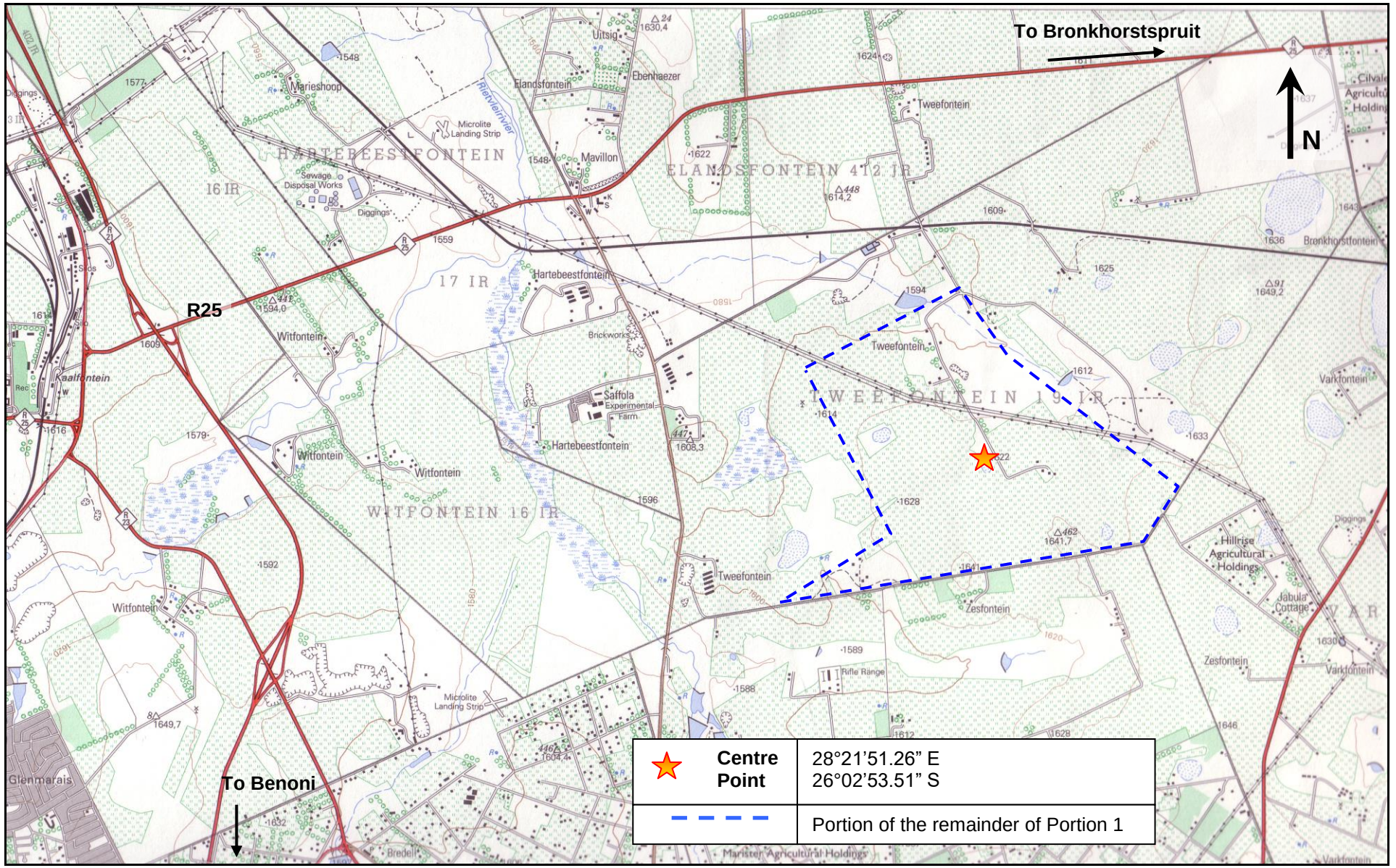


Figure 2.1: Map indicating the location of the prospecting area – a portion of the remainder of Portion 1 of the farm Tweefontein 19IR – in relation to the R25.

3 HABITAT ASSESSMENT

3.1 SURVEY METHODS

The date and hours spent on site.

3.1.1 Literature Survey

Prior to the date of the site visit, a literature survey was undertaken, using the following reference material, in order to determine what species could potentially occur on-site and what the habitat requirements of these species are.

- Robert's Birds of Southern Africa, seventh edition. (Hockey et al., 2005)
- The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. (Barnes, 2000a)
- Sasol, Birds of Southern Africa. (Sinclair et al., 1998)
- The Atlas of Southern African Birds Vol. 1: Non-passerines. (Harrison et al., 1997a)
- The Atlas of Southern African Birds Vol. 2: Passerines. (Harrison et al., 1997b)
- Robert's Birds of Southern Africa, sixth edition. (Maclean, 1993)

Of the red data bird species occurring in Gauteng, GDACE has identified sixteen of these as being priority species, given their status in the province and the national importance of the populations in the province. During the survey, emphasis was placed on the evaluation of habitat availability and suitability in terms of the sixteen priority species.

3.1.2 Bird Lists

In order to determine if the Gauteng priority bird species have been recorded in the vicinity of the prospecting site and the frequency with which they have been recorded, the following bird lists were obtained from the Avian Demography Unit's (ADU) Birds in Reserve Project (BIRP) web site - http://www.birds.sanbi.org/birp/birp_frameset_parent.htm:

- A list for the quarter degree square 2628AB, in which the prospecting site is located.
- A list for the following nature reserves or bird sanctuaries which are located within a 40km radius of the prospecting site:
  - Rietvlei Nature Reserve (±20km NNW of the prospecting site).
  - Faerie Glen Nature Reserve (±30km NNW of the prospecting site).
  - Korsmans Bird Sanctuary / Westdene Nature Reserve (±20km SSW of the prospecting site).
  - Marievale Bird Sanctuary (±35km SSE of the prospecting site).

3.1.3 Site Visit

Due to the time frame available for the project, a full survey of the site to determine what species actually occur on the property was not possible. Instead, a habitat assessment of the prospecting site was undertaken in order to:

- Determine the potential habitat availability on-site (specifically in the prospecting area).
- Compile a sensitivity map of the site.
- Determine the potential impacts that could result from the prospecting activities.

In order to achieve this, a site visit was undertaken on the 20th June 2007 from 08:00 to 13:00. The areas of the prospecting site that were traversed / investigated are outlined in Figure 3.1. The areas visited were based on the proposed prospecting activities (illustrated in Figure 3.1**Error! Reference source not found.**) and areas identified by the applicant as being potential mining areas.

The majority of the site has been ploughed for the cultivation of maize. Areas that have not been cultivated are grassland areas around the pans and the corridors between the cultivated lands. Some of the grassland areas include stands of exotic trees.

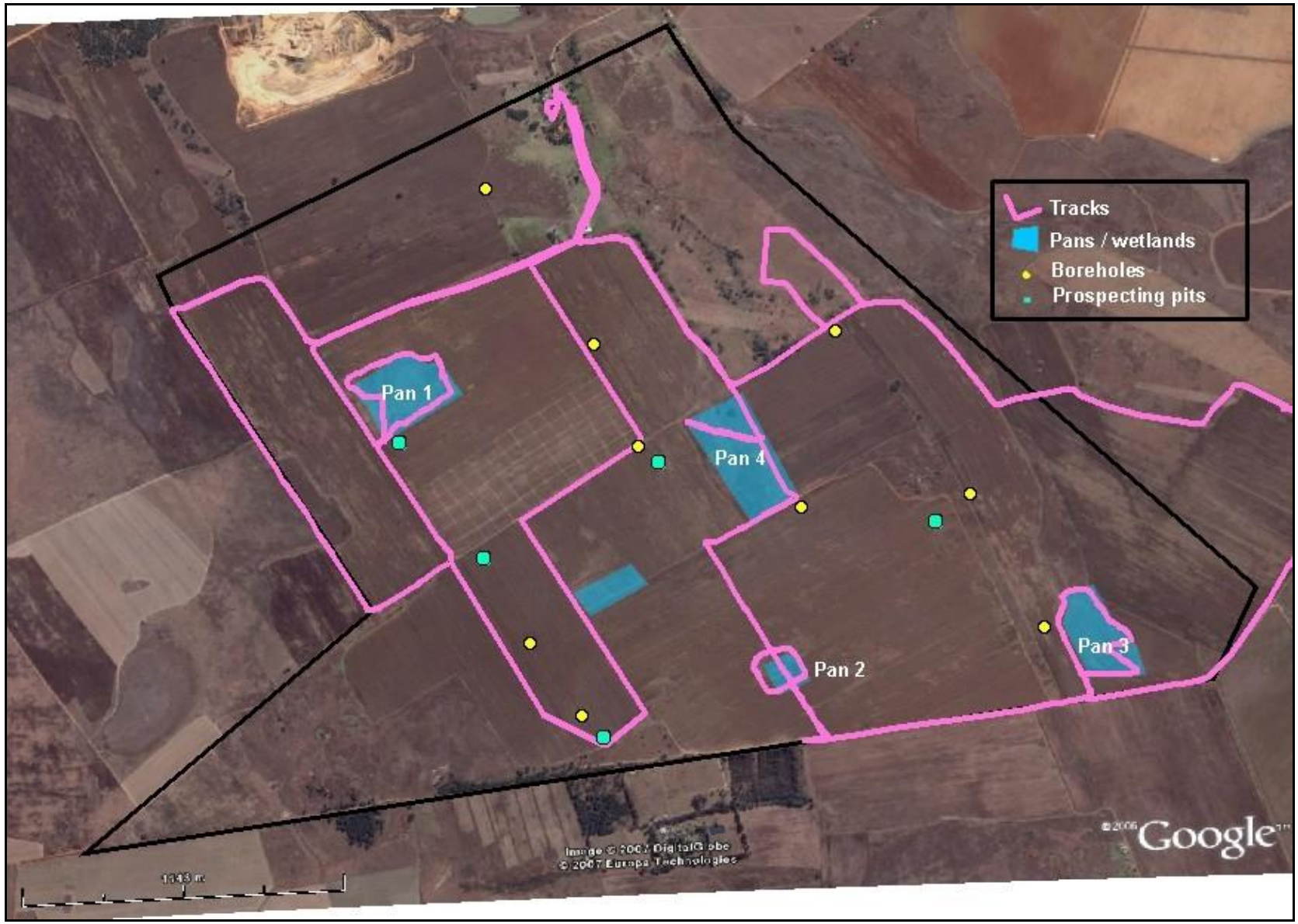


Figure 3.1: Indication of areas visited (tracks) during the site visit in relation to the pans and prospecting boreholes and pits. (Aerial photo from GoogleEarth, 2007.)

