
PROPOSED EXPANSION OF THE ESKOM MARAPONG CONTRACTOR'S VILLAGE, LEPHALALE, LIMPOPO PROVINCE.

ECOLOGICAL ASSESSMENT SURVEY

Prepared for:

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Lephalale_Eco Assess 07/08

July 2008

EnviRoss CC

CK: 2007/051532/23

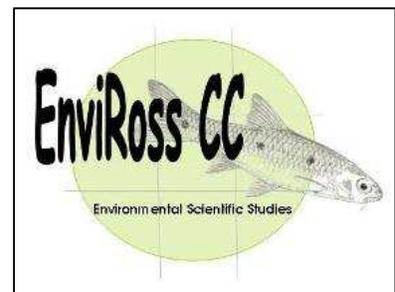
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Executive Summary

EnviRoss CC was requested to undertake an ecological investigation, encompassing the terrestrial fauna and flora composition for the proposed expansion development of Eskom Marapong Contractors Village that is located to the west of Lephalale (Ellisras) in Limpopo Province on a portion of the farm Nelsonskop 464 LQ.

The ecological assessment study was undertaken to determine the overall condition and ecological status of the vegetation type of the proposed development site as well as the occurrences (and possible potential habitat) of any RDL faunal or floral species. The findings of this report will be used to propose recommendations and mitigatory actions for the planning and operational phases of the proposed development activity pertaining to various ecological processes. A general ecological survey was undertaken throughout the entire site due to the uniformity in habitat type and the general degradation and transformation of the habitat unit. The field assessment was aimed at determining the conservational relevance of the proposed development site to RDL faunal and floral species within the area. The site was investigated during a field assessment in July 2008 to determine the overall Present Ecological State (PES) for the proposed development site and adjacent areas.

A desktop study to gain background information on the physical habitat and potential faunal and floral biodiversity lists of the proposed development site and surrounding areas was initially undertaken. These lists included the RDL species applicable to the area and a description of the physical habitat and vegetation types represented within the area. This information was then cross-referenced with the data from the habitat assessments done during the field survey.

Vegetation type status and general area assessment.

A desktop study was undertaken to gain background information for the proposed site. The vegetation type falls predominantly within an vegetation type of *Least concern* conservation status, namely *Limpopo Sweet Bushveld*, a *Central Bushveld Bioregion* representative of the *Savanna Biome*. Existing land use activities have had a significant impact on the vegetation type and habitat integrity in general to the point that the proposed development site has only been allowed to retain a relatively few established trees - no grassy layer or undergrowth presently occurs. Therefore there was limited representation of *Limpopo Sweet Bushveld*.

No RDL plant species were observed, and the highly-transformed nature of the proposed development site makes it highly unlikely that any RDL floral species would occur within the perimeter of the camp.

Faunal assessment.

Faunal assessment diversity was assessed initially as a desktop study and then a field assessment through visual observations and habitat evaluations. The proposed development site was found to be largely insignificant to the conservation of RDL faunal species in general due to the removal of all of the vegetation undergrowth that had already been undertaken. Detailed evaluations in terms of invertebrate trapping and thorough site searches were therefore regarded as being unnecessary. A general invertebrate survey was, however, undertaken within areas outside of the proposed development site that was still representative of natural habitat. This revealed only commonly-occurring species. This may be indicative that the proposed development activities would have a largely insignificant impact to RDL invertebrate species conservation within the region.

The desktop study, when cross-referenced with the data gathered from the field assessment, revealed that only natural areas further afield from the proposed development site and immediate surrounding areas would potentially offer significantly suitable habitat for further RDL faunal species. The most relevant species are presented in Table 1, Table 2 and Table 3, wherein the results of the RDSIS (Red Data Sensitivity Index Score) for fauna (also see Section 5.7) are also presented.

Table 1: Summary of RDL species status for the proposed development site.

Taxon	Total species	Total RDL	RDL category*						POC# ≥60%
			CE	EN	VU	NT	Ra	DD	
Mammals	100	27	1	2	6	11	0	7	2
Birds	398	28	0	1	12	15	0	0	0
Reptiles	66	1	0	0	1	0	0	0	0
Amphibians	15	1	0	0	1	0	0	0	0
Invertebrates	X	2**	0	0	0	0	2	0	2
Totals:		59	1	3	20	26	2	7	4

*CE-Critically endangered; EN-Endangered; VU-Vulnerable; NT-Near threatened; Ra-Rare & DD-Data deficient.

#POC – Probability of Occurrence.

**Trapdoor spiders for the region are categorised as one group due to the lack of distribution data.

The RDSIS for applicable RDL faunal species pertaining to the proposed development site was calculated at 19.8%. This is a *Low* relevance score, translating into a poor probability for RDL faunal species being particularly dependant on the habitat offered by the proposed development site. The proposed development site is considered to offer viable habitat (POC ≥60%) for only 4 (6.8%) out of the 59 RDL faunal species recorded from the region. This is largely due to the area already having undergone vegetation clearing, the high degree of disturbance factors (vehicular and pedestrian traffic and noise levels) and the adjacent main roadways and industries (Matimba

Power Station). The perimeter of the proposed development site is also fenced off. This greatly reduces the ecological connectivity potential for many faunal species.

Table 2: RDL fauna species POC category summary for the property.

Taxon	Total species	Total RDL	POC Category*				
			L	LM	M	MH	H
Mammals	100	27	10	9	8	0	0
Birds	398	28	12	10	6	0	0
Reptiles	66	1	0	1	0	0	0
Amphibians	15	1	0	1	0	0	0
Invertebrates	X	2**	0	0	2	0	0
Totals:		59	22	21	16	0	0

*L-Low (0-20%); LM-Low medium (21-40%); M-Medium (41-60%); MH-Medium high (61-80%) & H-High (81-100%).

**Trapdoor spiders for the region are categorised as one group due to the lack of distribution data.

There were no RDL faunal species with POC values categorising them as having a *medium-high* to *high* (>60%) POC. All of the RDL faunal species were rated as having a POC category of *Low* to *Medium* (0-60%). This is directly attributed to the high disturbance factors that the site has historically and is presently being subjected to that makes the localised area unlikely to significantly contribute to RDL faunal conservation within the region (Table 2).

Table 3: RDL fauna species summary for species with a POC value of $\geq 60\%$.

Common name	Species	RDL status	POC
MAMMALS			
Bushveld Gerbil	<i>Tatera leucogaster</i>	DD	60.0
BIRDS			
Martial Eagle	<i>Polemaetus bellicosus</i>	VU	60.0
INVERTEBRATES			
	Trapdoor spiders	Protected	60.0
	Baboon spiders	Protected	60.0

The species that were awarded a POC value of greater or equal to 60% are presented in Table 3 and are indicative of the species that could potentially inhabit the proposed development site or immediate surrounding area. The RDL invertebrates are limited to known provincial recordings for Mygalomorph spiders. The lack of data necessitates that these species be grouped (also see section 5.6. *RDSIS* for further detail).

Significance ratings of perceived environmental impacts.

Table 4 presents the significance assessment of the perceived environmental impacts for the pre-construction, construction and operational phases of the proposed development that are applicable to faunal and floral species as well as habitat conservation and pollution prevention within the region.

Table 4: Significance assessment of the various perceived environmental impacts applicable to proposed development activities.

Potential environmental impact	Project activity or issue	Environmental significance before mitigation*							Environmental significance after mitigation as per EMP						
		M	R	D	S	P	TOT	SP	M	R	D	S	P	TOT	SP
Pre-Construction Phase															
Habitat destruction	Vegetation removal and soil stripping	4	3	4	1	5	60	H	4	2	3	1	4	40	M
RDL species impacts	Habitat destruction that would lead to decreased potential to support RDL floral and faunal species	5	3	4	1	5	65	H	3	2	4	1	4	40	M
Surface water / soil pollution	Site clearing activities, Leaks from vehicles and equipment	3	2	4	2	4	44	M	2	1	3	1	2	14	L
Soil erosion	Soil stripping, vegetation removal	3	3	4	2	3	36	M	2	1	4	1	2	16	L
Species conservation	Subsistence hunting by contractors / construction crew	4	5	4	2	4	60	H	2	5	4	2	1	16	L
Construction Phase															
Habitat transformation	Surrounding areas being impacted on by dumping of excess building material / refuse	3	2	4	2	4	44	M	2	1	4	1	1	8	L
Species conservation	Subsistence hunting by contractors / construction crew	4	5	4	2	4	60	H	2	5	4	2	1	16	L
Surface water / soil pollution	Site clearing activities Leaks from vehicles and equipment	3	2	2	2	4	36	M	3	2	2	2	1	9	L
Operational Phase															
Species conservation	Subsistence hunting by contractors / construction crew	4	5	4	2	4	60	H	2	5	4	2	1	16	L
Exotic vegetation encroachment	Disturbed soils leading to exotic veg encroachment	5	4	5	2	4	64	H	1	1	4	1	1	7	L

M= severity/ magnitude; R= Reversibility; D= Duration; S= Spatial extent; P= Probability.

Significance = Consequence (M+R+D+S) X Probability (P)

SP = Significance points, where ≥60 = High; 30-60= Medium; <30 = Low.

Table 4 presents the various potential environmental impacts pertaining to the proposed development activities. All impacts are rated as having a *moderate* to *high* significance rating if left unabated. Management intervention with appropriate mitigation measures can greatly reduce the ecological impacts and therefore significance of these impacts.

General conclusions and mitigation recommendations.

The following general conclusions were drawn on completion of the survey:

- No ecologically sensitive habitats were observed due to the site having already been transformed by the removal of the vegetation undergrowth throughout the area. The upper soil layer had therefore undergone disturbances within the recent past that meant that

sedentary faunal species, burrowing species and any sensitive of RDL floral species were either displaced or destroyed.

- The proposed development activities can therefore be regarded as having insignificant further adverse effects on the overall regional conservation of RDL faunal or floral species.
- Appropriate mitigation measures can significantly reduce the ecological impact of the proposed development activities.
- The generally flat topography of the proposed development site means that soil erosion due to water runoff would not be considered a significant threat, however, adequate stormwater measures should be put into place as a preventative measure.
- The dumping of excess building material or refuse within the surrounding area should not be allowed. This will aid in limiting the footprint of the proposed development activities to a minimum.
- Contractors and building crew must be prohibited from subsistence hunting within the area.
- Adequate toilet facilities must be provided for construction crews to ensure that the surrounding bush areas are not utilised as informal toilet areas to prevent surface water contamination.

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Glossary of Terms & Acronyms.

Alien vegetation – Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally.

Biome – A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.

Bush encroachment – A state where undesirable woody elements gain dominance within a grassland, leading to depletion of the grass component. Typically due to disturbances and transformations as a consequence of veld mismanagement (overgrazing, incorrect burning, etc.).

Decreaser grass – Grass abundant in veld in good condition, which decreases when veld is under- or over-utilized.

°C – Degrees Celsius.

Endangered – Organisms in danger of extinction if causal factors continue to operate.

Endemic species – Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.

Exotic vegetation – Vegetation species that originate from outside of the borders of the biome. Usually international in origin.

Ex situ conservation – Where a plant (or community) cannot be allowed to remain in its original habitat and is removed and cultivated to allow for its ongoing survival.

Extrinsic – Factors that have their origin outside of the system.

GDACE – Gauteng Department of Agriculture, Conservation and Environment

ha – Hectares.

Indigenous vegetation – Vegetation occurring naturally within a defined area.

Increaser 1 grass – Grass species that increase in density when veld is underutilized.

Increaser 2 grass – Grass species that increase in density in over utilized, trampled or disturbed veld.

Increaser 3 grass – Grass species that increase in density in over and under-utilized veld.

In situ conservation – Where a plant (or community) is allowed to remain in its natural habitat with an allocated buffer zone to allow for its ongoing survival.

Karoid vegetation – A shrub-type vegetation that dominates in grasslands that have seen historical disturbances. Mainly due to over-grazing and mismanaged burning regimes. The shrubby vegetation eventually becomes dominant and out-competes the grassy layer.

m – Metres.

mm – Millimetres.

MAMSL – Metres above mean sea level.

MAP – Mean annual precipitation.

MAPE – Mean annual potential for evaporation.

MASMS – Mean annual soil moisture stress.

MAT – Mean annual temperature.

Orange Listed – Species that are not Red Data Listed, but are under threat and at risk of becoming RDL in the near future. Usually allocated to species with conservation status of *Near threatened*, *Rare* and *Data Deficient*.

PES – Present Ecological State.

POC – Probability of occurrence.

PRECIS – Pretoria Computer Information Systems.

Pioneer species – A plant species that is stimulated to grow after a disturbance has taken place.

This is the first step in natural veld succession after a disturbance has taken place.

QDS – Quarter degree square (1:50,000 topographical mapping reference).

Rare – Organisms with small populations at present.

RDL (Red Data listed) species – Organisms that fall into the *Extinct, Critically endangered, Endangered, Vulnerable* categories of ecological status.

RDSIS – Red data sensitivity index score.

SANBI – South African National Biodiversity Institute.

Veld retrogression – The ongoing and worsening ecological integrity state of a veld.

1. Introduction & Terms of Reference.

EnviRoss CC was requested to undertake an ecological investigation, encompassing the terrestrial fauna and flora composition for the proposed expansion and development of the existing contractor's camp pertaining to Eskom Marapong Contractors Village that is located to the west of Lephalale (Ellisras) in Limpopo Province on a portion of the farm Nelsonskop 464 LQ. The proposed development site is located immediately north of Matimba Power Station and is situated approximately 14km to the west of Lephalale, off the D2816 roadway in Limpopo Province. It is accessed from the D2816. The proposed development would entail the following activities:

- Site preparation;
- Earthworks (excavations, etc.);
- Infrastructure and services development;
- Construction of housing units and other infrastructure.

The proposed development site is represented on the SA 1:50,000 – 2327DA *Lephalale* QDS topographical maps (Figure 1). The extent of the proposed development is approximately 86ha. The figure shows the outer boundary and the extent of the proposed development site in red.

The proposed development site is already utilised for staff quarters in a contractor's camp layout. This incorporates residential units and other infrastructure typical of this type of establishment. The Matimba Power Station is situated in close proximity to the proposed development area. Further afield, the surrounding land use is dominated by agriculture, mining and open areas.

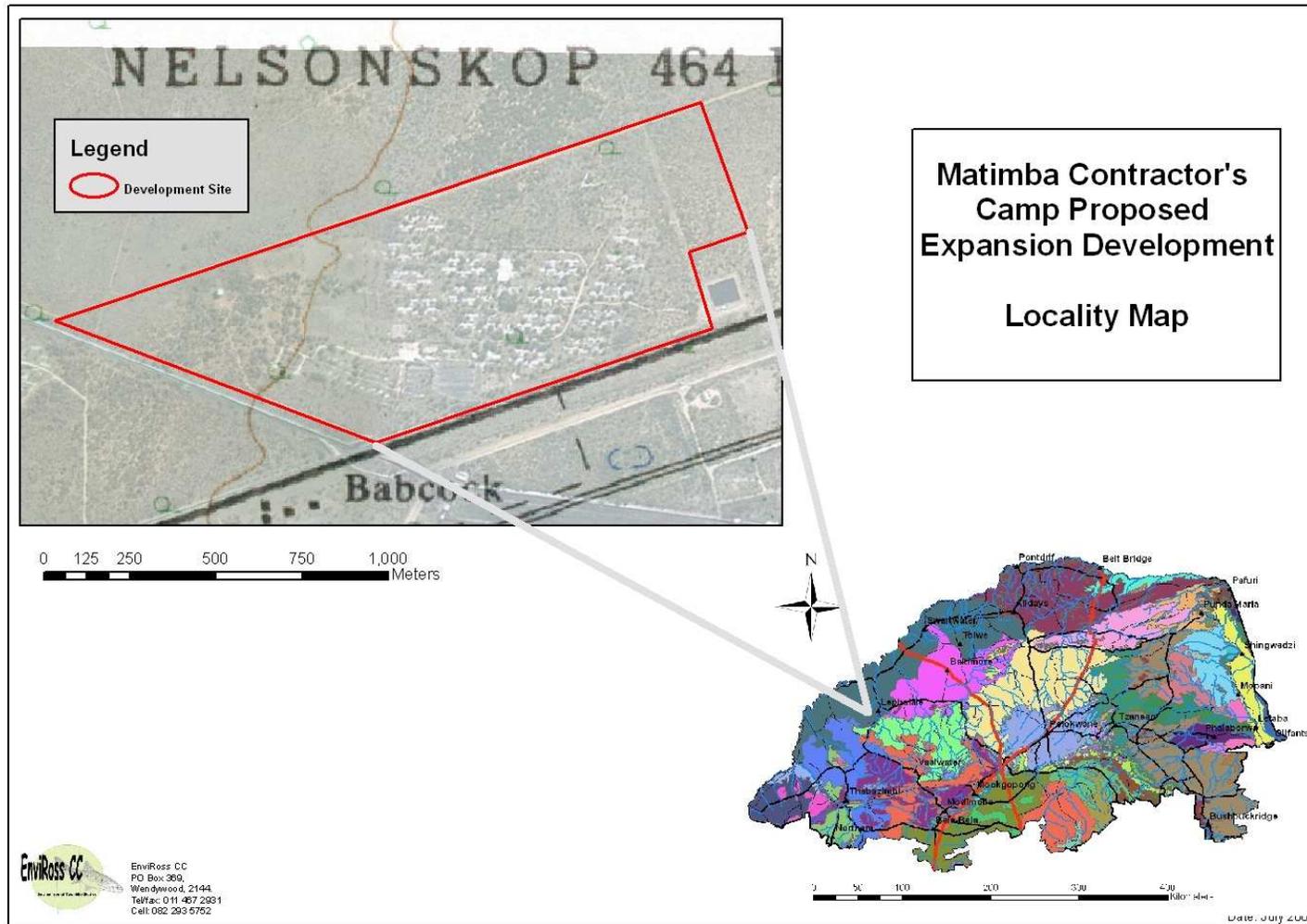


Figure 1: Locality of the proposed development site shown in red (1:50,000 SA QDS topographical maps, 2327DA – Lephalele, Chief Directorate: Surveys and Mapping, 1981).



2. Scope of Work.

The Scope of Work encompasses a general fauna and flora assessment for the proposed development site and immediate surrounding areas that are perceived to be affected by the proposed development activities, with emphasis being placed on the conservational significance that the proposed development area potentially holds for any RDL faunal or floral species.

A general site condition was to be presented in terms of vegetation ecological integrity, together with areas of particular ecological sensitivity were to be indicated and mapped. The perceived impacts leading to the loss of natural migrational corridors, open spaces and sensitive habitats were also to be assessed, with mitigatory measures being proposed on conclusion of the study aimed at reducing the potential ecological impacts of the proposed development activities.

3. Ecological Description of the Property.

3.1 Veld Type.

Limpopo Province incorporates 55 vegetation types (Figure 2), made up of essentially four vegetational biomes, namely the Grassland, Savanna, Forest and Wetland biomes. These are largely dominated by the Bushveld and Forest biomes, with the Grassland biome being relatively poorly represented.

These biomes incorporate various bioregions that are limited by geologies, climate, altitude, topography, rainfall, frost, etc. Limpopo Province has a varying topography that gives rise to a wide diversity of geologies and rainfall patterns throughout the province. This accounts for the wide range of vegetation types throughout the province, many of which are fairly localised in extent, making many of these vegetation units vulnerable to transformation.

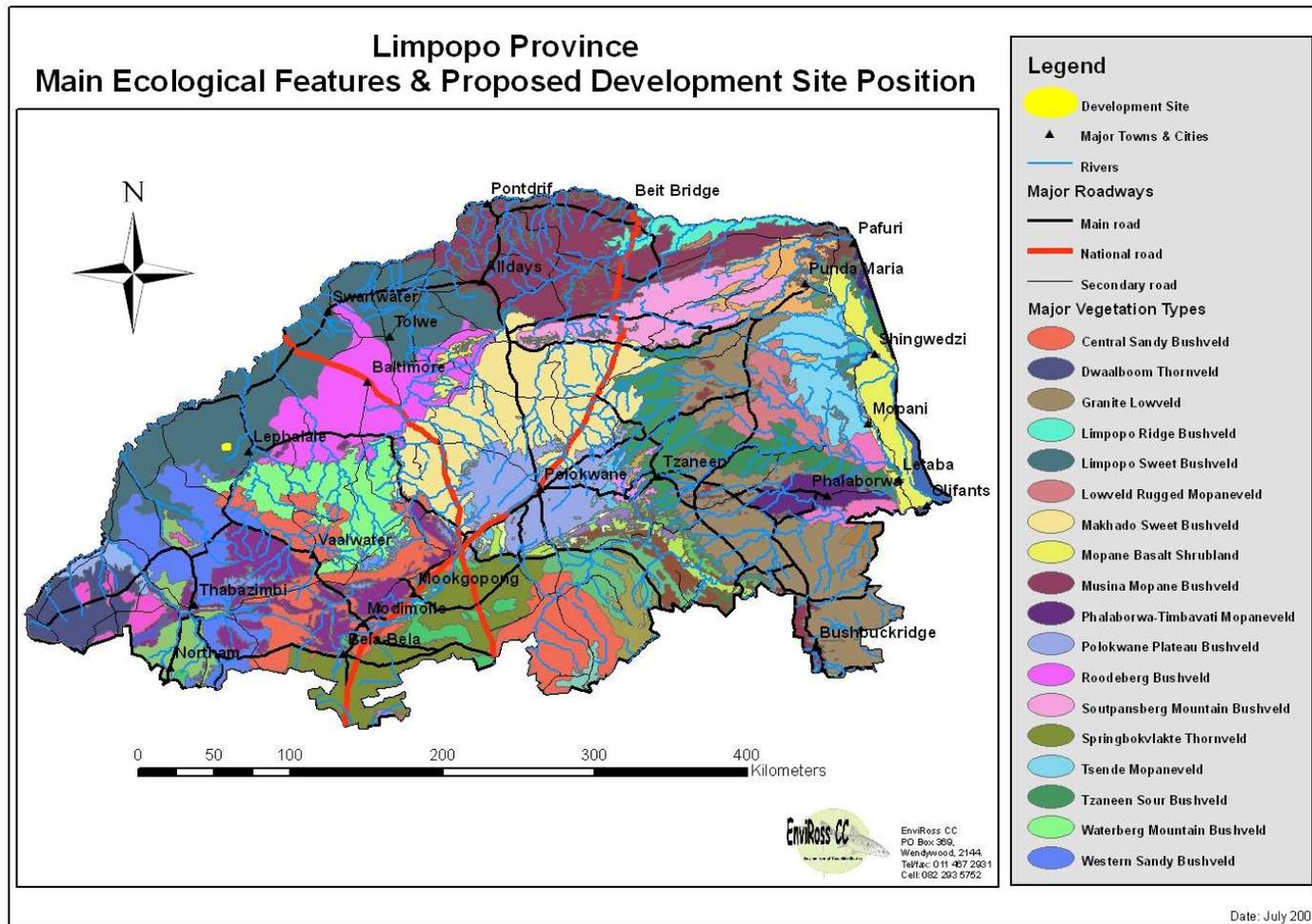


Figure 2: Vegetation types and other main ecological features of Limpopo Province (Adapted from Mucina & Rutherford "VegMap2006_Shapefile", 2006).



The proposed development site falls within the Central Bushveld bioregion of the Savanna biome. The vegetation type is known as *Limpopo Sweet Bushveld*, which is distributed within the Limpopo Province, where it extends from the lower reaches of the Crocodile and Marico Rivers around Makoppa and Derdepoort, respectively, down to the Limpopo River Valley, including Lephalale (Ellisras) and into the tropics past Tom Burke to the Usuthu border post and Taaiboschgroet area in the north. It occurs at an altitude range of between 700 to 1,000m AMSL (above mean sea level). This vegetation unit also extends on the Botswana side of the border.

Its main features include sometimes undulating or irregular plains, traversed by several tributaries of the Limpopo River. Short open woodlands are also common, where thickets of almost impenetrable *Acacia erubescens*, *Acacia mellifera* and *Dichrostachys cinerea* are common in disturbed areas. This vegetation type, although limited by low rainfall, is a good area for game and cattle farming due to the high grazing capacity of sweetveld. The dominant and diagnostic floral species for the vegetation type are presented in Table 5.