3.2 DESCRIPTION OF AVAILABLE HABITATS

An assessment of the availability of suitable habitat (breeding, foraging, roosting etc.) on site and within a minimum of 500m of the site. A larger area may be appropriate for wide-ranging species and the specialist must use his/her discretion to determine this.

The habitats available on-site have been evaluated based on their suitability for bird species (focusing on habitat structure) and not based on their floral species composition. Using this evaluation, the site can be divided into three habitat types which are listed below, followed by a description of each area:

- Cultivated Lands.
- Grasslands.
- Pans and Wetlands.

3.2.1 Cultivated Lands

The majority of the site has been ploughed for the cultivation of crops, predominantly maize, but also sunflowers and pasture (Figure 3.2). At the time of the site visit (June 2007) all the fields had been harvested.

Figure 3.2: A view of the cultivated lands where maize and pasture have been grown.

3.2.2 Grasslands

Patches of grassland occur within the prospecting area, where no cultivation has taken place. The structure of the grassland areas include patches of tall grass (>1m high) interspersed with shorter grass (<0.5m high), as shown in Figure 3.3. In all grassland areas visited, the density of vegetation cover is high, with almost no bare ground being evident. Although no species identification was undertaken, it is evident that the grasslands are not monocultures and do not appear to have been disturbed. The edges of the grasslands on the north-eastern side of the prospecting area have experienced some disturbance and as a result, stands of exotic trees have developed (*Eucalyptus spp.* and Wattles). Within the grasslands on the north-eastern side of the prospecting area, there are pockets of indigenous trees (*Acacia spp.*), while the grasslands throughout the remainder of the prospecting area do not include any trees or shrubs (Figure 3.4).

The grasslands in the south-western end of the property were not investigated as no prospecting activities are proposed for this area (based on **Error! Reference source not found.**). It must be stressed that if mining is to proceed, this area must be investigated.

Figure 3.3: An example of the grasslands on the north-eastern side of the prospecting area, illustrating the exotic trees on the edges.

Figure 3.4: An example of the grasslands on the north-eastern side of the prospecting area illustrating the pockets of indigenous trees.

3.2.3 Wetlands (Pans)

There are at least four pans within the prospecting area, the location of three of which have been confirmed as being recorded in the GDACE pan database. Although the pans themselves have not been cultivated, the upper catchments of all pans have either recently been cultivated (fields of harvested maize) or has been cultivated in the past (grassland and alien invasive species). There is also varying degrees of disturbance within the catchments and within the pans. A brief description of each is given below, with the location of each being indicated in **Error! Reference source not found.** and Figure 4.1.

Pan 1: This pan is completely surrounded by recently cultivated lands (harvested maize), with the upper reaches of the catchments having been cultivated. The remainder of the catchment is dominated by tall (>1m high) grass (Figure 3.5). The centre of the pan is also vegetated, covered with short grass (runner species creating a dense ground cover) and patches of taller grass and small shrubs (similar to the vegetation cover and structure of the pan shown in Figure 3.8). According to the GDACE survey of this pan (undertaken in 2004), there is suitable habitat for the African Grass-owl (*Tyto capensis*), a Gauteng priority bird species.

In addition to cultivation within the catchment, this pan has been disturbed by other anthropogenic activities both in the catchment and in the centre of the pan:

- *In the pan catchment*: Sewage sludge from ERWAT is being used as a form of fertilizer for the maize being grown in surrounding lands[1]. At present, this sludge is being stored within the pan catchment. It must be noted that the use of this site for the storage of sewage sludge was not taking place in 2004 when this pan was surveyed by GDACE.
- *In the pan centre*: Stones, presumably cleared from the surrounding lands, have been stacked in the centre of this pan (Figure 3.5). This mound of stones was already located in the pan when GDACE surveyed the pan in 2004.

As can be expected at this time of year, the pan was dry. The soil in the centre of the pan is soft and has been colonised by Highveld gerbils (*Tetera brantsii*). The use of this site by this species was also recorded by GDACE during their 2004 survey of this pan.

Figure 3.5: A view of Pan 1 (looking west), showing the disturbance within the pan and the catchment.

Pan 2: Within the pan catchment, the land to the west of this pan has previously been cultivated and is currently vegetated by tall grasses and alien invasive species. The land to the east of the pan (also within the catchment) has recently been cultivated and is currently a fallow field (Figure 3.6 and **Error! Reference source not found.**). The grass within the pan is predominantly short (<0.5m tall), but does include patches of tall grass. The centre of the pan is also vegetated, covered with short grass (runner species creating a dense ground cover) and patches of taller grass and small shrubs (similar to the vegetation cover and structure of the pan shown in Figure 3.8).

In addition to the cultivated lands within the catchment of the pan, there is also a farm road running through the centre of the pan (Figure 3.6) which will compact the soils and impact on the functionality of this pan.

As can be expected at this time of year, the pan was dry.

[1] According to the farmer leasing the land from the land owners (Mr & Mrs Labuschgne), the use of sewage sludge as a fertilizer is being undertaken in collaboration with ERWAT and Pretoria University. This project has been running for eleven years.

Figure 3.6: A view of Pan 2 showing the previously cultivated lands to the west and the road through the centre of the pan.

Pan 3: This pan has cultivated lands (recently and previously cultivated) around the eastern, southern and western sides, but is linked to a grassland corridor to the north (Figure 3.7 and **Error! Reference source not found.**). The vegetation structure of the grassland around the pan (within the catchment) is varied, but is dominated by dense tall grass (>1m high). The centre of the pan is also vegetated, covered with short grass (runner species creating a dense ground cover) and patches of taller grass and small shrubs (Figure 3.8).

According to the GDACE survey, this pan was identified as suitable African Grass-owl habitat (*Tyto capensis*), a Gauteng priority bird species, with the occurrence of Marsh Owls (*Asio capensis*)being confirmed.

As can be expected at this time of year, the pan was dry. The soils in the centre of the pan were soft and have currently been colonised by Highveld gerbils (*Tetera brantsii*). The use of this site by this species was also recorded by GDACE during their 2004 survey of this pan.

Figure 3.7: A view of Pan 3 showing the previously cultivated lands (to the west) and grassland within the catchment.

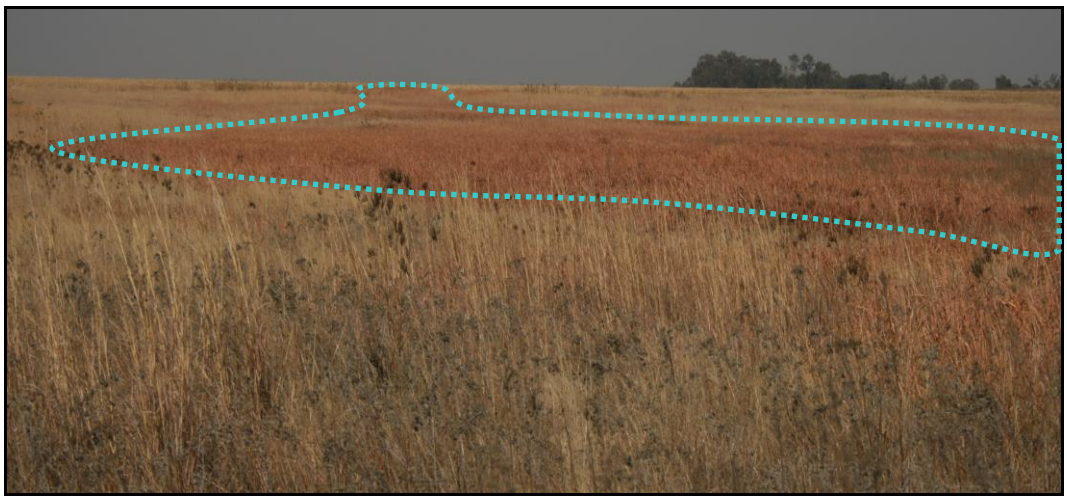
Figure 3.8: Vegetation cover within the centre of Pan 3.

Pan 4: Although no detailed floral survey was undertaken, the area is vegetated by grass species that grow in damp conditions, such as wetlands. Although this area was not wet at the time of the survey, the fact that the area is lower than the surrounding land (would naturally trap rainfall), has not been cultivated and includes dense stands of grass species that favour wetland conditions, it has been assumed that this area is a wetland.

In general, the vegetation cover within this wetland area is dense and the structure is varied, including both tall (>1m high) and short (<0.5m high) grasses. The areas investigated during the survey have not been invaded by alien invasive species, suggesting that the area is not frequently disturbed (Figure 3.9).

There are dense stands of *Imperata cylindrica* (Cottonwool grass), particularly at the base of the wetland (Figure 3.10). This is of particular interest in terms of the bird survey, as dense stands of this grass species offers suitable breeding habitat for the African Grass-owl (*Tyto capensis*), one of the Gauteng priority bird species.

Figure 3.9: A view of Pan 4.



Dense stand of *Imperata cylindrica*

Figure 3.10: A view of Pan 4showing the dense stand of *Imperata cylindrica* at the base of the pan.

Wetland: The vegetation within this depression had been burnt prior to the site visit and could therefore not be used to confirm if this site is a potential wetland, or if it offers suitable habitat for any of the Gauteng priority species.

3.3 SPECIES ASSESSMENT

The potential for each of the sixteen Gauteng priority red data species utilizing the proposed prospecting site for foraging, breeding and / or roosting purposes has been evaluated below. The habitat requirements of each species has been summarised briefly and presented in Section 9.1 for reference purposes and to substantiate the habitat assessment provided. The potential for each species utilising the proposed prospecting site has been determined based on the habitat descriptions provided in Section 3.2.

3.3.1 *Gorsachius leuconotus* – White-backed Night Heron

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: There is a non-perennial stream that runs along the eastern border of the prospecting site. However, this stream is not known to offer suitable habitat for the White-backed Night Heron and no suitable habitat is known within the vicinity of the site. Given the lack of suitable habitat and that this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006), there is a **very LOW** potential for White-backed Night Herons to occur on-site or within the vicinity of the site.

3.3.2 *Gyps coprotheres* – Cape Vulture

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: As no suitable habitat is available on-site and this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006), there is a **very LOW** potential for Cape Vultures to occur on-site or within the vicinity of the site.

3.3.3 *Polemaetus bellicosus* – Martial Eagle

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: Although there is some open grassland available for foraging, the only tall trees available in the vicinity of the site are exotic trees (*Eucalyptus spp* and *Acacia mearnsii*). In combination with the fact that the area in general has been cultivated, the prospecting site does no offer suitable breeding or foraging habitat for this species. As this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006), there is a **very LOW** potential for a Martial Eagle to occur on-site or within the vicinity of the site. Based on records for the nature reserves and bird sanctuaries located within 40km of the prospecting site, there has been one siting of a Martial Eagle, recorded for the Rietvlei Nature Reserve (SANBI, 2006), located approximately 20km NNW of the prospecting site. However, as there has only been one recorded siting, this species is not considered to be a frequent visitor to the vicinity and is unlikely to frequent the prospecting site.