Table 5: Dominant and typical floristic species of Limpopo Sweet Bushveld (Mucina & Rutherford, 2006).

Grass/sedge/reed species	Forb species	Tree/Shrub Species
<i>Digitaria eriantha</i>	<i>Acanthosicyos naudinianus</i>	<i>Acacia robusta</i>
<i>Enneapogon cenchroides</i>	<i>Commelina benghalensis</i>	<i>Acacia burkei</i>
<i>Eragrostis lehmanniana</i>	<i>Harpagophytum procumbens</i>	<i>Acacia erubescens</i>
<i>Panicum coloratum</i>	<i>subsp. transvaalense</i>	<i>Acacia fleckii</i>
<i>Schmidtia pappophoroides</i>	<i>Hemizygia elliotii</i>	<i>Acacia nilotica</i>
<i>Aristida congesta</i>	<i>Hermbstaedia odorata</i>	<i>Acacia senegal var. rostrata</i>
<i>Cymbopogon nardus</i>	<i>Indigofera daleoides</i>	<i>Albizia anthelmintica</i>
<i>Eragrostis pallens</i>	<i>Kleinia fulgens</i>	<i>Boscia albitrunca</i>
<i>Eragrostis rigidior</i>	<i>Plectranthus neochilus</i>	<i>Combretum apiculatum</i>
<i>Eragrostis trichophora</i>		<i>Terminalia sericea</i>
<i>Ischaemum afrum</i>		<i>Catophractes alexandri</i>
<i>Panicum maximum</i>		<i>Dichrostachys cinerea</i>
<i>Setaria verticillata</i>		<i>Phaeoptilum spinosum</i>
<i>Stipagrostis uniplumis</i>		<i>Rhigozum obovatum</i>
<i>Urochloa mosambicensis</i>		<i>Cadaba aphylla</i>
		<i>Combretum hereroense</i>
		<i>Commiohora pyracanthoides</i>
		<i>Ehretia rigida subsp. rigida</i>
		<i>Euclea undulata</i>
		<i>Grewia flava</i>
		<i>Gymnosporia senegalensis</i>
		<i>Acacia tenuispina</i>
		<i>Commiohora africana</i>
		<i>Felicia muricata</i>
		<i>Gossypium herbaceum subsp. africanum</i>
		<i>Leucosphaera bainesii</i>

(*)(d) – Dominant species for the vegetation type; (c) – Common species for the vegetation type.)

Limpopo Sweet Bushveld is classified as *Least Threatened*. It has a target conservation of 19%, however, less than 1% is statutorily conserved and limited to reserves that straddle the south-

eastern limits of the unit. Examples of these include D'Nyala Nature Reserve. Very little of it is conserved in other areas. About 5% of it is transformed, mainly by cultivation and mining. Erosion within the unit is low to high (Mucina & Rutherford, 2006).

3.2. Geology and Soils.

The northern half of the area is dominated by gneisses, metasediments and metavolcanics of the Malala Drift Group, Beit Bridge Complex (Swazian Erathem), basalts of the Letaba Formation (Lebombo Group of the Karoo Supergroup) are also found in the northeast. Sandstone, siltstone and mudstone of the Clarens Formation (Karoo Supergroup), as well as of the Matlabas Subgroup (Mokolian Waterberg Group) are found to the south and west. Soils with calcrete and surface limestone layers, brownish sandy (Clovelly soil form) clayey-loamy soils (Hutton soil form) occur on the plains and low-lying areas, with shallow, gravely, sandy soils on the slightly undulating areas. Localised areas of black clayey soils (Valsrivier or Arcadia soil forms) and Kalahari sand occur. Land types are mainly Ae, Ah and Fc.

3.3. Climate.

Limpopo Sweet Bushveld falls within an area that receives summer rainfall with very dry winters, including the shoulder months of May and September. The MAP (Mean Annual Precipitation) value ranges from about 350 mm in the northeast to about 500 mm in the southwest. Frost is fairly infrequent. The mean monthly maximum and minimum temperatures for Lephalale (Ellisras) are 38.2 °C and 2.1 °C for December and June, respectively (Table 6).

Table 6: General climatic information for Limpopo Sweet Bushveld (Mucina & Rutherford, 2006).

Bioregion	Vegetation types	Altitude (m)	MAP* (mm)	MAT* (°C)	MAPE* (mm)	MASMS* (%)
Central Bushveld	Limpopo Sweet Bushveld	700-1,000	421	20.2	2,422	82

*MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply).

4. Methods of Investigation.

4.1 Desktop Study.

Initially a desktop study was undertaken to gather background information regarding the site and its surrounding areas. Relevant authorities were consulted regarding conservational species lists

as well as all the latest available literature utilized to gain a thorough understanding of the area and its surrounding habitats. This information (included in the introductory chapters above) and further literature reviews were then used to determine the potential biodiversity lists for the proposed development site and surrounding areas. This information incorporated (amongst others) data on vegetation types, habitat suitability and biodiversity potential coupled to this information.

4.2 Site Descriptions & Assessments.

A site visit was undertaken during July 2008 to determine the ecological status of the proposed development site and the surrounding areas. A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the study area and, following this, specific study sites were chosen that were representative of the habitats found within the area - special emphasis was placed on potential areas that may support *Red Data Listed* species. Sites were investigated on foot to identify the occurrence of the *dominant* plant species and habitat diversities. The presence of any faunal inhabitants of the property was also assessed through direct visual observation or identifying them through calls, tracks, scats and burrows, with emphasis being placed on determining if any *Red Data Listed* species occur within the study area.

4.3 Red Data Sensitivity Index Scoring.

Species from various taxa are continuously monitored and their population numbers are recorded and scored against given criteria to determine their conservation status. This is done on a world-wide, national, provincial or even local scale, where the present population numbers and potential for decline in these numbers are considered for qualification into the various "IUCN categories". The following definitions are used to categorise the various taxa (IUCN, 2000).

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time-frame appropriate to the taxon's life cycle and life form.

EXTINCT IN THE WILD (EW)

A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time-frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

4.3.1 Probability of Occurrence (POC).

A desktop study was undertaken prior to the field assessment. This included the acquisition of the *Red Data listed species* lists for Mpumalanga Province. These lists were cross-referenced to the specific grid reference of the site to establish the historic distribution of each of the species concerned. This information was then used to generate applicable *Red Data Listed species* flora and faunal lists for the site. The specific information of each applicable species was then referenced to determine whether the habitats present at the site were suitable to potentially sustain viable populations of these species. This information was used to supplement the determination of food availability for each species at the site where possible. These three criteria (known historical distribution ranges, habitat suitability and food availability (where possible)) were given a percentage potential score. The average of these scores then gave a value known as the "Probability of Occurrence" (POC) for each species. These values were then categorised as follows:

- 0-20% - LOW;
- 21-40% - LOW-MEDIUM;
- 41-60% - MEDIUM;
- 61-80% - MEDIUM-HIGH;
- 81-100% - HIGH.

4.3.2 Red Data Sensitivity Index Score (RDSIS).

Only the species with a POC of more than 60% (*medium-high* and above) were then used in the analysis. A factor was assigned to weight the different IUCN categories, giving species with a higher conservation status, a higher score. The factors assigned to the various categories are as follows:

- *Data Deficient* – 0.2;
- *Rare* – 0.5;
- *Near Threatened* – 0.7;
- *Vulnerable* – 1.5;
- *Endangered* – 1.7 and
- *Critically Endangered* – 1.8.

This factor was then multiplied with the POC to calculate the *Species' Scores* (Total) for each species. The average *Species Score* from all of the species was then calculated that could potentially occur at the site (Total *Species scores*/No. of species). The average of all the *Threatened taxa* (*Vulnerable, Endangered and Critically Endangered*) species' scores are then also calculated. The average of these two scores was then calculated to add more weight to threatened taxa with a more than 60% POC. The percentage of species with a POC of 60% or higher of the total number of *Red Data Listed species* listed for the area was then calculated. The average of these two scores then gives the RDSIS for the area investigated (See 5.7. *Red Data Sensitivity Index Scoring*).

4.4. Invertebrate Survey.

A desktop survey was initially undertaken to determine if any RDL invertebrate species had historical records in association with the proposed development site and immediate surrounding areas. The RDL invertebrate species were determined for Limpopo Province. These species in particular were focused on during the survey. A "walk about" survey of the habitats perceived as having the highest potential for supporting any RDL invertebrate species was undertaken to assess potential suitability for the habitats incorporated into the proposed development site for harbouring any RDL invertebrate species. The already-transformed nature of the proposed development site rendered the habitat largely unsuitable for supporting invertebrates and therefore areas surrounding the proposed development site that still were representative of natural habitat were focused on.

Methodical searches were undertaken at various points throughout the surrounding area that focused on determining if the area supported any RDL Mygalomorph spiders, scorpions, or other

invertebrate species of conservational concern, and if the proposed development site offered viable habitat for any of these species.

Butterfly species that were observed throughout the property were visually identified. Potential habitat was also identified through observations of potential food plants and specific habitat requirements for known RDL species from the area.

5. Flora and Fauna Assessments.

5.1. RDL Floral Status Assessments.

An assessment into the presence of any RDL plant species as well as suitable habitat to support any such species was undertaken according to the requirements stipulated in the standard Red List Plant Species Guidelines. The complete PRECIS (Pretoria Computer Information Systems) plant list for the grid reference was also obtained from SANBI (South African National Biodiversity Institute) that gave an indication of the plant species that would be expected to occur within the QDS. The national conservational status of these species is also listed within this list. A site visit and field assessment was then undertaken to determine if the habitat offered by the proposed development site was in fact conducive to potentially supporting any RDL species.

The field survey ascertained that the majority of the proposed development site had been transformed through present land use and site preparations in the form of vegetation removal and soil stripping. The vast majority of the undergrowth had been removed at the time of the survey. The potential for the proposed development site of supporting any RDL or sensitive species was therefore regarded as being minimal.

5.2. Exotic and Invader Species.

Alien invaders are plants that are of exotic origin and are invading previously pristine areas or ecological niches (Bromilow, 2001). Not all weeds are exotic in origin, but, as these exotic plant species have very limited natural "check" mechanisms within the natural environment, they are often the most opportunistic and aggressively-growing species within the ecosystem. Therefore, they are often the most dominant and noticeable within an area. Disturbances of the ground through trampling, excavations or landscaping often leads to the dominance of exotic pioneer species that rapidly dominate the area. Under natural conditions, these pioneer species are overtaken by sub-climax and climax species through natural veld succession. This process, however, takes many years to occur, with the natural vegetation never reaching the balanced,

pristine species composition prior to the disturbance. There are many species of indigenous pioneer plants, but very few indigenous species can out-compete their more aggressively-growing exotic counterparts.

Invading alien plants have become established in over 10 million hectares of land in South Africa and waste 7% of South Africa's water resources. Alien vegetation invasion causes degradation of the ecological integrity of an area, causing (Bromilow, 2001 & DWAF, 2002):

- A decline in species diversity and potentially lead to indigenous species extinction;
- Local extinction of indigenous species;
- Ecological imbalance;
- Intensify flooding and fires;
- Create erosion;
- Increase rate of siltation of dams and estuaries;
- Reduce water quality;
- Decreased productivity of grazing pastures; and
- Increased agricultural input costs.

Grasslands are particularly prone to bush encroachment and alien vegetation invasion as this vegetation type is the most utilized for agricultural purposes. This is mainly for livestock grazing, or complete transformation for agronomy (crops). These areas therefore suffer the highest degree of degrading factors that include overgrazing, trampling, incorrect fire management, and removal as grassland areas are traditionally sought after for agronomy as they often occur on rich, fertile soils. These factors lead to an imbalance in the species composition and make the grasslands prone to alien vegetation invasion. Exotic trees and shrubs often invade grasslands, with the grass species not being able to compete with the deeper-rooted and taller trees for moisture and light and are therefore quickly displaced. A loss of floral and faunal species diversity then occurs that was once dependent on the grassland. Riparian zones are also largely dominated by alien opportunistic tree, reed and forb species. This is due to the rich alluvial soils and moisture-rich habitat type.

The majority of the proposed development site was found to have been cleared of vegetation, barring the larger established indigenous trees. Exotic vegetation encroachment was absent and therefore largely insignificant.

5.3. Medicinal Plant Species.

Plants with traditional medicinal value are not necessarily indigenous species, with many of them being regarded as alien invasive weeds. Table 7 presents a list of plant species with traditional medicinal value, plant parts traditionally used and their main applications, which were identified

during the field assessment. These species are all widespread and common species. See also Section 5.1. *Floral Status Assessments*.

Table 7: Traditional medicinal plants identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, et al., 1997).

Species	Name	Plant parts used	Medicinal uses
<i>Acacia karroo</i>	Sweet thorn	Bark, leaves, gum and rarely the roots.	Bark and leaves a remedy for diarrhoea and dysentery. The gum, bark and leaves used as an emollient and astringent for colds, conjunctivitis and haemorrhage. Gum used for food and also taken for oral thrush.
<i>Asclepias fruticosa</i>	Milkweed	Mainly leaves, sometimes roots.	Snuff is prepared from ground leaves and used for treatment of headaches, tuberculosis and a general emetic to strengthen body.
<i>Datura stramonium</i>	Thornapple	Leaves and rarely the green fruit.	Generally as asthma treatment and pain reduction.
<i>Leonotis dysophylla</i>	Wild dagga	Leaves and stems, sometimes roots.	Dried parts smoked for relief of epilepsy. Leaves and roots widely used for a remedy for snake bite and other stings and bites. External decoctions used as a treatment for boils, eczema, skin diseases, itching and muscular cramps. Internal decoctions used for coughs, colds and influenza, bronchitis, high blood pressure and headaches. Leaf infusions have been used for asthma and viral hepatitis.

These floral species with traditional medicinal value were found to be common and widespread species for the vegetation and habitat type and therefore the proposed development activities are regarded as having an insignificant impact on the medicinal plant species recorded from the region.

5.4. Overall Site Description.

The proposed development site incorporates a homogenous vegetation unit, namely a mixed woodland. The majority of the area, however, has been transformed through removal of the vegetation undergrowth. The disturbance of the upper soil layers and removal of the basal vegetation means that all floral species have been destroyed and sedentary and burrow-dwelling faunal species have either been destroyed or displaced. Only the larger and more established indigenous trees remain on the property (Figure 3).

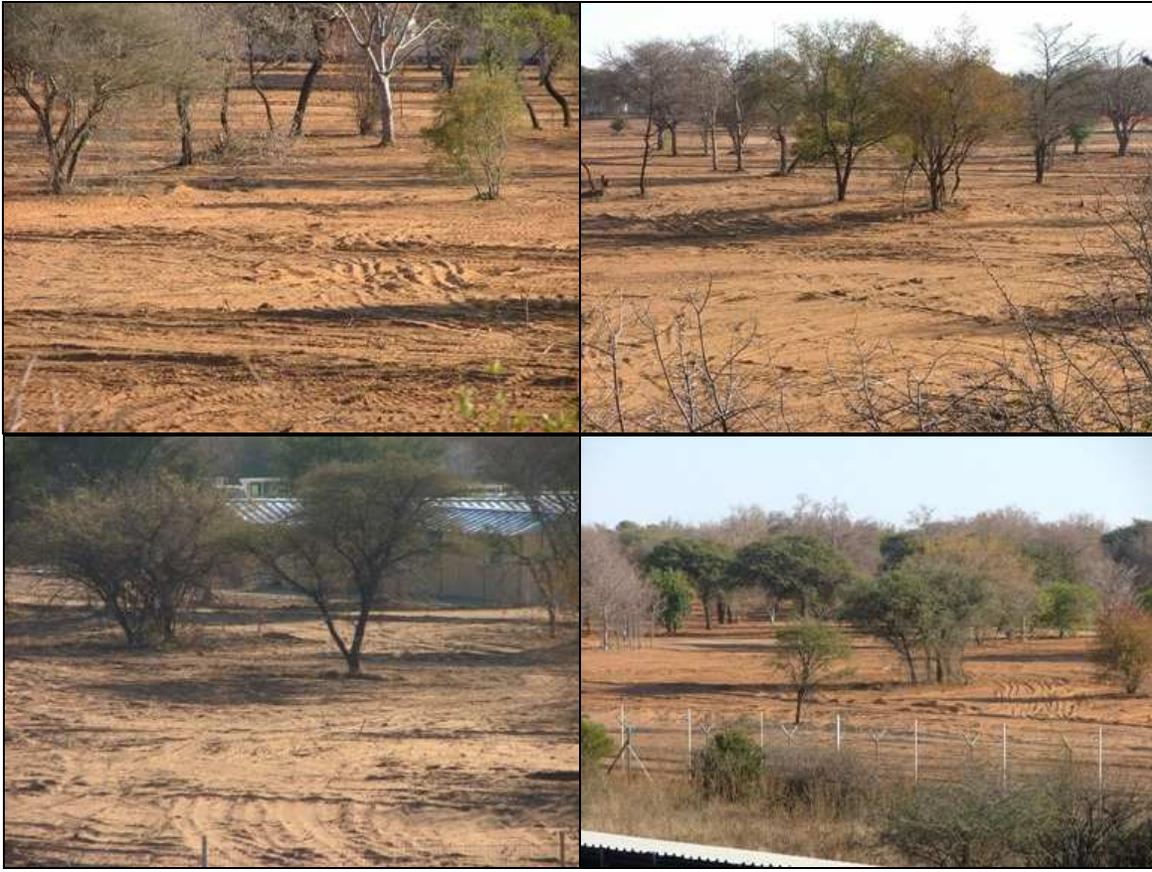


Figure 3: Various views of the proposed development site.

A proportion of the proposed development area has historically been utilised as a contractor's camp with the associated infrastructure development. Negative impacts that already impinge on the ecological integrity of the site include a high degree of disturbance factors through a high vehicular and pedestrian presence, noise disturbances from surrounding commercial developments and various other forms of generally negative impacts. The site also is bordered by a roadway in the south and a coal conveyor system along its western boundary. This, together with the fine-mesh border fencing, means that the property suffers relative ecological isolation. The cumulative effect of these factors means that the site suffers a *low* PES.

Table 8 presents the dominant floral species observed within the proposed development site. There was a general lack of grasses and forb species as these components had been removed prior to the survey having been undertaken.

Table 8: Dominant floral species observed within the proposed development area.

Grasses/Sedges/Reeds	Forbs	Trees/Shrubs
<i>Andropogon eucomus</i> <i>Enneapogon cenchroides</i> <i>Aristida congesta</i> subsp. <i>congesta</i> <i>Hyparrhenia hirta</i> <i>Melinis repens</i>	<i>Indigofera daleoides</i> <i>Tagetes minuta</i> * <i>Datura stramonium</i> *	<i>Acacia senegal</i> <i>Terminalia sericea</i> <i>Dichrostachys cinerea</i> <i>Combretum apiculatum</i> <i>Euclea undulata</i> <i>Acacia erubescens</i> <i>Acacia robusta</i> <i>Rhigozum obovatum</i> <i>Acacia nilotica</i> <i>Acacia burkei</i> <i>Acacia karroo</i> <i>Asclepias fruticosa</i> <i>Leonotis dysophylla</i>

5.5. Faunal Assessments.

The faunal assessment was undertaken largely as a desktop study as the limited time spent to undertake the field assessment is not adequate to allow for comprehensive species counts and inhabitation potential. The often-secretive and nocturnal nature of many of the species also makes encountering them unlikely during a field assessment. Direct (visual) and indirect observations (calls, scats, burrows, etc) were used to identify faunal inhabitants throughout the proposed development site. Habitat suitability evaluations also play an inevitably high role in determining if the habitat type and quality are suitable for potentially supporting the various species.

5.5.1. Mammals.

There were relatively few mammal species (directly or indirectly) observed during the field assessment, but the area is known to be relatively rich in small mammal diversity, with 100 mammalian species of known historical distribution ranges that incorporate the property and surrounding areas. Species that were observed during the field assessment were Common Duiker (*Sylvicapra grimmia*), Scrub Hare (*Lepus saxatilis*), Common Molerat (*Cryptomys hottentotus*) and various other small mammal species. These are regarded as common and widely distributed species.

The potential mammal list (based on the known historical distributions) is given in Appendix A, Table 16. Even though larger mammals are included in this list, it must be remembered that these records are of *known historical records*. It therefore includes species that would not be

encountered due to larger mammals being confined to fenced-off nature reserves or being excluded from the property due to fencing. This lack of mobility or migratory freedom means that they would not realistically be found within the area. Smaller to medium-sized mammals (rodents, small carnivores, etc.) and highly-mobile mammals (e.g. bats) are more likely to inhabit the site. The RDL mammalian species relevant to the site and surrounding region are dealt with under section 5.6. *Red Data Sensitivity Index Scoring (RDSIS)*.

5.5.2. Birds.

There was a relatively low number of bird sightings noted during the field assessment for the property which is mainly attributed to the lack of habitat and habitat degradation and transformation. A high degree of disturbance factors also meant that a high number of bird observations was not expected. The surrounding area is known to be relatively rich in avifaunal diversity, with 398 bird species recorded for the property and surrounding areas (QDS 2327DA). The expected species list is therefore presented in Appendix A, Table 17. Not all of these species would be expected to occur within the proposed development site due to the unavailability of various specific habitat types that are otherwise incorporated into the QDS. This is of the known historical distribution list for all of the species listed. The observed list during the field assessment is included in this table (indicated as bold text).

The RDL bird species relevant to the region are dealt with under section 5.6. *Red Data Sensitivity Index Scoring (RDSIS)*, where ecological aspects of relevant RDL avifaunal species applicable to the proposed development site are discussed.

As birds are highly mobile, they can move away from unfavourable areas and habitats. They are therefore not directly affected by small, localised developments unless they are directly dependent on the habitat that will be subject to the development. It must, however, be noted that habitat destruction is the leading cause of species decline, and the cumulative effects of localised habitat destruction and fragmentation needs to be taken into consideration. Larger RDL species such as the various crane species rely on large open areas and are therefore vulnerable to habitat changes and disturbances through localised developments that lead to habitat fragmentation.

5.5.3. Reptiles.

The field survey did not observe any reptile species directly on the actual proposed development site, but one species was observed within the natural surrounding areas, namely *Mabuya striata* subsp. *punctatissima* (Striped skink). Habitat evaluations found the surrounding habitat to have a

relatively good potential for supporting various reptilian species. There are 66 known reptile species that have a distribution range that includes the proposed development site.

These lack of observations are by no means an indication of the potential reptile diversity list for the proposed development area and surrounding habitat. This potential species list is therefore based on known historical distribution records, presented in Appendix A, Table 19. The RDL reptilian species relevant to the area are dealt with under section 5.6. *Red Data Sensitivity Index Scoring (RDSIS)*.

5.5.4. Amphibians.

There were no amphibian species noted during the field assessment, and the lack of permanent water meant that relatively few species would be expected to utilise the habitat. There are 15 amphibian species known from the area that are presented in Appendix A, Table 20. The largely elusive and nocturnal habits of amphibians makes a general field assessment to accurately determine the amphibian diversity of a property difficult and therefore the potential amphibian species diversity list is based on the list of species previously recorded within the region. RDL species relevant to the region are dealt with under section 5.6. *Red Data Sensitivity Index Scoring (RDSIS)*.

5.5.5. Invertebrates.

Site or area specific invertebrate data for Limpopo Province are generally lacking or difficult to come by and therefore data at the provincial level were utilised during the desktop survey. The desktop study revealed that there were various Mygalomorph spiders recorded from the province. These species are protected at a national level and are therefore relevant to the site. The Mygalomorph spiders applicable to the province are presented in Table 9.

Table 9: Mygalomorph spiders recorded from Limpopo Province (Dippenaar-Schoeman, 2002).