3.3.4 *Cirus ranivorus* – African Marsh Harrier

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: The wetland habitats (pans) available on-site are not large and are unlikely to offer suitable breeding habitat for the African Marsh Harrier. Approximately 70% of the African Marsh Harrier's prey includes small mammals (primarily *Rhabdomys pumilio* and *Otomys irroraius*) (Hockey *et al.*, 2005), but also frequently includes wetland birds and passerines, reptiles, frogs, fish and insects (cited in Simmonds, 1997; cites in Cohen, 2000; cited in Hockey *et al.*, 2005). Although the wetland habitat on-site is not considered large, they have the potential to provide **suitable foraging habitat** given that these are not the only wetland in the vicinity of the site (evident from the wetland layer in the GDACE C-Plan). Therefore, it is likely that this species may forage in the wetlands within the prospecting area. This species has been recorded for the quarter degree square, 2628AB (SANBI, 2006) and has been recorded as breeding at Marievale Bird Sanctuary (SANBI, 2006), located 35km SSE of the site. As the African Marsh Harrier travels extensively and is known to fly up to 200km a day for foraging purposes (Harrison *et al*., 1997a; cited in Hockey *et al.*, 2005), the prospecting site is within the foraging range for this species. Therefore, the potential for African Marsh Harriers to visit the site is considered to be **MEDIUM** to **HIGH**.

3.3.5 *Fulco naumanni* – Lesser Kestrel

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: The habitat available in the proposed prospecting area and in the vicinity of the site offers **suitable foraging habitat** for the Lesser Kestrel, with **suitable roosting habitat** being available in the stands of exotic trees located north and south of the site (seen in **Error! Reference source not found.**). When evaluating the importance of this site as a foraging habitat, it is important to note that these birds will not occur on the prospecting site on a daily basis but forage in a large area around their roosting sites, wherever suitable food is available [mostly arthropods and occasionally vertebrates (Hockey *et al.*, 2005)]. However, this does not render the site less important as a foraging site. This species has been recorded for the quarter degree square, 2628AB (SANBI, 2006), although not very frequently. Therefore, the potential for this species to visit the site is considered to be **LOW** to **MEDIUM**. However it must be noted that it is unlikely that this species will utilise this site continuously, but rather only when suitable food is available.

3.3.6 *Anthropoides paradiseus* – Blue Crane

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: Blue Cranes have been recorded within the quarter degree square 2628AB (SANBI, 2006), although not very frequently. Despite vast areas of the site being cultivated, the prospecting area and the surrounding lands offer **suitable foraging habitat** for Blue Cranes. Within the prospecting application area, there are sites that offer **moderate** to **low suitable roosting** and **breeding** habitat, on the eastern side of the property where no cultivation has taken place. However, the proximity of these areas to the neighbouring mine make the habitat less suitable. Therefore, there is a **LOW** potential for this species to occur within the prospecting site.

3.3.7 *Podica senegalensis* – African Finfoot

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: There is a non-perennial stream that runs along the eastern border of the prospecting site. However, this stream is not known to offer suitable habitat for the African Finfoot and no suitable habitat is known to be within the vicinity of the site. As this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006), there is a **very LOW** potential for African Finfoot to occur on-site or within the vicinity of the site.

3.3.8 *Eupodotis senegalensis* – White-bellied Korhaan

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: There is no suitable habitat for the White-bellied Korhaan within the prospecting site, nor is there any known suitable habitat within the vicinity of the site. In addition this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006). Therefore, there is a **very LOW** potential for White-bellied Korhaans to occur on-site or within the vicinity of the site.

3.3.9 *Tyto capensis* – African Grass-Owl

Conservation Status: Vulnerable.
Habitat Assessment and Potential for Occurrence: The structure of the grasslands around the wetlands (Pans 3 and 4) provides **suitable foraging, roosting** and **breeding habitat** for African Grass-owls. (The suitability of these sites was confirmed during the GDACE survey of these wetlands during 2004.) The diet of the African Grass-owl includes a variety of rodent species and less commonly hedgehogs, elephant shrews, hares, bats, frogs, large beetles and termite alates (Hockey *et al*., 2005). The base of Pans 1 and 3 are currently colonised by the Highveld Gerbil (*Tetera brantsii*) which will provide a suitable prey species for the owls. During the GDACE survey in 2004, a Marsh Owl was identified as having been present at Pan 3, which suggests that the area is potentially suitable for the African Grass-Owl (both owl species have similar habitat requirements). Grass-owls been recorded for the quarter degree square, 2628AB (SANBI, 2006) and have been recorded as breeding at Marievale Bird Sanctuary (SANBI, 2006), located 35km SSE of the site. Given the suitability of the habitat and the confirmed occurrence of a food source, there is **HIGH** potential for the African Grass-owl to occur on-site.

3.3.10 *Ciconia nigra* – Black Stork

Conservation Status: Near threatened.
Habitat Assessment and Potential for Occurrence: Although there is no suitable breeding habitat on-site or in the vicinity of the site, the wetland areas on-site will offer **suitable foraging habitat** when they contain water. Black Stork have been recorded as occurring infrequently in this area (recorded for the quarter degree square, 2628AB) and at the Marivale Bird Sanctuary located 35km SSE of the prospecting site (SNABI, 2006). Given the sporadic sitings of this species within the area, this species is likely to only ever be an occasional visitor to the site, particularly when there is water in the pans. Therefore, the potential occurrence of Black Stork on-site is considered to be **very LOW**.

3.3.11 *Phoenicopterus ruber* – Greater Flamingo

Conservation Status: Near Threatened.
Habitat Assessment and Potential for Occurrence: Greater Flamingos mainly feed on small invertebrates filtered from water and mud (Hockey *et al*., 2005), foraging in waters with a depth range of 70 - 130cm (Williams and Velásquez, 1997a). Given that there are pans and potential wetlands on-site, these habitats could offer **suitable foraging habitat** for this species during summer months, provided there is adequate water in the wetlands. The Greater Flamingo has frequently been recorded in the quarter degree square (2628AB) and at nature reserves and bird sanctuaries in a 40km radius of the site (SANBI, 2006). Given that the on-site wetlands offer suitable foraging habitat (when they contain adequate water), the potential for this species to occur on-site (in the wetlands) is **MEDIUM** to **HIGH**.

3.3.12 *Phoenicopterus minor* – Lesser Flamingo

Conservation Status: Near Threatened.
Habitat Assessment and Potential for Occurrence: Lesser Flamingos filters cyanobacteria from the surface of the water and small diatoms from the bottom layers, foraging in shallow waters with its upturned bill (Hockey *et al*., 2005). When the wetland area contains water, they will offer **suitable foraging habitat** for Lesser Flamingos. The Lesser Flamingo has frequently been recorded in the quarter degree square (2628AB) and at nature reserves and bird sanctuaries in a 40km radius of the site (SANBI, 2006). Given that the wetlands offer suitable foraging habitat (when they contain adequate water), the potential for this species to occur on-site (in the wetlands) is **MEDIUM** to **HIGH**.

3.3.13 *Sagittarius serpentarius* – Secretarybird

Conservation Status: Near threatened.
Habitat Assessment and Potential for Occurrence: Secretary birds have been recorded in the quarter degree square (2628AB), at Rietvlei Nature Reserve (20km NNW of the prospecting area) and Marivale Bird Sanctuary (35km SSE of the prospecting area) (SANBI, 2006). Within the prospecting area there is no suitable nesting habitat, but there is limited **suitable foraging habitat** in the grasslands and fallow fields. The Secretarybird feeds on a wide variety of prey including large grasshoppers and locusts, amphibians, reptiles, rodents, birds and their eggs (Hockey *et al.*, 2005). It must be noted that the availability of food on-site will fluctuate based on the season and phases of cultivation. Therefore, the potential for occurrence on-site is considered to be **LOW** to **HIGH**. The occurrence of Secretarybirds in the area was confirmed through the discovery of a dead Secretarybird within the prospecting area. As the bird was found under the overhead Eskom power lines, it is assumed that this bird was killed when it collided with the power lines[2].

3.3.14 *Alcedo semitorquata* – Half-collared Kingfisher

Conservation Status: Near Threatened.
Habitat Assessment and Potential for Occurrence: As no suitable habitat is available on-site and this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006), there is a **very LOW** potential for Half-collared Kingfishers to occur on-site or within the vicinity of the site.

3.3.15 *Mirafra cheniana* – Melodious Lark

Conservation Status: Near threatened.
Habitat Assessment and Potential for Occurrence t: The structure of the grasslands around some of the wetlands (Pans 3 and 4) provides **suitable foraging** and **breeding habitat** for the Melodious Lark. However, Melodius Larks have not been recorded for the quarter degree square 2628AB (SANBI, 2006). Therefore, despite the occurrence of potentially suitable habitat on-site, it is unlikely that this species will occur within the prospecting site. The potential for occurrence on-site is considered to be **very LOW**.

3.3.16 *Buphagus erythrorhynchus* – Red-billed Oxpecker

Conservation Status: Near threatened.
Habitat Assessment and Potential for Occurrence: As no suitable habitat is available on-site and this species has not been recorded for the quarter degree square 2628AB (SANBI, 2006), there is a **very LOW** potential for Red-billed Oxpeckers to occur on-site or within the vicinity of the site.

4 SENSITIVITY MAP AND SITINGS

4.1 SENSITIVITY MAP

A sensitivity map demarcating areas of suitable habitat (differentiating between breeding, foraging, roosting etc.) for each Red List species, together with appropriate buffers and corridors. All sensitive habitats (e.g. wetlands) must be clearly demarcated using the appropriate techniques, even where the probability of Red List species utilizing them is considered small.

The sensitivity map has been generated using the habitats identified within the prospecting area and the potential for each red data bird species to utilise those habitats. When considering the potential for a species to use these habitats, reference has also been made to the known distribution of these species and the frequency with which they have been recorded in the area (based on the bird atlas data and BIRP records).

[2] The incident was reported to Dr Craig Whittington-Jones on the day of the site visit and the information was sent through to Chris van Rooyen of the Endangered Wildlife Trust – Eskom partnership. Chris van Rooyen has been in contact with the landowners.

4.1.1 High Sensitivity

Areas marked as **HIGH sensitivity** include the pans and the grassland with minimal disturbance identified within the prospecting application area (Figure 4.1). These areas have been marked as high sensitivity because they offer suitable breeding, roosting and / or foraging habitats for the priority species listed below. The grassland habitats in the vicinity of the pans are particularly important as they provide foraging habitat to species such as the African Grass-owl which may breed in the wetland areas. Without these foraging habitats available in the vicinity of the breeding sites, the breeding sites would not be suitable.