Family	Species	Common names
Barychelidae	<i>Sipalolasma humicola</i>	Trapdoor baboon spider
Idiopidae	<i>Galeosoma vandami</i>	Shield bum trapdoor spider
Idiopidae	<i>Heligmomerus caffer</i>	
Idiopidae	<i>Idiops castaneus</i>	Front-eyed trapdoor spider
Idiopidae	<i>Idiops gunningi elongatus</i>	
Idiopidae	<i>Segregara paucispinulosus</i>	
Idiopidae	<i>Segregara transvaalensis</i>	
Mygidae	<i>Moggridgea albimaculata</i>	Tree trapdoor spider
Mygidae	<i>Moggridgea breyeri</i>	Tree trapdoor spider
Mygidae	<i>Moggridgea pyimi</i>	Tree trapdoor spider
Nemesiidae	<i>Entypesa schoutedeni</i>	

Family	Species	Common names
Theraphosidae	<i>Ceratogyrus bechuanicus</i>	
Theraphosidae	<i>Ceratogyrus brachycephalus</i>	
Theraphosidae	<i>Pterinonchilus junodi</i>	Soutpansberg starburst baboon spider
Theraphosidae	<i>Pterinonchilus pluridentatus</i>	

These species have been historically recorded from Limpopo Province and are therefore not necessarily applicable to the proposed development site and surrounding areas. Some of the more common baboon spiders (Theraphosidae) are expected from the area (pers obs.).

A relatively poor presence of invertebrate species diversity was observed throughout the site due to the lack of habitat availability and suitability. Butterfly species noted during the field assessment are all regarded as commonly-occurring species with wide distribution ranges.

5.6. Red Data Sensitivity Index Scoring (RDSIS).

After application of the RDSIS (the methodology of which is described in Section 4.3) it was found that the proposed development site (and the surrounding area) was *historically* relatively rich in species diversity. An increase in urbanisation, agriculture and mining, with the consequential fragmentation and general transformation and disturbances of habitat, has led to the loss of habitat and inevitable decline of the densities of all of these historically-recorded species. Many of these species (especially larger mammals) are now only found confined to fenced nature reserves, where the habitat is also conserved. This means that many of the smaller species also remain within these reserves due to the appropriate management of the habitat and consequential superior habitat quality.

The results of the RDSIS are outlined below, where the faunal species with known *historical* distributions are used to populate the list. The numbers of species of relevance to the site and their conservational status are summarised in Table 10 and Table 11 according to their POC values, with the complete results of the RDSIS presented in Table 12.

Table 10: Summary of RDL species status for the proposed development site.

Taxon	Total species	Total RDL	RDL category*						POC# ≥60%
			CE	EN	VU	NT	Ra	DD	
Mammals	100	27	1	2	6	11	0	7	2
Birds	398	28	0	1	12	15	0	0	0
Reptiles	66	1	0	0	1	0	0	0	0
Amphibians	15	1	0	0	1	0	0	0	0
Invertebrates	X	2**	0	0	0	0	2	0	2
Totals:		59	1	3	20	26	2	7	4

*CE-Critically endangered; EN-Endangered; VU-Vulnerable; NT-Near threatened; Ra-Rare & DD-Data deficient.

#POC – Probability of Occurrence.

**Trapdoor spiders for the region are categorised as one group due to the lack of distribution data.

It can be seen from Table 10 that the proposed development site and surrounding area potentially offers viable habitat (POC \geq 60%) for only 1 out of the 27 (3.7%) RDL mammal species listed for the area and 1 out of the potential 28 (3.6%) RDL bird species recorded from the region. There is viable habitat offered for 2 out of the 2 (100%) groups of RDL invertebrate species expected to occur in association with the area. This means that some representation of these taxa are expected to occur within the area. The proposed development site therefore offers viable habitat (POC \geq 60%) for 4 out of the potential 59 RDL faunal species (6.8%).

Table 11: RDL fauna species POC category summary for the property.

Taxon	Total species	Total RDL	POC Category*				
			L	LM	M	MH	H
Mammals	100	27	10	9	8	0	0
Birds	398	28	12	10	6	0	0
Reptiles	66	1	0	1	0	0	0
Amphibians	15	1	0	1	0	0	0
Invertebrates	X	2**	0	0	2	0	0
Totals:		59	22	21	16	0	0

*L-Low (0-20%); LM-Low medium (21-40%); M-Medium (41-60%); MH-Medium high (61-80%) & H-High (81-100%).

Table 11 indicates that the RDL species listed for the area fall into the POC category of *low* to *medium* (0-60%) of conservational relevance to applicable RDL species within the region. There were no noteworthy RDL faunal species with POC values categorising it as having *high* or *medium-high* probabilities of occurrence.

Table 12 presents the completed RDSIS analysis for the variety of RDL faunal taxa that have known distribution ranges that include the property and surrounding areas. The species with a POC value of more than 60% (*medium* to *high* probability of occurrence) are highlighted in bold text. These species are made up of opportunistic and tolerant species that could potentially utilise the surrounding habitats. This low figure is attributed to the high degree of industrial activity and consequential movement and noise disturbances, habitat transformations and degradations within the proposed development site and immediate surrounding areas.

The property scored a relevance to potentially supporting any RDL faunal species known from the region of 19.8%. This is categorised as a *Low* value and therefore holds a relative value in contributing to RDL species conservation within the region.

Table 12: The results of the RDSIS for the proposed development site. Species of relevance (POC ≥ 60%) are highlighted in bold text.

Common name	Species	RDL status	RDL factor	Total	POC	Distr	Hab	Food
MAMMALS								
Short-eared Trident Bat	<i>Cloeotis percivali</i>	CE	1.8	30.0	16.7	20	5	25.0
African Wild Dog	<i>Lycaon pictus</i>	EN	1.7	19.8	11.7	25	5	5.0
Tsessebe	<i>Damaliscus lunatus lunatus</i>	EN	1.7	31.2	18.3	45	5	5.0
Black Rhinoceros	<i>Diceros bicornis minor</i>	VU	1.5	25.0	16.7	40	5	5.0
Cheetah	<i>Acinonyx jubatus</i>	VU	1.5	25.0	16.7	45	5	0.0
Lion	<i>Panthera leo</i>	VU	1.5	20.0	13.3	30	5	5.0
Pangolin	<i>Manis temminckii</i>	VU	1.5	37.5	25.0	55	15	5.0
Roan Antelope	<i>Hippotragus equinus</i>	VU	1.5	25.0	16.7	40	5	5.0
Sable Antelope	<i>Hippotragus niger niger</i>	VU	1.5	27.5	18.3	45	5	5.0
Brown Hyaena	<i>Hyaena brunnea</i>	NT	0.7	21.0	30.0	80	5	5.0
Darling's Horseshoe Bat	<i>Rhinolophus darlingi</i>	NT	0.7	24.5	35.0	75	5	25.0
Geoffroy's Horseshoe Bat	<i>Rhinolophus clivus</i>	NT	0.7	24.5	35.0	75	5	25.0
Hildebrandt's Horseshoe Bat	<i>Rhinolophus hildebrandtii</i>	NT	0.7	15.2	21.7	35	5	25.0
Honey Badger	<i>Mellivora capensis</i>	NT	0.7	29.2	41.7	85	25	15.0
Rusty Bat	<i>Pipistrellus rusticus</i>	NT	0.7	25.7	36.7	80	5	25.0
Schreibers' Long-fingered Bat	<i>Miniopterus schreibersii</i>	NT	0.7	26.8	38.3	85	5	25.0
Serval	<i>Leptailurus serval</i>	NT	0.7	22.2	31.7	75	15	5.0
South African Hedgehog	<i>Atelerix frontalis</i>	NT	0.7	33.8	48.3	85	45	15.0
Spotted Hyaena	<i>Crocuta crocuta</i>	NT	0.7	12.8	18.3	45	5	5.0
Temminck's Hairy Bat	<i>Myotis tricolor</i>	NT	0.7	14.0	20.0	30	5	25.0
African Weasel	<i>Poecilogale albinucha</i>	DD	0.2	11.3	56.7	85	65	20.0
Bushveld Elephant-shrew	<i>Elephantulus intufi</i>	DD	0.2	9.3	46.7	60	60	20.0
Bushveld Gerbil	<i>Tatera leucogaster</i>	DD	0.2	12.0	60.0	90	70	20.0
Lesser Red Musk Shrew	<i>Crocidura hirta</i>	DD	0.2	11.0	55.0	85	60	20.0
Reddish-grey Musk Shrew	<i>Crocidura cyanea</i>	DD	0.2	11.0	55.0	80	65	20.0
Short-snouted Elephant-shrew	<i>Elephantulus brachyrhynchus</i>	DD	0.2	7.0	35.0	65	20	20.0
Single-striped Mouse	<i>Lemniscomys rosalia</i>	DD	0.2	8.3	41.7	85	25	15.0
BIRDS								
Saddlebilled Stork	<i>Ephippiorhynchus senegalensis</i>	EN	1.7	2.8	1.7	5.0	0.0	0.0
Tawny Eagle	<i>Aquila rapax</i>	VU	1.5	70.0	46.7	65.0	50.0	25.0
Kori Bustard	<i>Ardeotis kori</i>	VU	1.5	57.5	38.3	55.0	35.0	25.0
Southern Ground Hornbill	<i>Bucorvus leadbeateri</i>	VU	1.5	35.0	23.3	15.0	35.0	20.0
Lesser Kestrel*	<i>Falco naumanni</i>	VU	1.5	72.5	48.3	60.0	60.0	25.0
Whitebacked Vulture	<i>Gyps africanus</i>	VU	1.5	72.5	48.3	70.0	60.0	15.0
Cape Vulture	<i>Gyps coprotheres</i>	VU	1.5	45.0	30.0	75.0	5.0	10.0
Pinkbacked Pelican	<i>Pelecanus rufescens</i>	VU	1.5	7.5	5.0	15.0	0.0	0.0
African Finfoot	<i>Podica senegalensis</i>	VU	1.5	2.5	1.7	5.0	0.0	0.0
Martial Eagle	<i>Polemaetus bellicosus</i>	VU	1.5	90.0	60.0	90.0	65.0	25.0
Bateleur	<i>Terathopius ecaudatus</i>	VU	1.5	50.0	33.3	10.0	65.0	25.0
Lappetfaced Vulture	<i>Torgos tracheliotus</i>	VU	1.5	67.5	45.0	75.0	35.0	25.0

Common name	Species	RDL status	RDL factor	Total	POC	Distr	Hab	Food
Whiteheaded Vulture	<i>Trigonoceps occipitalis</i>	VU	1.5	35.0	23.3	10.0	35.0	25.0
Halfcollared Kingfisher	<i>Alcedo semitorquata</i>	NT	0.7	3.5	5.0	15.0	0.0	0.0
Redbilled Oxpecker	<i>Buphagus erythrorhynchus</i>	NT	0.7	29.2	41.7	75.0	15.0	35.0
Black Stork	<i>Ciconia nigra</i>	NT	0.7	14.0	20.0	60.0	0.0	0.0
Pallid Harrier*	<i>Circus macrourus</i>	NT	0.7	18.7	26.7	80.0	0.0	0.0
Lanner Falcon	<i>Falco biarmicus</i>	NT	0.7	25.7	36.7	80.0	5.0	25.0
Peregrine Falcon	<i>Falco peregrinus</i>	NT	0.7	2.3	3.3	10.0	0.0	0.0
Blackwinged Pratincole*	<i>Glareola nordmanni</i>	NT	0.7	4.7	6.7	20.0	0.0	0.0
Ayres' Eagle**	<i>Hieraetus ayresii</i>	NT	0.7	4.7	6.7	20.0	0.0	0.0
Marabou Stork	<i>Leptoptilos crumeniferus</i>	NT	0.7	21.0	30.0	60.0	5.0	25.0
Yellowbilled Stork**	<i>Mycteria ibis</i>	NT	0.7	14.0	20.0	60.0	0.0	0.0
Lesser Flamingo	<i>Phoenicopterus minor</i>	NT	0.7	14.0	20.0	60.0	0.0	0.0
Greater Flamingo	<i>Phoenicopterus ruber</i>	NT	0.7	14.0	20.0	60.0	0.0	0.0
Old World Painted Snipe	<i>Rostratula benghalensis</i>	NT	0.7	17.5	25.0	75.0	0.0	0.0
Secretarybird	<i>Sagittarius serpentarius</i>	NT	0.7	28.0	40.0	90.0	5.0	25.0
Whitethroated Plover	<i>Vanellus albiceps</i>	NT	0.7	1.2	1.7	5.0	0.0	0.0
Egyptian Vulture	<i>Neophron percnopterus</i>	possibly extinct in SA (no recent recordings)						
REPTILES								
Southern African Python	<i>Python natalensis</i>	VU	1.5	55.0	36.7	70.0	20.0	20.0
AMPHIBIANS								
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	VU	1.5	42.5	28.3	70.0	0.0	15.0
INVERTEBRATES								
Trapdoor spiders		Protected	0.5	30.0	60.0	60.0	60.0	60.0
Baboon spiders		Protected	0.5	30.0	60.0	60.0	60.0	60.0
SP SCORE – TOTAL (all RDL species)								1538.3
SP SCORE – AVERAGE (all RDL species)								26.1
THREATENED TAXA - AVERAGE (RDL const ≥1.5)								39.4
AVERAGE								32.8
% SPP ≥60%								6.8
RDSIS OF SITE (%)								19.8

Table 13 presents the species that were awarded a POC value of 60% (or greater) and is made up of 1 *Data deficient* mammalian and 1 *Vulnerable* bird species. Species categorised as being *Data Deficient* are not necessarily RDL species, but are species that have insufficient data regarding their biology and ecology to ascertain their conservational status. These species are therefore typically the small rodents, insectivores and highly elusive small carnivores. The accepted conservation strategy incorporating these species is to conserve appropriate habitat until such a time that more data become available to re-assess their conservation status. *Vulnerable* species are species that are perceived to suffer declining population numbers due to deteriorating habitat quality and quantity, hunting pressures, genetic isolation of populations, displacement, etc. These species are likely to qualify for an *Endangered* category within the near future. The greatest threat to the future conservation of these species is perceived to be habitat destruction.