	Foraging	Roosting	Breeding
• African Marsh Harrier,	✓ - pans		
• African Grass-owl,	✓ - pans & grassland	✓ - pans	✓ - pans
• Lesser Kestrel,	✓ - grassland		
• Blue Crane,	✓ - grassland	✓ - dam in grassland	
• Black Stork,	✓ - pans		
• Greater Flamingo,	✓ - pans		
• Lesser Flamingo,	✓ - pans		
• Secretarybird.	✓ - grassland		

In order to reduce the impact on these species, it is recommended that NO prospecting activities of any kind may be undertaken within the wetlands (pans), grasslands and the recommended buffers (see Section 4.2).

4.1.2 High-Medium Sensitivity

The grassland habitat in the south-western corner of the property has been marked as **HIGH-MEDIUM sensitivity** (Figure 4.1). As this habitat was not identified as an area where prospecting was going to take place, this area was not visited. However, grasslands in close proximity to suitable breeding sites for species such as the African Grass-owl will provide essential foraging habitat. Although these areas have been disturbed historically, they are large habitats (compared with the isolated grassland areas marked as medium sensitivity) which will provide foraging habitats for certain priority species. In addition, these areas will also act as a "feeder area" for small mammals, from which the smaller grasslands and cultivated lands (when left fallow) can be re-populated. Without these foraging habitats (for priority bird species) available in the vicinity of the breeding sites, the breeding sites would not be suitable.

4.1.3 Medium Sensitivity

Areas marked as **MEDIUM sensitivity** include the isolated grasslands and the pan areas that have either been previously disturbed or are too small to be of any importance in terms of red data priority species (Figure 4.1). Although these areas will be used by some of the priority species for foraging purposes, they do not offer breeding habitat nor are they large enough areas to provide sufficient foraging habitat and are therefore considered to be of lower ecological importance than high and high-medium sensitivity areas. Red data bird species that are likely to forage in these areas include:

	Foraging	Roosting	Breeding
• African Grass-owl,	✓ - pans & grassland		
• Lesser Kestrel,	✓ - grassland		
• Blue Crane,	✓ - grassland		
• Secretarybird.	✓ - grassland		

4.1.4 Low Sensitivity

Areas marked as **LOW sensitivity** include the cultivated lands and the area around the homestead (all areas not marked as other sensitivities in Figure 4.1). Although the cultivated lands will be used by some of the priority species for foraging purposes, they do not offer ideal foraging habitat and are therefore considered to be of low ecological importance. Red data bird species that are likely to forage in the cultivated lands include:

	Foraging	Roosting	Breeding
• Lesser Kestrel,	✓ - cultivated lands		
• Blue Crane,	✓ - cultivated lands		
• Secretarybird.	✓ - cultivated lands		

4.2 BUFFER ZONE

The GDACE guidelines (GDACE, 2006) provide minimum buffer zones required for each Gauteng red data priority species. These buffer zones often refer to confirmed breeding sites, or confirmed sitings of species. Due to the short duration of the site assessment, it is not possible to confirm the occurrence of the red data species on-site, nor is it possible to locate nests. Therefore the implementation of buffer zones applicable to confirmed siting and breeding sites becomes more difficult.

For the purpose of this application, buffer zones were considered for species that are thought to have a high potential for occurring on-site (foraging and / or roosting) and those species that could potentially breed on-site. These include, the African Marsh Harrier, African Grass-owl, Greater and Lesser Flamingos. In all instances, buffer zones have been considered around areas of HIGH sensitivity as these are the areas that offer suitable foraging, roosting and / or breeding habitat. In the protection of the areas of HIGH sensitivity for breeding species, the habitats will be protected for other species that may utilise the sites less frequently.

Due to the differing habitat requirements of various species, each priority species has a different sized buffer zone in order to protect the habitat required. In some areas there is more than one species utilising the areas marked as HIGH sensitivity, therefore, there will be overlap in the buffers. In such instances, the greater of the buffer zones has been applied, in order to preserve the habitat being utilised by the priority species.

In order to provide guidance for ecological management of suitable habitats, GDACE has provided minimum buffer zones for all priority species (GDACE, 2006), as presented in Table 4.1. These have been used in the consideration of buffers for the prospecting site, as described below.

During Prospecting

The buffer zones provided by GDACE cover the majority of the prospecting site, with the majority of the areas included in the recommended buffer zones being cultivated lands. Given the nature of the prospecting activities, one excavator and one drill rig operating at a time, these activities are considered to have a similar impact to those related to cultivation activities. Therefore, it is unlikely that prospecting within the GDACE proposed buffer zone will have a significant negative impact on the priority species utilising the habitats of HIGH sensitivity, provided:

- **NO activities** take place within the areas marked as HIGH sensitivity.
- No prospecting activities (within the buffer zones) are undertaken during the breeding season of the African Grass-owl (March to August[3]).

In order to ensure that no activities take place within the areas of HIGH sensitivity, a buffer of 50m is proposed. **NO prospecting activities** of any kind may be permitted in this buffer zone. The purpose of this buffer is not for ecological reasons, but based on experience, many drilling contractors do not respect or understand the purpose of buffer zones and will drive vehicles in these areas. If a buffer of 50m is implemented and contractors are told that all drill and trench sites must be at least 50m from the edge of the areas of HIGH sensitivity, any careless driving around their drilling site (into a buffer zone) will not destroy habitat within the area of HIGH sensitivity.

During Mining

This specialist study focuses on the impacts relating to prospecting activities. However, as the long-term intention of prospecting is mining, the impacts associated with mining must be considered. However, when considering buffer zones applicable to mining, the delineation at this stage can only be based on generic mining activities and assumptions. These buffers can only be used as a rough guide in decision making and not as the scientifically defined buffers to be implemented during mining. In order to determine the buffer zones applicable to mining, an additional bird specialist survey must be undertaken once the mining area has been defined and the details regarding mining activities are known.

[3] This includes laying of eggs, incubation, and rearing of chicks till fledging.

It must be stressed that a large portion of the areas identified as HIGH sensitivity are associated with pans. As I am not qualified to determine buffers for these pans nor to determine the impacts that mining (or even prospecting) may have on these pans, a wetland survey must be undertaken by a qualified wetland specialist. The information from the wetland survey must then be incorporated into the bird survey to determine suitable buffers that will protect the habitats associated with the pans, which currently offer suitable red data bird habitat.

In order to provide some guidance in determining where buffer zones may be imposed for mining, the minimum buffer zones published by GDACE (2006) (Table 4.1) have been illustrated around the pan habitats. It must be stressed that these buffer zones may change (possibly expand) once the wetland survey has been undertaken.

Table 4.1: Buffer zones for priority species utilising habitats on-site.

SPECIES	BUFFER (GDACE, 2006)	PROPOSED BUFFER	USE OF HABITAT
Cirus ranivorus African Marsh Harrier	350m around "all confirmed points and the wetland with which the birds are associated".	50m from HIGH sensitivity areas.	Foraging in wetlands.
Tyto capensis African Grass-Owl	"570m buffer around each confirmed point".	50m from HIGH sensitivity areas.	Breeding, roosting and foraging in wetlands and associated habitats.
Phoenicopterus ruber Greater Flamingo *Phoenicopterus minor* Lesser Flamingo	"60m buffer comprising terrestrial habitat around all confirmed wetlands"	50m from HIGH sensitivity areas.	Foraging in wetlands.

4.3 SURFACE WATER BODIES

The GDACE guidelines request that surface water bodies be indicated on the sensitivity map.

- Five wetlands (pans) were identified within the prospecting application area. These have been indicated on the sensitivity map but it must be stressed that these were not delineated based accepted delineation methods. A more scientific delineation can only be undertaken by a qualified wetland specialist.

The following surface water bodies are located in close proximity to the site:

- There is a farm dam located north of the prospecting application area.
- A non-perennial stream runs south-west from this dam, close to the eastern boundary.

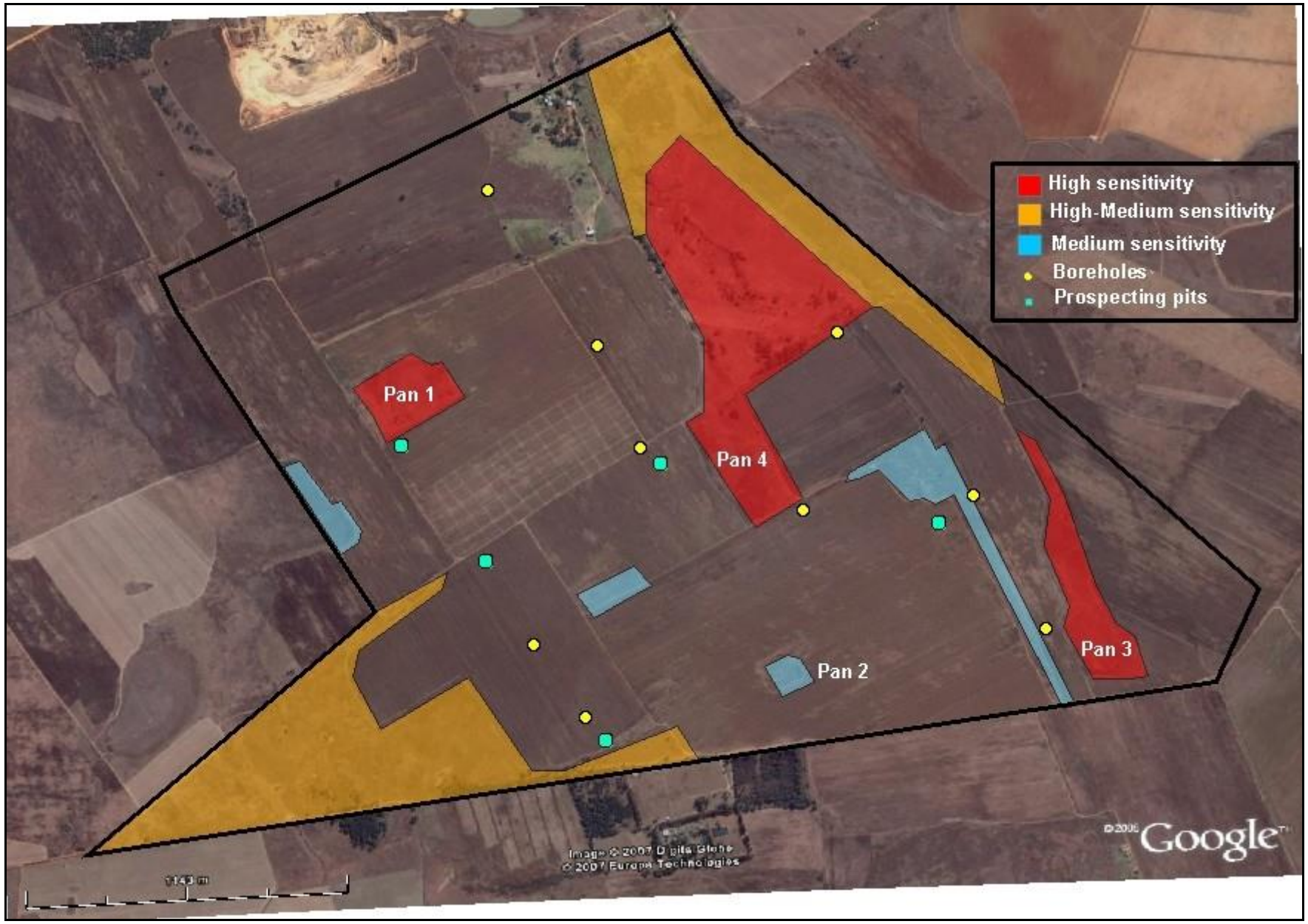


Figure 4.1: Sensitivity map showing sensitive areas in relation to the prospecting boreholes and trenches on a portion of the remainder of Portion 1 of the farm Tweefontein 19IR. (Aerial photo taken from GoogleEarth, 2007.)