Table 13: RDL fauna species summary for species with a POC value of $\geq 60\%$.

Common name	Species	RDL status	POC
MAMMALS			
Bushveld Gerbil	<i>Tatera leucogaster</i>	DD	60.0
BIRDS			
Martial Eagle	<i>Polemaetus bellicosus</i>	VU	60.0
INVERTEBRATES			
	Trapdoor spiders	Protected	60.0
	Baboon spiders	Protected	60.0

These results show that there are therefore no RDL species that significantly depend on the habitat that is presently available on the property that would be displaced or destroyed if the proposed development does proceed. Mitigatory measures to manage ecological impacts should, however, be implemented to inhibit further ecological degradation within the area.

6. Loss of open spaces.

The proposed development activity is to expand on existing infrastructure and will still remain fairly localised and confined. The perceived loss of open space is therefore regarded as being insignificant.

7. Migratory Connectivity.

Maintaining migratory connectivity through migratory corridors and open spaces is important to the ongoing conservation of species to allow for the exploitation of suitable habitat types for foraging and breeding purposes as well as to escape unfavourable conditions. It is also important to facilitate the maintenance of genetic diversity of species as habitat fragmentation often leads to the ecological and genetic isolation of populations of the same species. This eventually leads to a lack of genetic diversity that inevitably weakens the species, making the species as a whole succumb more readily when adverse conditions are encountered.

The wetland habitat located to the south as well as river courses located to the west of the proposed development site offer good habitat connectivity in various directions. The riparian habitat typically remains undeveloped as developments are not permitted within the 1:100 year floodlines as well as within the conservation buffer zones of the wetland habitat. This habitat type therefore remains as a natural migratory corridor. The riparian vegetation is also generally denser and therefore offers greater cover for various species, leading to a higher density of species in general. This aspect would therefore increase the prey availability for predatory species as well. It

is therefore imperative that this habitat and the associated buffer zones of the wetland remain unimpacted and conserved to preserve the ecological integrity of the system.

The proposed development site is not directly associated with this habitat type, however, it has the potential to impact on it. This aspect therefore needs to be taken into consideration during the planning and operational phases of the proposed development activities.

8. Sensitivity mapping.

The proposed development site incorporates a largely homogenous habitat unit, being dominated by mixed indigenous woodlands. This habitat has largely been modified and transformed through recent soil stripping and vegetation undergrowth removal. Only sporadic larger and well-established trees remained on the site that retained components of the natural vegetation type. The site had therefore lost its overall ecological sensitivity. The complete lack of vegetation undergrowth, high degree of disturbances through vehicular and pedestrian traffic, existing infrastructure and continual noise disturbances meant that the site suffers a *Low* PES. The site is also fenced off that effectively makes the proposed development site ecologically isolated to many mobile faunal species. A sensitivity map of the proposed development site is therefore unnecessary.

9. Significance Ratings for Perceived Ecological Impacts.

The perceived impacts are discussed according the various phases of the project i.e. Pre-Construction (vegetation removal, soil stripping, etc.), Construction (building and establishment of infrastructure) and Operation (ongoing management of the following completion of the construction phase).

The potential significance of the environmental impact identified can be determined using the significance rating as described below. The terminology has been taken from the Guideline Documentation on EIA Regulations, of the Department of Environmental Affairs and Tourism (DEAT), April 1998 guidelines.

Determining environmental significance:

Significance of environmental impact = Consequence X Probability

The consequence of an impact can be derived from the following factors:

- Severity / magnitude
- Reversibility
- Duration of impact
- Spatial extent

The severity of an impact relates to how severe the impact will be. The reversibility of the impact refers to the ability of the site to recover after an impact has occurred. Duration is defined by how long the impact may be prevalent and spatial scale is the physical area, which could be affected by an impact. The severity, duration and spatial scale should be ranked using the criteria indicated in Table 14, and then the overall consequence is determined by adding the individual scores. The overall probability of the impact can then be determined, and relates to the likelihood of such an impact occurring.

Table 14: Consequence and probability ranking used to aid in calculating the significance of various environmental impacts.

Severity / magnitude	Reversibility	Duration	Spatial extent	Probability
5 – Very high / don't know	1 – Reversible (regenerates naturally)	5 – Permanent	5 – International	5 – Definite / don't know
4 – High		4 – Long term (impact ceases after operational life)	4 – National	4 – High probability
3 – Moderate	3 – Recoverable (needs human input)	3 – Medium term (5 – 15 years)	3 – Regional	3 – Medium probability
2 – Low		2 – Short term (0 – 5 years)	2 – Local	2 – Low probability
1 – Minor	5 – Irreversible	1 – Immediate	1 – Site only	1 – Improbable
0 – None				0 – None

The maximum value that can be obtained is 100 significance points. Environmental impacts are rated as High, Moderate or Low significance by combining the consequence of the impact and the probability of occurrence:

Consequence (severity + reversibility + duration + spatial scale) X Probability = Significance

- More than 60 significance points indicate *High* environmental significance
- Between 30 and 60 significance points indicate *Moderate* environmental significance
- Less than 30 significance points indicate *Low* environmental significance

The significance of the environmental impacts pertaining to the various phases of the proposed development activities are presented in Table 15.

Table 15: Significance assessment of the various perceived environmental impacts applicable to proposed development activities.

Potential environmental impact	Project activity or issue	Environmental significance before mitigation*						Environmental significance after mitigation as per EMP							
		M	R	D	S	P	TOT	SP	M	R	D	S	P	TOT	SP
Pre-Construction Phase															
Habitat destruction	Vegetation removal and soil stripping	4	3	4	1	5	60	H	4	2	3	1	4	40	M
RDL species impacts	Habitat destruction that would lead to decreased potential to support RDL floral and faunal species	5	3	4	1	5	65	H	3	2	4	1	4	40	M
Surface water / soil pollution	Site clearing activities, Leaks from vehicles and equipment	3	2	4	2	4	44	M	2	1	3	1	2	14	L
Soil erosion	Soil stripping, vegetation removal	3	3	4	2	3	36	M	2	1	4	1	2	16	L
Species conservation	Subsistence hunting by contractors / construction crew	4	5	4	2	4	60	H	2	5	4	2	1	16	L
Construction Phase															
Habitat transformation	Surrounding areas being impacted on by dumping of excess building material / refuse	3	2	4	2	4	44	M	2	1	4	1	1	8	L
Species conservation	Subsistence hunting by contractors / construction crew	4	5	4	2	4	60	H	2	5	4	2	1	16	L
Surface water / soil pollution	Site clearing activities Leaks from vehicles and equipment	3	2	2	2	4	36	M	3	2	2	2	1	9	L
Operational Phase															
Species conservation	Subsistence hunting by contractors / construction crew	4	5	4	2	4	60	H	2	5	4	2	1	16	L
Exotic vegetation encroachment	Disturbed soils leading to exotic veg encroachment	5	4	5	2	4	64	H	1	1	4	1	1	7	L

M= severity/ magnitude; R= Reversibility; D= Duration; S= Spatial extent; P= Probability.

Significance = Consequence (M+R+D+S) X Probability (P)

SP = Significance points, where ≥ 60 = High; 30-60= Medium; <30 = Low.

Table 15 presents the various potential environmental impacts pertaining to the proposed development activities. All impacts are rated as having a *moderate* to *high* significance rating if left unabated. Management intervention with appropriate mitigation measures can greatly reduce the ecological impacts and therefore significance of these impacts.

9.1. Preconstruction Phase.

The preconstruction phase incorporates surface preparations, levelling of soils and removal of vegetation. It also often entails the removal of topsoil to be stored off site. This is then replaced during a site reinstatement phase. This phase typically destroys habitat on a local scale as the

vegetative layer is removed and the upper soil layer is also disturbed and transformed. This destroys floral communities and displaces or destroys sedentary faunal species, such as burrow-dwelling invertebrates and small mammals. The removal of the vegetative layer removes refugia for invertebrates in general and therefore insectivorous species are also displaced due to the lack of adequate prey abundance.

The soil remains exposed during this development phase and therefore vulnerable to soil erosion. Heavy machinery compacts the upper soil layers, inhibiting recruitment by vegetation within the future. Earthmoving heavy machinery also very often leak oils and other contaminants that pollute soils and nearby watercourses and surface waters after rainfall events.

This development activity also typically sees a high number of contract labourers and informal workers that would rely on subsistence hunting within the surrounding areas for food supplementation. Chopping down of indigenous trees within the area for firewood also typically increases during such periods. Trapping methods and poaching activities that are not monitored and policed can have detrimental effects on the faunal and floral communities within the surrounding areas.

9.2. Construction Phase.

Many of the factors applicable to the preconstruction phase are also relevant to the construction phase. The nature of construction means the production of a high degree of excess building material that needs to be disposed of or stored. Dumping excess building rubble within natural habitat areas will significantly transform and degrade the habitat within these areas. Designated areas should be utilised for storage and disposal of excess wastes generated throughout this phase of the development.

9.3. Operational Phase.

The operational phase sees the reinstatement of the construction site, establishment of open green areas and gardens and removal of all excess wastes. The volume of people (labourers) is reduced and it is the time when a certain degree of rehabilitation of the site is needed. The long-term management of waste generation and disposal are the most pertinent issues applicable to this phase of the development. This stage of the development also allows for the establishment and encroachment of pioneering floral species. These species are typically exotic in nature and careful

management and removal needs to be implemented to lessen the impact of exotic vegetation encroachment.

The ecological significance of the impacts incurred during the various phases of the development activities can be significantly reduced within management intervention and appropriate mitigatory measures (Table 15).

10. Conclusions & Recommendations.

An ecological assessment for the proposed development of the Eskom's Marapong Contractor Village in Lephalale, Limpopo Province was undertaken during a field survey in July 2008 that incorporated a fauna and flora biodiversity assessment. Habitat evaluations to ascertain the relevance of the proposed development site to RDL fauna and flora recorded from the area were also undertaken.

The following general conclusions were drawn on completion of the survey:

- No ecologically sensitive habitats were observed due to the site having already been transformed by the removal of the vegetation undergrowth throughout the area. The upper soil layer had therefore undergone disturbances within the recent past that meant that sedentary faunal species, burrowing species and any sensitive of RDL floral species were either displaced or destroyed.
- The proposed development activities can therefore be regarded as having insignificant further adverse effects on the overall regional conservation of RDL faunal or floral species.
- Appropriate mitigation measures can significantly reduce the ecological impact of the proposed development activities.
- The generally flat topography of the proposed development site means that soil erosion due to water runoff would not be considered a significant threat, however, adequate stormwater measures should be put into place as a preventative measure.
- The dumping of excess building material or refuse within the surrounding area should not be allowed. This will aid in limiting the footprint of the proposed development activities to a minimum.
- Contractors and building crew must be prohibited from subsistence hunting within the area.
- Adequate toilet facilities must be provided for construction crews to ensure that the surrounding bush areas are not utilised as informal toilet areas to prevent surface water contamination.

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Appendix A - Expected faunal biodiversity species lists.

Table 16: Expected mammal list (based on known historical distribution lists – from Friedmann & Daly, 2004) for the proposed development site. The RDL status for each species is also given.

Species	Name	Status
<i>Aepyceros melampus</i>	Impala	
<i>Alcelaphus buselaphus</i>	Red Hartebeest	
<i>Ceratotherium simum</i>	White Rhinoceros	
<i>Connochaetes gnou</i>	Black Wildebeest	
<i>Connochaetes taurinus taurinus</i>	Blue Wildebeest	
<i>Damaliscus lunatus lunatus</i>	Tsessebe	EN
<i>Diceros bicornis minor</i>	Black Rhinoceros	VU
<i>Equus burchellii</i>	Plains Zebra	
<i>Giraffa camelopardalis</i>	Giraffe	
<i>Hippopotamus amphibius</i>	Hippopotamus	
<i>Hippotragus equinus</i>	Roan Antelope	VU
<i>Hippotragus niger niger</i>	Sable Antelope	VU
<i>Kobus ellipsiprymnus ellipsiprymnus</i>	Waterbuck	
<i>Oreotragus oreotragus</i>	Klipspringer	
<i>Pelea capreolus</i>	Grey Rhebok	
<i>Phacochoerus africanus</i>	Warthog	
<i>Potamochoerus porcus koiropotamus</i>	Bushpig	
<i>Raphicerus campestris</i>	Steenbok	
<i>Redunca arundinum</i>	Reedbuck	
<i>Redunca fulvorufula</i>	Mountain Reedbuck	
<i>Sylvicapra grimmia</i>	Common Duiker	
<i>Syncerus caffer</i>	Cape Buffalo	
<i>Taurotragus oryx</i>	Eland	
<i>Tragelaphus angasii</i>	Nyala	
<i>Tragelaphus scriptus</i>	Bushbuck	
<i>Tragelaphus strepsiceros</i>	Kudu	
<i>Procavia capensis</i>	Rock Hyrax	
<i>Acinonyx jubatus</i>	Cheetah	VU
<i>Aonyx capensis</i>	Cape Clawless Otter	
<i>Atilax paludinosus</i>	Water Mongoose	
<i>Canis mesomelas</i>	Black-backed Jackal	
<i>Caracal caracal</i>	Caracal	
<i>Civettictis civetta</i>	African Civet	
<i>Crocuta crocuta</i>	Spotted Hyaena	NT
<i>Felis nigripes</i>	Black-footed Cat	
<i>Felis silvestris</i>	African Wild Cat	
<i>Galerella sanguinea</i>	Slender Mongoose	
<i>Genetta genetta</i>	Small-spotted Genet	
<i>Genetta tigrina</i>	Large-spotted Genet	
<i>Helogale parvula</i>	Dwarf Mongoose	
<i>Hyaena brunnea</i>	Brown Hyaena	NT
<i>Ictonyx striatus</i>	Striped Polecat	
<i>Leptailurus serval</i>	Serval	NT
<i>Lycaon pictus</i>	African Wild Dog	EN

Species	Name	Status
<i>Mellivora capensis</i>	Honey Badger	NT
<i>Mungos mungo</i>	Banded Mongoose	
<i>Otocyon megalotis</i>	Bat-eared Fox	
<i>Panthera leo</i>	Lion	VU
<i>Panthera pardus</i>	Leopard	
<i>Poecilogale albinucha</i>	African Weasel	DD
<i>Proteles cristatus</i>	Aardwolf	
<i>Vulpes chama</i>	Cape Fox	
<i>Cloeotis percivali</i>	Short-eared Trident Bat	CE
<i>Miniopterus schreibersii</i>	Schreibers' Long-fingered Bat	NT
<i>Myotis tricolor</i>	Temminck's Hairy Bat	NT
<i>Neoromicia capensis</i>	Cape Serotine Bat	
<i>Neoromicia zuluensis</i>	Aloe Bat	
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	
<i>Pipistrellus hesperidus</i>	African Pipistrelle	
<i>Pipistrellus rusticus</i>	Rusty Bat	NT
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	NT
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	NT
<i>Rhinolophus hildebrandtii</i>	Hildebrandt's Horseshoe Bat	NT
<i>Rhinolophus simulator</i>	Bushveld Horseshoe Bat	
<i>Scotophilus dinganii</i>	Yellow House Bat	
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat	
<i>Atelerix frontalis</i>	South African Hedgehog	NT
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew	DD
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	DD
<i>Lepus saxatilis</i>	Scrub / Savannah Hare	
<i>Pronolagus randensis</i>	Jameson's Red Rock Rabbit	
<i>Cercopithecus aethiops pygerythrus</i>	Vervet Monkey	
<i>Galago moholi</i>	Southern Lesser Galago	
<i>Papio ursinus</i>	Chacma Baboon	
<i>Acomys spinosissimus</i>	Spiny Mouse	
<i>Aethomys chrysophilus</i>	Red Veld Rat	
<i>Aethomys namaquensis</i>	Namaqua Rock Mouse	
<i>Cryptomys hottentotus</i>	Common Mole-rat	
<i>Dendromus melanotis</i>	Grey Climbing Mouse	
<i>Gerbillurus paebea</i>	Hairy-footed Gerbil	
<i>Graphiurus murinus</i>	Woodland Dormouse	
<i>Hystrix africaeaustralis</i>	Porcupine	
<i>Lemniscomys rosalia</i>	Single-striped Mouse	DD
<i>Mastomys coucha</i>	Multimammate Mouse	
<i>Otomys angoniensis</i>	Angoni Vlei Rat	
<i>Otomys irroratus</i>	Vlei Rat	
<i>Paraxerus cepapi</i>	Tree Squirrel	
<i>Pedetes capensis</i>	Springhare	
<i>Saccostomus campestris</i>	Pouched Mouse	
<i>Steatomys pratensis</i>	Fat Mouse	
<i>Tatera brantsii</i>	Highveld Gerbil	
<i>Tatera leucogaster</i>	Bushveld Gerbil	DD
<i>Thallomys paedulcus</i>	Tree Rat	
<i>Thryonomys swinderianus</i>	Greater Cane Rat	

Species	Name	Status
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant-shrew	DD
<i>Elephantulus intufi</i>	Bushveld Elephant-shrew	DD
<i>Elephantulus myurus</i>	Rock Elephant-shrew	
<i>Manis temminckii</i>	Pangolin	VU
<i>Orycteropus afer</i>	Aardvark	

Table 17: Expected bird list (based on known historical distribution lists) for the proposed development site. General status and habitat preferences are also given (Gibbon, 2002). The observed species during the field assessment are indicated as bold text. Abbreviation explanations are given in Table 18.

Rob	English Name	Species	General Status	Habitats
1	Ostrich	<i>Struthio camelus</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, Fa
8	Dabchick	<i>Tachybaptus ruficollis</i>	R-C	Wa
50	Pinkbacked Pelican	<i>Pelecanus rufescens</i>	R-LC/R	Wa, Ms
55	Whitebreasted Cormorant	<i>Phalacrocorax lucidus</i>	R-C	Wa, Ms
58	Reed Cormorant	<i>Phalacrocorax africanus</i>	R-C	Wa
60	Darter	<i>Anhinga rufa</i>	R-C	Wa
62	Grey Heron	<i>Ardea cinerea</i>	R-C	Wa
63	Blackheaded Heron	<i>Ardea melanocephala</i>	R-C	Gr, Fa, Wa
64	Goliath Heron	<i>Ardea goliath</i>	R-U	Wa
65	Purple Heron	<i>Ardea purpurea</i>	R-U	Wa
66	Great White Egret	<i>Egretta alba</i>	R-C	Wa
67	Little Egret	<i>Egretta garzetta</i>	R-C	Wa
68	Yellowbilled Egret	<i>Egretta intermedia</i>	R-U	Wa
69	Black Egret	<i>Egretta ardesiaca</i>	R-LC/R	Wa
71	Cattle Egret	<i>Bubulcus ibis</i>	R-C	BW, Gr, Fa, Wa
72	Squacco Heron	<i>Ardeola ralloides</i>	R/NBM-U	Wa
74	Greenbacked Heron	<i>Butorides striatus</i>	R-U	Wa
76	Blackcrowned Night Heron	<i>Nycticorax nycticorax</i>	R-C	Wa
77	Whitebacked Night Heron	<i>Gorsachius leuconotus</i>	R-R	Wa
78	Little Bittern	<i>Ixobrychus minutus</i>	R/NBM-U	Wa
79	Dwarf Bittern	<i>Ixobrychus sturmii</i>	BM-R	Wa
81	Hamerkop	<i>Scopus umbretta</i>	R-C	Wa
83	White Stork	<i>Ciconia ciconia</i>	NBM-C	BW, Ki, Gr, Ko, Mo, Fa
84	Black Stork	<i>Ciconia nigra</i>	R-U/R	RC, Fa, Wa
85	Abdim's Stork	<i>Ciconia abdimii</i>	NBM-C	Ki, Gr, Ko, Fa, Wa
88	Saddlebilled Stork	<i>Ephippiorhynchus senegalensis</i>	R-R/LC	Wa
89	Marabou Stork	<i>Leptoptilos crumeniferus</i>	R-R/LC	BW, Wa
90	Yellowbilled Stork	<i>Mycteria ibis</i>	NBM/R-LC	Wa
91	Sacred Ibis	<i>Threskiornis aethiopicus</i>	R-C	Gr, Fa, Wa
93	Glossy Ibis	<i>Plegadis falcinellus</i>	R-U	Wa
94	Hadeda Ibis	<i>Bostrychia hagedash</i>	R-A	Fo, BW, Gr, To, Fa, Wa
95	African Spoonbill	<i>Platalea alba</i>	R(n)-C	Wa
96	Greater Flamingo	<i>Phoenicopterus ruber</i>	R(n)-LA	Wa, Ms
97	Lesser Flamingo	<i>Phoenicopterus minor</i>	R(n)-LA	Wa, Ms
99	Whitefaced Duck	<i>Dendrocygna viduata</i>	R-C	Wa
100	Fulvous Duck	<i>Dendrocygna bicolor</i>	R-C	Wa
101	Whitebacked Duck	<i>Thalassornis leuconotus</i>	R-U	Wa
102	Egyptian Goose	<i>Alopochen aegyptiacus</i>	R-A	Fa, Wa