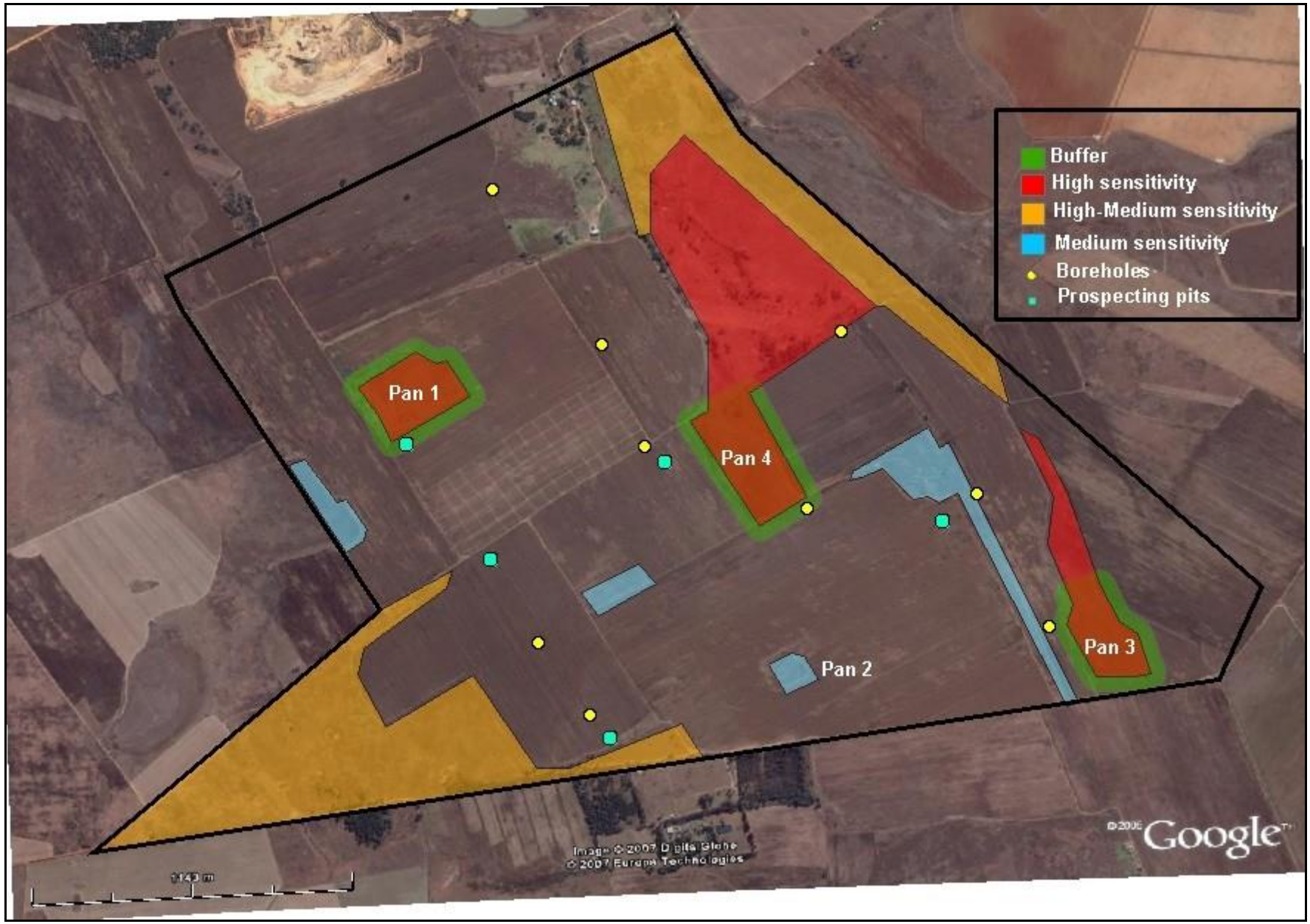


Figure 4.2: Buffer zones and sensitivity map showing in relation to the prospecting boreholes and trenches on a portion of the remainder of Portion 1 of the farm Tweefontein 19IR. (Aerial photo taken from GoogleEarth, 2007.)

4.4 RED DATA SPECIES SITINGS

GPS coordinates (WGS84 datum; geographic co-ordinate system) for all confirmed sightings of Red List species. The size and location of buffers must be motivated in terms of the latest research and publications. All references must be listed at the end of the report.

During the brief period on-site, only one of the sixteen Gauteng priority species, or any other red data bird species, was seen. A dead Secretarybird was found under the power lines that run through the eastern corner of the prospecting area. The GPS co-ordinates where this bird was found are given below and the location of this siting is indicated on the sensitivity map, Figure 4.1.

- S26.04179
- E28.37142
- 1649m

It must be stressed that the lack of identification of red data species on-site does not indicate that the species do no occur on-site as suitable habitat is available for some of these species (Section 3.3).

5 IMPACTS AND MITIGATION MEASURES

Where mitigation measures are appropriate, these must be detailed together with the relevant problem statement.

One of the reasons for commissioning specialist studies during the prospecting phase is to determine where the potentially sensitive habitats are and to utilise this information (along with prospecting results) to plan future mining. For this reason, the impact assessment focuses on both the impacts of prospecting and the overall impacts associated with potential mining. This is undertaken in the following manner:

- *Prospecting*: The impact evaluation has been undertaken assuming that prospecting activities will take place in the areas demarcated for these activities (**Error! Reference source not found.**), which currently exclude the buffer zones and other sensitive areas indicated in Figure 4.2 (Section 4.1). In order to determine the impacts on the priority species, the impacts associated with the individual prospecting activities (as described in Section 2.2) have been considered. As the impacts generally result from a disturbance to or the destruction of habitats, there are often similarities between the impacts associated with more than one species. Therefore, a list of affected species is presented for each impact evaluated as being significant.
- *Mining*: As the impact assessment for mining will be used to inform mine planning and given that the details regarding the proposed activities are not known, it is not possible to undertake a detailed impact assessment based on individual activities. Therefore, the impacts assessment for mining will be based on the generic impacts anticipated for an opencast operation. These are generally associated with the impacts on habitat.

5.1 PROSPECTING

Impact: Habitat disturbance through excavation of pits and drilling of boreholes.

- *Cultivated Lands*: Despite the fact that there are red data priority species that would utilise the cultivated lands, none of these species are totally dependant on these lands for foraging, roosting and / or breeding. In addition, prospecting activities will be undertaken by one excavator and one drill rig, resulting in only one pit being dug and one hole being drilled at a time. Therefore, any disturbance to these lands as a result of prospecting activities is considered to have impacts of **LOW** *significance*.
  - Species most likely to be impacted: Lesser Kestrel, Blue Crane, and Secretary bird.
- *Grasslands*: No prospecting activities are being undertaken in the grasslands. Due to the isolated nature of the digging and drilling activities (only one pit being dug and one hole being drilled at a time), the impacts as a result of prospecting activities near the edge of the grasslands are considered to be of **LOW** *significance*.
  - Species most likely to be impacted: Lesser Kestrel, Blue Crane, and Secretary bird.

- *Wetlands*: No prospecting activities are being undertaken in the wetlands. However, as the wetlands offer suitable breeding habitat for the African Grass-owl, there is the potential for disturbance through increased activity levels in the vicinity of the Grass-owl habitat, particularly as a traverse line is proposed along the eastern boundary of Pan 4 and within 300m of the grassland corridor running north of Pan 3. Considering these activities will be of limited duration (maximum of 17 months for the entire digging and drilling operation), the impacts will only be realised for the brief period of time that activities are undertaken adjacent to these habitat. If these activities coincide with the breeding season of the African Grass-owl (March to August[4]), the impacts may be of **HIGH** *significance*. However, if the activities are undertaken outside of the breeding season, the impact is considered to be of **LOW** *significance*.
  - Species most likely to be impacted: African Marsh Harrier, African Grass-owl, Greater Flamingo, and Lesser Flamingo.

Management: Management of impacts on wetlands.

- *Buffer zones*: Delineate buffers in conjunction with a wetland survey in order to protect both the habitat required by the priority bird species and those required for the continued functioning of the wetlands. If the wetland survey indicates that prospecting activities will have a detrimental impact on the functioning of the wetland, then no prospecting activities are permitted within the buffer zones depicted in Figure 4.1. If prospecting will not impact on the wetland functioning, then prospecting may be permitted within the puffer zones provided
  - **NO activities** take place within the areas marked as HIGH sensitivity.
  - No prospecting activities (within the buffer zones) are undertaken during the breeding season of the African Grass-owl (March to August[5]).
- *Timing of activities*: The African Grass-owl breeds between March and August. Therefore, any prospecting in the vicinity of the "wetland" habitat (outside of the areas of HIG sensitivity) must be undertaken between September and February.

Impact: Increased potential for hunting and poaching.

- With the increase in number of personnel on-site (in addition to those involved with agricultural activities), there is an increase in the potential for hunting and poaching. This is a particular concern as the methods used are often cruel and involve poisons which have "downstream" impacts. The impacts associated with hunting and poaching are considered to have a **HIGH** *significance ranking* if not controlled.

Management: Preventing hunting / poaching can only be achieved through increased awareness. It is the prospecting right applicant's responsibility to ensure that the personnel employed to undertake prospecting are aware that hunting / poaching is not permitted. It should be conveyed to the prospecting team that anyone caught hunting / poaching will be dismissed from the prospecting team.

Management: Additional management measures not linked to specific impacts.

- *Audit / Site Inspections*: In order to reduce the impact on red data bird species, buffer zones have been suggested and it has been indicated that concurrent rehabilitation must be undertaken. Due to the common occurrence of miscommunication between the prospecting right applicant and any contractors or staff members, it is strongly advised that the prospecting operation is audited by an independent environmental auditor on a quarterly basis for the duration of the prospecting operation. The purpose of this audit would be to ensure that all management measures proposed in this report and those outlined in the EMPlan are adhered to. It will also ensure that if any management measures are not being implemented or activities are not being restricted to the areas designated for prospecting, this will be come evident sooner, rather than later and the environmental degradation will be reduced. This will also reduce the cost of remediation where necessary.
- *Use of Herbicides or Chemicals*: The use of insecticides, herbicides and other chemicals that could poison invertebrates, small mammals, reptiles and amphibians (a source of food for birds) should not be permitted, unless crucial to the prospecting activities. If the latter is the case, these should only be used in the prospecting area and are not permitted in the buffer zone or outside the area designated for prospecting. The type of insecticides, herbicides and other chemicals use must be approved by the Endangered Wildlife Trust Poison Working Group. They can be contacted on Tel: 011 486 1102, Fax: 011 486 1506, or e-mail: ewt@ewt.org.za.

[4] This includes laying of eggs, incubation, and rearing of chicks till fledging.
[5] This includes laying of eggs, incubation, and rearing of chicks till fledging.

5.2 MINING

Impact: Habitat destruction through excavation of the open cast pit.

- *Cultivated Lands*: Despite the fact that there are red data priority species that would utilise the cultivated lands, none of these species are totally dependant on these lands for foraging, roosting and / or breeding. Therefore loss of this habitat is considered to have impacts of **LOW** *significance*.
  - Species most likely to be impacted: Lesser Kestrel, Blue Crane, and Secretary bird.
- *Grasslands*: Based on current prospecting results, it was indicated that no mining is proposed in the grasslands. Provided mining (creation of the pit and the establishment of infrastructure) remains outside of the grasslands, no destruction of habitat is anticipated, resulting in an impact of **LOW** *significance*.
  - Species most likely to be impacted: Lesser Kestrel, Blue Crane, and Secretary bird.
- *Wetlands*: Prospecting results indicate that there are sand and clay reserves in the vicinity of the wetlands. Therefore, there is the potential that these habitats may be mined. If so, these habitats would be lost / destroyed, resulting in an impact of **HIGH** *significance*. Even if the wetlands themselves are not mined but the clay and sand in the vicinity of the wetlands is mined, it is likely that the impacts on the wetlands will be significant, resulting in loss of this suitable foraging, roosting and breeding habitat. The details regarding the impacts on the wetlands and the possibility of imposing adequate buffers can not be quantified in this survey. It is *strongly advised* that a wetland specialist is employed to delineate the wetlands and determine the significance of the impacts as a result of mining. Any buffer delineated to protect the wetland is often adequate to protect the habitat required by the bird species utilising the wetland. However, this must be confirmed.
  - Species most likely to be impacted: African Marsh Harrier, African Grass-owl, Greater Flamingo, and Lesser Flamingo.

Management:

- *Buffer zones*: Delineate buffers in conjunction with the wetland survey in order to protect both the habitat required by the priority bird species and those required for the continued functioning of the wetlands. At a minimum, maintain the buffers depicted in Figure 4.1 with no activities being permitted within the buffers.

Impact: Erosion impacting on wetland functioning.

- If mining or surface disturbance is permitted in the catchment of the wetland, there is an increased potential that surface run-off flowing over the exposed surfaces (into the wetland), will collect sediments and increase the sediment load in the pans. Given that some of the priority species are utilising the pans for foraging, the increased sediment load may have an impact on the bird's food source, resulting on the habitat no longer being suitable. Given the threat to wetlands, specifically pans (due to agriculture, mining and development), the significance of this habitat loss is considered to have an impact of **HIGH** *significance* ranking.
  - Species most likely to be impacted: African Marsh Harrier, Greater Flamingo, and Lesser Flamingo.

Management:

- *Storm water management plan*: A detailed storm water management plan must be generated as part of the Environmental Management Programme (EMP). This management plan must ensure that the following is included:
  - The mining area must be divided into catchment areas based on i) topography, ii) existing disturbance from mining (in order to separate clean and dirt water), iii) long-term mine plans, and iv) natural management barriers, such as roads.
  - The volume of storm water run-off anticipated for each catchment within the mining area.
  - The size of the diversion channels and catchment ponds, ensuring that the "clean" and "dirty water" does not interact more than once in 50 years.
  - The location of these diversion channels and catchment ponds on a site plan.
  - An explanation as to how the collected "dirty water" will be managed, specifying i) how water will be discharged, ii) the volume of water that will be discharged, iii) when it will be discharged, iv) how the silt levels in the water will be managed, v) how the quality of discharge water will be ensured, and vi) action that will be taken if polluted water is accidentally released.

6 ECOLOGICAL MANAGEMENT PLAN

A comprehensive, site-specific ecological management plan for all proposed open spaces, buffers and corridors that are relevant to the species and/or habitats under investigation.

The site is currently utilised for pasture lands, grazing of cattle and / or cultivation of crops. The red data bird species that could utilise the site for foraging purposes will be impacted by these activities as land uses change. The ecological management plan presented in this section of the report will not aim at altering the agricultural activities being undertaken on-site, but aim to provide guidance to the management of open grasslands and pans that are not being cultivated.

Fire

Fire can alter the habitat structure of the area and can have an impact on the breeding success of the African Grass-owl (the only species likely to breed on-site), depending on the time of year when fires pass through. For this reason it is necessary to manage fire in the uncultivated parts of the site.

Frequency: There are many conflicting theories as to how frequently veld should burn in order to remain productive. Considering the purpose of management of this section of veld is not for grazing purposes, it is undesirable to allow annual fires to pass through this area. A fire break must be maintained around the areas of HIGH sensitivity, outside of these areas (Figure 4.1). This will reduce the potential for too frequent burning. It is advised that burning should **not** be permitted in this area more frequently than every three years and even longer periods between burning is acceptable.

Time of Year: The breeding period of the African Grass-owl begins in March and runs through until August, with variations from year to year and from region to region. Therefore, burning may only be permitted between September and January. This will reduce the potential of any disturbance to breeding African Grass-owl pairs and the potential death of chicks. It is recommended that the no-burn period starts a month before breeding so that birds preparing nests will not be disturbed.

Cattle Grazing

Time of Year: As indicated above, the breeding period of the African Grass-Owl begins in March and runs through until August, with variations from year to year and from region to region. Therefore, this area may only be used for grazing between September and February. During this time, the area must not be grazed heavily and must be allowed adequate time to recover between grazing periods.

Management of Storm Water Run-off

Two of the wetlands on-site (Pan 3 and Pan 4) offer suitable habitat for the African Grass-owl because of the structure of the habitat. In order to maintain the habitat structure, no prospecting activities may take place within the wetlands (areas delineated as HIGH sensitivity in Figure 4.1). It must be noted that the entire catchment of the pans are not protected by this delineation. Therefore, there is the potential that activities outside of the HIGH sensitivity areas may change the current storm water run-off volumes and / or patterns. This may result in erosion both inside and outside of the sensitive areas, increasing the sediment loads in the storm water run-off. Increased sediments settling in the wetlands may alter the functioning of the wetlands and over time, alter the habitat structure. This would then have an impact on species utilising the wetlands as foraging sites and those utilising the habitat for roosting and breeding purposes.

In order to reduce the potential of this change, it is essential to implement a storm water management plan. In the development and implementation of a storm water management plan, it is essential that the functioning of the wetland is not negatively impacted. Therefore, it is necessary for a wetland specialist to have input into the development of the storm water management plan. As it will be necessary for the wetlands on-site to be delineated by a wetland specialist, the storm water management plan must form part of the terms of reference for the investigation.

7 ADDITIONAL SURVEYS

7.1 WETLAND SURVEY

In terms of priority bird species, the sensitive habitats within the prospecting site are most commonly associated with wetlands (pans). I am not qualified to determine what the impacts of prospecting (and future mining) will be on wetland functioning. Therefore, it is vital that a wetland survey be undertaken to determine the following:

- Delineation of the wetlands.
- If prospecting and future mining will have an impact on the functionality of the wetland. Any change in wetland functioning may impact on the habitat structure of the wetland which will then have an impact on habitat suitability for birds.
- Suitable buffer zones must be determined to ensure that the wetlands continue to function without changing the current habitat. These buffers must then be compared with the buffers required for the priority bird species to ensure that a maximum buffer is imposed.

7.2 ADDITIONAL BIRD SURVEYS

Before mining is undertaken, another bird specialist survey must be undertaken in conjunction with the wetland survey to determine the potential impacts of mining and if / how these can be managed. As indicated above, suitable buffer zones must also be delineated in conjunction with the results from the wetland survey.

8 REFERENCES

This reference list includes the references of the habitat descriptions provided in Section 9.1.

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9 APPENDICES

9.1 RED DATA BIRD SPECIES HABITAT REQUIREMENTS

Gorsachius leuconotus – White-backed Night Heron

Conservation Status: Vulnerable.
The White-backed Night Heron is associated with clear swift- and slow-flowing streams and rivers with dense overhanging vegetation along the edges (Maclean, 1993; cited in Martin, 1997; cited in Parker and Barnes, 2000) in woodland and forested edges (Hockey *et al.*, 2005). This species forages along margins of water ways by night, feeding on fish and aquatic invertebrates (Maclean, 1993), and roosts in dense vegetation during the day (cited in Parker and Barnes, 2000). For breeding, they build their nest in well-foliaged trees or shrubs, overhanging the water (Tarboton, 2001).

Gyps coprotheres – Cape Vulture

Conservation Status: Vulnerable.
Cape Vultures breed on tall cliffs but will roost on cliffs as well as trees and pylons (Mundy *et al*., 1997; Anderson, 2000). They feed over woodland and open country, such as grasslands, and are less common in savannah or deserts (Maclean, 1993; Mundy *et al*., 1997a; Anderson, 2000; Hockey *et al.*, 2005).

Polemaetus bellicosus – Martial Eagle

Conservation Status: Vulnerable.
The habitat requirements of the Martial Eagle are varied as they tolerate a wide range of vegetation types, from open grassland, savannah, scrub, Karoo, open shrubland and open woodland (Maclean, 1993; Boshoff, 1997; Barnes, 2000b; cited in Hockey *et al.*, 2005). They rely on tall trees for nesting and are more common in flat country than mountainous regions (Boshoff, 1997; Barnes, 2000a; cited in Hockey *et al.*, 2005). Outside of protected areas, the mean territory size has been recorded to vary between 300 and 1 000km^2 while in protected areas, home ranges are in excess of 130km^2. They prey on vertebrates, ranging in weight from 1kg to 4kg (cites in Barnes, 2000b), such as the Scrub hare (*Lepus saxatilis*) that occurs on the proposed development site.

Cirus ranivorus – African Marsh Harrier

Conservation Status: Vulnerable.
African Marsh Harriers occur almost exclusively over inland and coastal wetlands (Hockey *et al.*, 2005). For breeding, this species shows a preference for large wetlands (usually permanent wetlands), with a breeding pair utilising wetlands more than 100ha in extent (cited in Barnes, 2000a). For foraging, this species has been recorded as foraging over smaller wetlands (1 – 2ha), open water (occasionally), drier floodplains, grassland, cultivated lands / croplands and open savannah (Maclean, 1993; cited in Simmonds, 1997; cited in Hockey *et al.*, 2005). It should also be noted that this species travels extensively and are known to fly up to 200km a day for foraging purposes (Harrison *et al*., 1997a; cited in Hockey *et al.*, 2005).

Fulco naumanni – Lesser Kestrel

Conservation Status: Vulnerable.
Lesser Kestrels are a non-breeding migrant to South Africa. They are a gregarious species, occurring in open country and foraging over pristine grassland, agricultural fields (particularly cereal crops) and small-scale pastures (Maclean, 1993; McCann, 1997; cited in Pepler, 2000). They are attracted to these habitats by the abundance of swarming insects, such as alates, termites, locusts and grasshoppers, crickets, mole crickets and large beetles (cited in Pepler, 2000). Lesser Kestrels roost communally in tall trees (mainly *Eucalyptus* spp), often in urban areas (McCann, 1997; cited in Pepler, 2000). The foraging range from these roosting sites may exceed 1 000km^2 (cited in Pepler, 2000), while in Gauteng, the foraging range has been recorded to be an average of 13km^2 and a maximum of 69km^2 (Hockey *et al.*, 2005).

***Anthropoides paradiseus* – Blue Crane**

Conservation Status: Vulnerable.
Blue Cranes occur most frequently in grasslands and agricultural fields, and less frequently in lightly wooded areas, cleared woodland and along the edges of wetlands, and are tolerant of intensively grazed and burnt grassland (Maclean, 1993; Harrison *et al.*, 1997a; Barnes, 2000a; cited in Hockey *et al*., 2005). Their preferred nesting sites are secluded open grasslands, such as hillsides where they have a full view around for predator evasion (Barnes, 2000a).

***Podica senegalensis* – African Finfoot**

Conservation Status: Vulnerable.
The African Finfoot inhabits streams and rivers lined with reeds, overhanging trees and shrubs, particularly where the vegetation droops over the waters edge and touches the water (Maclean, 1993; Allan, 1997a; Barnes and Parker, 2000; Hockey *et al*., 2005). They roost and breed in the dense overhanging vegetation and feed on aquatic invertebrates, frogs and fish (Barnes and Parker, 2000). It has been estimated that one pair of African Finfoot requires a 1.5km to 2.2km stretch of river.

***Eupodotis senegalensis* – White-bellied Korhaan**

Conservation Status: Vulnerable.
The White-bellied Korhaan occurs in either tall, dense, open grassland (especially sour and mixed grassland) or open / lightly wooded regions, often in undulating or hilly country (cited in Barnes, 2000c; Allan, 1997b; cited in Hockey *et al*., 2005). They are gregarious and found in family groups of approximately three birds and have been recorded at densities of 2.5 birds / 100ha (Barnes, 2000c).

***Tyto capensis* – African Grass-Owl**

Conservation Status: Vulnerable.
The Grass-owl's preferred habitat is rank grass and marshes, usually in open habitat near water, vleis and marshes (Maclean, 1993; Mendelsohn, 1997; cites in Barnes, 2000d; cited in Hockey *et al*., 2005). This species requires long grass for roosting and breeding sites, where they can create a vegetation canopy (Mendelsohn, 1997; cites in Barnes, 2000d; cited in Hockey *et al*., 2005).

***Ciconia nigra* – Black Stork**

Conservation Status: Near threatened.
Black Stork are reliant on shallow water bodies such as marshes, dams, shallow rivers, floodplains and estuaries where it forages for fish and a range of aquatic invertebrates (Maclean, 1993; cited in Allan, 1997c; cited in Barnes, 2000e; cited in Hockey *et al*., 2005). As they nest on cliffs, breeding sites are associated with mountainous regions (cited in Allan, 1997c).

***Phoenicopterus ruber* – Greater Flamingo**

Conservation Status: Near Threatened.
Greater Flamingos forage on open shallow eutrophic wetlands (both inland and coastal), inland dams, sewage treatment works, with a preference for saline and brackish waters (Maclean, 1993; cited in Williams and Velásquez, 1997a; cited in Hockey *et al.*, 2005). When breeding in South Africa, they utilise recently flooded large eutrophic shallow salt pans (Hockey *et al.*, 2005).

***Phoenicopterus minor* – Lesser Flamingo**

Conservation Status: Near Threatened.
Lesser Flamingos occur in large brackish or saline waters (inland and coastal) (Maclean, 1993) occurring in open, eutrophic, shallow wetlands (Hockey *et al*., 2005). When breeding in South Africa, they utilise saline lakes and salt pans, with small ephemeral freshwater wetlands being very important for birds dispersing from feeding grounds (Hockey *et al*., 2005). Non-breeding birds often aggregate at coastal mudflats, salt works and sewage treatment works (Hockey *et al*., 2005).

***Sagittarius serpentarius* – Secretarybird**

Conservation Status: Near threatened.

This species shows a preference for open country, mainly savannah, open woodland, grassland (<0.5m in height), dwarf shrubland, mountain slopes and man-made habitats such as grazing paddocks and fallow fields (Maclean, 1993; Boshoff and Allan, 1997; Hockey *et al.*, 2005). This species breeds in most open-country habitats where suitable nest tress, typically flat topped trees 2 to 12m high, are available (Tarboton, 2001). In conservation areas, a Secretarybird pair will occupy a 20km^2 home range, while in the former Transvaal, this species has been recorded to occupy home ranges varying between 100km^2 and 230km^2 (Steyn, 1982; Hockey *et al.*, 2005). Using information gathered during Co-ordinated Avifaunal Roadcounts (CAR) during the late 1990's, the density of Secretarybirds has been recorded to vary between 0.2 and 1.8 birds per 100km.

***Alcedo semitorquata* – Half-collared Kingfisher**

Conservation Status: Near Threatened.

The Half-collared Kingfisher inhabits fast-flowing and clear perennial streams, rivers and estuaries, with dense or well wooded marginal vegetation, often near rapids (Mclean, 1993; Clancey and Hermans, 1997; Hockey *et al.*, 2005). For suitable breeding habitat, this species requires exposed river banks in which to excavate nest tunnels (Clancey and Hermans, 1997) and approximately 1km of river territory (cited in Clancey and Hermans, 1997; cited in Barnes, 2000h).

***Mirafra cheniana* – Melodious Lark**

Conservation Status: Near threatened.

The Melodious Lark occurs in open climax grassland, or relatively dry grassland dominated by Rooigrass (*Themeda triandra*) and sometimes in association with rocky outcrops (Maclean, 1993). They have also been recorded in grassland dominated by *Hyparrhenia hirta* (*pers. com* Dr C. Whittington-Jones and *pers. obs*), cultivated fields of Teff (*Eragrostis tef*) (Maclean, 1993), in planted *Eragrostis* pastures and fallow fields (Dean, 1997). Melodious Larks have been observed in fields where patches of *Hyparrhenia hirta* have been harvested for thatching, suggesting that this species does not require grass of uniform height (*pers. obs*).

***Buphagus erythrorhynchus* – Red-billed Oxpecker**

Conservation Status: Near threatened.

The Red-billed Oxpecker occurs in open savannah (Hockey *et al.*, 2005).

9.2 BUFFER ZONES APPLICABLE TO THIS SURVEY

Cirus ranivorus – African Marsh Harrier

GDACE (2006) stipulates a buffer of 350m around "all confirmed points and the wetland with which the birds are associated". Although the wetlands within the prospecting site are too small to offer breeding sites or to provide permanent foraging sites for the African Marsh Harrier, these wetlands are of ecological importance for at least three other priority bird species. Therefore, it is necessary to ensure that the wetlands are protected and that the GDACE buffer of 350m around the pan must be adhered to. (See Figure 4.1 for a delineation of the buffer zones.)

Tyto capensis – African Grass-Owl

GDACE (2006) stipulates a "570m buffer around each confirmed point" for Grass Owls[6]. As there are no known or confirmed sitings for this species, no buffer zones can be delineated from a specified point. However, it must be noted that the wetland areas (particularly Pan 3 and Pan 4) offer suitable breeding and foraging habitat. Therefore, it is recommended that a buffer be delineated around these wetlands as illustrated in the sensitivity map in Section 4 (Figure 4.1). Note that the buffer has been delineated from the edge of the grassland area around the pans (the area that offers suitable habitat) and has not been delineated based on any wetland zones.

In order to ensure that prospecting does not have an impact on the African Grass-Owl, NO prospecting activities of any kind may be undertaken in the wetlands and the buffer zones.

Phoenicopterus ruber and *P. minor* – Greater Flamingo and Lesser Flamingo

GDACE (2006) stipulates a "60m buffer comprising terrestrial habitat around all confirmed wetlands." In order to protect the foraging habitat of the Greater and Lesser Flamingo, a buffer of 60m has been delineated around the grassland area of the wetlands, as illustrated in the sensitivity map in Section 4 (Figure 4.1). The buffer has been delineated from the edge of the grassland area that is currently the catchment area of the pans. This is to ensure that the pans continue to function as they are at present. The buffer zone has not been delineated based on any wetland zones.

Sagittarius serpentarius – Secretarybird

GDACE (2006) stipulates a "5150m buffer around each confirmed point (i.e. 8350ha) outside of the urban edge and excluding Agricultural Holdings". The prospecting site falls outside of the urban edge and is not agricultural holdings. However, after consultation with GDACE it was decided that this buffer does not have to be applied to this site as there are no suitable breeding sites within close proximity to the site. It must be stressed that the relaxation of the buffer zone is determined on a case-by-case basis and can not be assumed for any other agricultural sites.

[6] The reason for the large buffer is to ensure the protection of not only the breeding habitat, but also the neighbouring habitats in which the birds forage.

10 CURRICULUM VITAE OF SPECIALIST

Curriculum Vitae
Lynn Merle Randell

PERSONAL DETAILS:

First names	Lynn Merle
Surname	Randell
ID number	7506020071089
Contact details	
Business telephone	(011) 795 3636
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E-mail	lynn.umhlaba@telkomsa.net
Home language	English
Other languages	Afrikaans
Criminal offences	None
Health	Excellent

EDUCATION:

Degrees:

BSc (1993-1995).
1996 - Rhodes University, Grahamstown, RSA.

BSc Hon Geology (1996).
1997 - Rhodes University, Grahamstown, RSA.

MSc Zoology (1997-1999).
2000 - Rhodes University, Grahamstown, RSA.

Courses Attended:

Environmental Monitoring and Reporting
July 2005 – University of Witwatersrand, Johannesburg
Short Course in Wetland Training - Background to wetlands, delineation and impact assessments.
September 2005 – University of Pretoria, Pretoria
Minerals and Petroleum Resources Development Act (MPRDA) – In Operation
July 2004 - Johannesburg
Department of Mineral and Energy, Workshop on Implementation of the MPRDA
May 2004 - Pretoria
Air Quality Management and Pollution Control in South Africa.
August 2002 - Matrix and University of the Witwatersrand CEE, Johannesburg.
Environmental Management System (ISO 14001) Implementation and Internal Auditor Training Course.
May 2002 - Walmsley, Johannesburg.
Short Course on the Role and Use of Aquatic Bio-monitoring.
February 2001 - Rhodes University, Grahamstown.

EMPLOYMENT HISTORY:

Environmental Consultant **Umhlaba Environmental Consulting cc**

January 2004 to present

I am one of the Founding Members of Umhlaba and my responsibilities include general environmental work such as:

- Bird & Mammal Specialist Studies.
- Co-ordinating specialist faunal and flora assessments.
- EIA Checklists and Scoping Reports.
- Part of a team compiling EIA.
- Environmental Management Plans / Programme.
- Environmental Management Plans for new developments.
- Environmental Auditing of Environmental Management Programmes.
- Pre-ISO Auditing.
- Liaison with government departments, on behalf of the clients.
- Alien Vegetation Removal Programmes.

Other projects undertaken by Umhlaba where I gave assistance included:

- Closure Reports.
- Rehabilitation Plans.

Environmental Consultant **Blue Swallow Environmental Services (Pty) Ltd.**

March 2003 to December 2003

I was appointed as the Projects Manager to co-ordinate all projects undertaken by the company as well as run my own projects. The majority of my work focussed around mining activities, with work undertaken by myself, including:

- Environmental Management Programme Reports (in terms of the Minerals Act, 1991).
- Environmental Auditing of Environmental Management Programme Reports.
- Pre-ISO Auditing.
- Environmental Impact Assessment Checklists.
- Bird specialist studies.
- Liaison with government departments, on behalf of the clients.

Other projects undertaken during my period of employment for which I gave assistance included:

- Scoping Studies and Reports.
- Closure Reports.
- Rehabilitation Plans.
- Financial Provision documents.
- Wetland identification and delineation.
- Tourism Marketing.

Environmental Consultant **Matrix Environmental Consultants cc**

June 2000 to February 2003

I began working for Matrix after a graduated. While employed with Matrix, our work focused on mining and industry, with my tasks including:

- Writing of monthly, quarterly and annual dustfall monitoring reports for the first year then progressing to the supervision of the compilation of these dustfall monitoring reports.
- Scoping Studies and Reports,
- Co-ordinate and host the public participation processes.
- Environmental Impact Assessment Checklists.
- Assist with Air Quality Management Plans.
- Assist with Air Quality Specialist Studies for EIA's.
- Conduct internal environmental performance audits, with particular reference to air quality issues.

LIST OF PROJECTS:

Ecological / Faunal Projects:

Bird and Mammal Specialist Studies:

- Three Diamonds Trading 289 (Pty) Ltd
- Ecological Management Services (Pty) Ltd – Blair Atholl.
- Gomes Zimbiwa Sand and Stone (Olifantsfontein) (Pty) Ltd – Olifantsfontein Sand Operation.

Co-ordinating Fauna and Flora Specialist Studies:

- Prime Resources (Pty) Ltd – New Kleinfontein Operation
- Holcim (South Africa) (Pty) Ltd X 3
- Three Diamonds Trading 289 (Pty) Ltd
- Ecological Management Services (Pty) Ltd – Blair Atholl.
- Gomes Zimbiwa Sand and Stone (Olifantsfontein) (Pty) Ltd – Olifantsfontein Sand Operation.

Desktop Faunal Surveys:

- Ecological Management Services (Pty) Ltd – Jeffreys Bay golf estate.
- Ecological Management Services (Pty) Ltd – Mining Right Application.
- David Hoare Consulting cc – Dersley Park Extension 2 housing development.
- David Hoare Consulting cc – Attridgeville housing development.
- Desktop faunal surveys have also been undertaken for all Scoping Reports, Mining Right Applications, EMPans and EMProgrammes listed below.

Mining Related Projects:

Scoping Reports and EIA (in accordance with the MPRDA):

- Three Diamonds Trading 289 (Pty) Ltd – Sand Operations
- Zimbiwa Resources (Pty) Ltd – Dolomite Operations
- Monroe Mining (Pty) Ltd – London Alluvial Diamond Operation
- Gomes Zimbiwa Sand and Stone (Olifantsfontein) (Pty) Ltd – Olifantsfontein Sand Operation

Mining Right Applications:

- K.S.M Mining (Pty) Ltd – Northern Cape

EMPlans (in accordance with the MPRDA):

- Holcim (South Africa) (Pty) Ltd X 4
- K.S.M Mining (Pty) Ltd – Northern Cape

EMProgrammes (in accordance with the MPRDA):

- Three Diamonds Trading 289 (Pty) Ltd – Sand Operations
- Zimbiwa Resources (Pty) Ltd) – Zimbiwa Dolomite Operation
- Monroe Mining (Pty) Ltd
- Gomes Zimbiwa Sand and Stone (Olifantsfontein) (Pty) Ltd – Olifantsfontein Sand Operation
- Gomes Zimbiwa Sand and Stone (Pty) Ltd – Rietfontein Sand Operation
- Holcim (South Africa) (Pty) Ltd X 2
- Gomes Zimbiwa Sand and Stone (Pty) Ltd – Doornrandje Aggregate Operation

Environmental Performance Audits:

- Gomes Transport (Pty) Ltd
- Holcim (South Africa) (Pty) Ltd X 10
- Much Asphalt: 1 Durban Operation
- Much Asphalt: 3 Gauteng Operations

EMPlans (for operations not covered under the MPRDA):

- Viva Bricks (Pty) Ltd
- Heidelberg 4x4 School

Alien Vegetation Removal Programmes:

- Ecological Management Services (Pty) Ltd – Blair Atholl
- Holcim (South Africa) (Pty) Ltd X 4
- Gomes Zimbiwa Sand and Stone (Pty) Ltd – Doornrandje Operation

Other Projects Undertaken Since 2004:

- *Gauteng Department of Agriculture Conservation and Environment:* Mining in Metsweding Project (Project co-ordinator)
- *Viva Bricks (Pty) Ltd*: Environmental Management Programme for a brick manufacturing operation.
- *Holcim (South Africa) (Pty) Ltd:* Investigation into available Bioremediation.
- *Monroe Mining (Pty) Ltd*. Concurrent Rehabilitation Assessment.
- *Monroe Mining (Pty) Ltd*. Rehabilitation Proposal in consultation with the DME.
- *Ecological Management Services (Pty) Ltd*. Blair Atholl Scoping Report - Impact Assessment and Management Measures.
- *Ecological Management Services (Pty) Ltd*. Blair Atholl Environmental Management Plan – Mitigation and Management Measures.
- *Zimbiwa Dolomite (Pty) Ltd*. Review of Dustfall Monitoring Results.
- *Graham Fowler*: Scoping Report for a 4x4 and recreational facility
- *Graham Fowler*. Alien Demarcation Application.
- *Richards Bay Coal Terminal*. Annual Dustfall Report.
- *Kynoch Fertilizers*. Annual Dustfall Report.

LECTURING, PRESENTATIONS, PUBLICATIONS, AND SEMINARS:

Guest Lecturers

University of the Witwatersrand, School of Mining Engineering September 2005 & May 2006

Umhlaba Environmental Consulting was invited to present a lecture for the MSc course "Introduction to Environmental Impact Assessment". My lecture was entitled "The Integration of Environmental Impact Assessments and Environmental Management Programmes for Mining".

University of the Witwatersrand, School of Mining Engineering April 2005

Umhlaba Environmental Consulting was invited to present a lecture for the MSc course "Mining and the Environment". Our lecture was entitled "The Minerals and Petroleum Resource Development Act and the Environment".

Vista University August 2003

I was invited to present a guest lecture to the third year Environmental Management students to provide an overview of environmental consulting, focussing on sustainable development and related environmental issues

Rhodes University, Department of Zoology and Entomology February 1998 to December 1999

While studying for my Masters Degree, I undertook part time lecturing to the following:

- Lecturing to first year Biology and Zoology students.
- Giving various talks and guest lectures to third year Zoology students and scholars and school groups.

Formal Presentations / Scientific Publications

NICHOLSON, A.N, RANDELL, L.M. and ALLISON H. August 2006. When are mining related industries regulated by the New NEMA EIA Regulation and not by the MPRDA? Presented at the International Association for Impact Assessment annual conference August 2006.

RANDELL, L M. October 2002. The Impact of Air Pollution on Vegetation - What is Happening?. Presented at the National Association for Clean Air annual conference October 2002.

RANDELL, L M. August 1999. Mini television documentary on my M.Sc. thesis: A possible solution to the problem of Common Duiker, *Sylvicapra grimmia*, on chicory farms, with reference to their behaviour in agriculturally disturbed areas

RANDELL, L M. July 1998. The common duiker, Sylvicapra grimmia, - Nocturnal behaviour in an agricultural environment. Presented at the Zoology Society of Southern Africa's annual conference, July 1998.

Informal Presentations / Popular Articles

WHITTINGTON-JONES, C. & RANDELL, L. 2005. The Conquest of Botswana, Part 1: There and back again in a sedan. Diaz Diary: 33 (4)

RANDELL, L & WHITTINGTON-JONES, C. 2006. The Conquest of Botswana, Part 2: The Delta and the Panhandle. Diaz Diary: 34 (2)

I have given many informal presentations to a variety of groups from school wildlife societies to interest groups from the National Schools Science Festival and various University organisations.

MEMBERSHIPS:

- Registered with the South African Council for Natural Scientific Professionals (SACNSP). Registration No.: *Pr.Sci.Nat 400076/05*
- BirdLife South Africa since 1992
- Wildlife and Environment Society of South Africa since 2002
- International Association for Impact Assessments, South Africa since 2004
- Member of the Dias Bird Club, Grahamstown, Eastern Cape. 1997 - 1999
- Family member of the West Vaal Bird Club, Potchesfstroom, North West Province. since 1992

FIELD EXPERIENCE:

Birds:

- Participated in the annual Birding Big Day since 1993.
- Participated in the biannual Co-ordinated Avifaunal Road (CAR) Count during 1998 and since 2004.
- Participated in the biannual Co-ordinated Water-bird Count (CWAC) since 2001
- CWAC site co-ordinator for two sites in Gauteng since 2003.
- Trainee bird ringer.
- Assisted in raptor netting and ringing.
- Assisted with raptor telemetry.
- Avid bird watcher since 1989. (My life list current stands on 605 species, excluding species splits.)

Mammals:

- Eight months experience in mammal telemetry.
- Involved in antelope capture of Common and Blue duiker, Impala, Blesbok and Nyala.
- Microscopic faecal preparation and analysis.