Rob	English Name	Species	General Status	Habitats
104	Yellowbilled Duck	<i>Anas undulata</i>	R-A	Wa
105	African Black Duck	<i>Anas sparsa</i>	R-U	RC, Wa
106	Cape Teal	<i>Anas capensis</i>	R-C	Wa
107	Hottentot Teal	<i>Anas hottentota</i>	R-C	Wa
108	Redbilled Teal	<i>Anas erythrorhyncha</i>	R-C	Wa
112	Cape Shoveller	<i>Anas smithii</i>	Er-C	Wa
113	Southern Pochard	<i>Netta erythrophthalma</i>	R-C	Wa
115	Knobbilled Duck	<i>Sarkidiornis melanotos</i>	R-LC	Wa
116	Spurwinged Goose	<i>Plectropterus gambensis</i>	R-VC	Fa, Wa
117	Maccoa Duck	<i>Oxyura maccoa</i>	R-U	Wa
118	Secretarybird	<i>Sagittarius serpentarius</i>	R-U	BW, Ki, Gr, Ko, Ds, Fy, Mo, Fa
120	Egyptian Vulture	<i>Neophron percnopterus</i>	V-R	Gr, Ko, Ds
122	Cape Vulture	<i>Gyps coprotheres</i>	E-LC	BW, Ki, Gr, Ko, Ds, Fy, Mo, Fa
123	Whitebacked Vulture	<i>Gyps africanus</i>	R-C	BW, Ki, Ko, Ds
124	Lappetfaced Vulture	<i>Torgos tracheliotus</i>	R-U	BW, Ki, Ko, Ds
125	Whiteheaded Vulture	<i>Trionocephs occipitalis</i>	R-U	BW, Ko, Ds
126	Black Kite	<i>Milvus migrans</i>	NBM-LC	BW, Ko, Ds, Fa
126.1	Yellowbilled Kite	<i>Milvus aegyptius</i>	BM-C	Fo, BW, Gr, To, Fa
127	Blackshouldered Kite	<i>Elanus caeruleus</i>	R(n)-C	BW, Gr, Ko, Ds, Fa
130	Honey Buzzard	<i>Pernis apivorus</i>	NBM-U	Fo, BW
131	Black Eagle	<i>Aquila verreauxii</i>	R-U	Mo, RC
132	Tawny Eagle	<i>Aquila rapax</i>	R-LC	BW, Ki
133	Steppe Eagle	<i>Aquila nipalensis</i>	NBM-U	BW, Ki
134	Lesser Spotted Eagle	<i>Aquila pomarina</i>	NBM-U	BW
135	Wahlberg's Eagle	<i>Aquila wahlbergi</i>	BM-C	BW, Ki, Fa
136	Booted Eagle	<i>Hieraaetus pennatus</i>	R/NBM-C	BW, Ki, Gr, Ko, Fy, Mo, Fa
137	African Hawk Eagle	<i>Hieraaetus spilogaster</i>	R-U	Fo, BW
138	Ayres' Eagle	<i>Hieraaetus ayresii</i>	R-R	Fo, BW
140	Martial Eagle	<i>Polemaetus bellicosus</i>	R-U	BW, Ki, Gr, Ko, Ds
142	Brown Snake Eagle	<i>Circaetus cinereus</i>	R-U	BW
143	Blackbreasted Snake Eagle	<i>Circaetus pectoralis</i>	R-U	BW, Ki, Ko, Ds, Fa
146	Bateleur	<i>Terathopius ecaudatus</i>	R-LC	BW, Ki
148	African Fish Eagle	<i>Haliaeetus vocifer</i>	R-C	Wa, Ms
149	Steppe Buzzard	<i>Buteo vulpinus</i>	NBM-C	BW, Gr, Ko, Fa
152	Jackal Buzzard	<i>Buteo rufofuscus</i>	E-C	Gr, Ko, Ds, Mo, RC, Fa
154	Lizard Buzzard	<i>Kaupifalco monogrammicus</i>	R-C	BW
156	Ovambo Sparrowhawk	<i>Accipiter ovampensis</i>	R-U	BW
157	Little Sparrowhawk	<i>Accipiter minullus</i>	R-C	Fo, BW
158	Black Sparrowhawk	<i>Accipiter melanoleucus</i>	R-C	Fo, RC
159	Little Banded Goshawk	<i>Accipiter badius</i>	R-C	BW
160	African Goshawk	<i>Accipiter tachiro</i>	R-C	Fo, BW, To
161	Gabar Goshawk	<i>Melierax gabar</i>	R-C	BW, Ki, To, Fa
162	Pale Chanting Goshawk	<i>Melierax canorus</i>	Er-C	BW, Ki, Ko, Ds
164	Eurasian Marsh Harrier	<i>Circus aeruginosus</i>	NBM-R	Gr, Wa
166	Montagu's Harrier	<i>Circus pygargus</i>	NBM-R	Ki, Gr
167	Pallid Harrier	<i>Circus macrourus</i>	NBM-R	Ki, Gr, Fa
169	Gymnogone	<i>Polyboroides typus</i>	R-C	Fo, BW, Ko, RC
170	Osprey	<i>Pandion haliaetus</i>	NBM-U	Wa, Ms
171	Peregrine Falcon	<i>Falco peregrinus</i>	R/NBM-R	Fo, Gr, Ko, Ds, Mo, RC, To

Rob	English Name	Species	General Status	Habitats
172	Lanner Falcon	<i>Falco biarmicus</i>	R-C	BW, Ki, Ko, Ds, Fy, Mo, RC, To, Fa
173	Northern Hobby Falcon	<i>Falco subbuteo</i>	NBM-U	BW, Ki, Gr, Ko, Fa
179	Western Redfooted Kestrel	<i>Falco vespertinus</i>	NBM-R	BW, Ki, Gr, Fa
180	Eastern Redfooted Kestrel	<i>Falco amurensis</i>	NBM-C	BW, Gr, To, Fa
181	Rock Kestrel	<i>Falco rupicolis</i>	R-C	Ki, Gr, Ko, Ds, Fy, Mo, RC, Fa
182	Greater Kestrel	<i>Falco rupicoloides</i>	R-C	BW, Ki, Gr, Ko, Ds, Fa
183	Lesser Kestrel	<i>Falco naumanni</i>	NBM-VC	Gr, Ko, To, Fa
188	Coqui Francolin	<i>Peliperdix coqui</i>	R-C	BW
189	Crested Francolin	<i>Dendroperdix sephaena</i>	R-VC	BW
196	Natal Francolin	<i>Pternistis natalensis</i>	Er-C	Fo, BW, RC
199	Swainson's Francolin	<i>Pternistis swainsonii</i>	Er-C	BW, Gr, Fa
200	Common Quail	<i>Coturnix coturnix</i>	R/BM/NBM-C	Ki, Gr, Ko, Mo, Fa
201	Harlequin Quail	<i>Coturnix delegorguei</i>	R/BM-C	Gr, Fa
203	Helmeted Guineafowl	<i>Numida meleagris</i>	R-VC	BW, Ki, Gr, Ko, Fa
205	Kurrichane Buttonquail	<i>Turnix sylvatica</i>	R(n)-U/LC	BW, Gr, Fa
212	African Crake	<i>Creccopsis egregia</i>	BM-U	Gr, Wa
213	Black Crake	<i>Amaurornis flavirostris</i>	R-C	Wa
214	Spotted Crake	<i>Porzana porzana</i>	R-U	Gr, Wa
226	Common Moorhen	<i>Gallinula chloropus</i>	R-C	Wa
227	Lesser Moorhen	<i>Gallinula angulata</i>	BM-U	Wa
228	Redknobbed Coot	<i>Fulica cristata</i>	R-A	Wa
229	African Finfoot	<i>Podica senegalensis</i>	R-U	Wa
230	Kori Bustard	<i>Ardeotis kori</i>	R-R	BW, Ki, Gr, Ko, Ds
237	Redcrested Korhaan	<i>Eupodotis ruficrista</i>	Es-C	BW, Ki
239.1	Whitewinged Korhaan	<i>Eupodotis afroaoides</i>	E-VC	Ki, Ko, Ds
240	African Jacana	<i>Actophilornis africanus</i>	R-VC	Wa
242	Old World Painted Snipe	<i>Rostratula benghalensis</i>	R-U	Wa
245	Ringed Plover	<i>Charadrius hiaticula</i>	NBM-C	Wa, Ms
248	Kittlitz's Plover	<i>Charadrius pecuarius</i>	R-C	Gr, Wa, Ms
249	Threebanded Plover	<i>Charadrius tricollaris</i>	R-C	Wa, Ms
252	Caspian Plover	<i>Charadrius asiaticus</i>	NBM-U	BW, Ki, Gr
255	Crowned Plover	<i>Vanellus coronatus</i>	R-C	BW, Ki, Gr, Ko, Fy, To, Fa
258	Blacksmith Plover	<i>Vanellus armatus</i>	R-VC	Gr, Wa
259	Whitewinged Plover	<i>Vanellus albiceps</i>	R-LC	Wa
260	Wattled Plover	<i>Vanellus senegallus</i>	R/BM-LC	Gr, Wa
262	Ruddy Turnstone	<i>Arenaria interpres</i>	NBM-C	Ms
264	Common Sandpiper	<i>Actitis hypoleucos</i>	NBM-C	Gr, Wa, Ms
265	Green Sandpiper	<i>Tringa ochropus</i>	NBM-R	Wa
266	Wood Sandpiper	<i>Tringa glareola</i>	NBM-C	Wa
268	Redshank	<i>Tringa totanus</i>	V-R	Wa, Ms
269	Marsh Sandpiper	<i>Tringa stagnatilis</i>	NBM-C	Wa, Ms
270	Greenshank	<i>Tringa nebularia</i>	NBM-C	Wa, Ms
272	Curlew Sandpiper	<i>Calidris ferruginea</i>	NBM-VC	Wa, Ms
274	Little Stint	<i>Calidris minuta</i>	NBM-C	Wa, Ms
281	Sanderling	<i>Calidris alba</i>	NBM-C	Wa, Ms
284	Ruff	<i>Philomachus pugnax</i>	NBM-C	Gr, Wa
286	Ethiopian Snipe	<i>Gallinago nigripennis</i>	R-LC	Gr, Wa
290	Whimbrel	<i>Numenius phaeopus</i>	NBM-C	Wa, Ms
294	Pied Avocet	<i>Recurvirostra avosetta</i>	R-LC	Wa, Ms

Rob	English Name	Species	General Status	Habitats
295	Blackwinged Stilt	<i>Himantopus himantopus</i>	R-C	Wa, Ms
297	Spotted Dikkop	<i>Burhinus capensis</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, To, Fa, Ms
298	Water Dikkop	<i>Burhinus vermiculatus</i>	R-C	Wa, Ms
300	Temminck's Courser	<i>Cursorius temminckii</i>	R-U	BW, Ki, Gr, Fa
302	Threebanded Courser	<i>Rhinoptilus cinctus</i>	R-U	BW
303	Bronzewing Courser	<i>Rhinoptilus chalcopterus</i>	R/BM-U	BW, Ki
305	Blackwinged Pratincole	<i>Glareola nordmanni</i>	NBM-LA	Gr
313	Lesser Blackbacked Gull	<i>Larus fuscus</i>	NBM-U	Wa, Ms
315	Greyheaded Gull	<i>Larus cirrocephalus</i>	R-VC	Wa, Ms
338	Whiskered Tern	<i>Chlidonias hybridus</i>	R(n)-LC	Wa
339	Whitewing Tern	<i>Chlidonias leucopterus</i>	NBM-A	Wa
345	Burchell's Sandgrouse	<i>Pterocles burchelli</i>	E-C	Ki
347	Doublebanded Sandgrouse	<i>Pterocles bicinctus</i>	Er-C	BW, Ki, Ko, Ds
348	Feral Pigeon	<i>Columba livia</i>	R-A	To, Fa
349	Rock Pigeon	<i>Columba guinea</i>	R-C	Mo, RC, To, Fa
352	Redeyed Dove	<i>Streptopelia semitorquata</i>	R-C	Fo, BW, To, Fa
354	Cape Turtle Dove	<i>Streptopelia capicola</i>	R-VC	BW, Ki, Gr, Ko, Ds, Fy, To, Fa
355	Laughing Dove	<i>Streptopelia senegalensis</i>	R-VC	BW, Ki, Gr, Ko, Ds, Fy, To, Fa
356	Namaqua Dove	<i>Oena capensis</i>	R-VC	BW, Ki, Gr, Ko, Ds, To, Fa
358	Greenspotted Dove	<i>Turtur chalcospilos</i>	R-C	BW, To
361	African Green Pigeon	<i>Treron calva</i>	R-C	Fo, BW
364	Meyer's Parrot	<i>Poicephalus meyeri</i>	R-C	BW
373	Grey Lourie	<i>Corythaixoides concolor</i>	R-C	BW, To
374	Eurasian Cuckoo	<i>Cuculus canorus</i>	NBM-U	BW, Mo
375	African Cuckoo	<i>Cuculus gularis</i>	BM-U	BW, Ki
377	Redchested Cuckoo	<i>Cuculus solitarius</i>	BM-C	Fo, BW, To, Fa
378	Black Cuckoo	<i>Cuculus clamosus</i>	BM-C	Fo, BW, To, Fa
380	Great Spotted Cuckoo	<i>Clamator glandarius</i>	NBM-U	BW
381	Striped Cuckoo	<i>Clamator leuallantii</i>	BM-U	Fo, BW
382	Jacobin Cuckoo	<i>Clamator jacobinus</i>	BM-C	BW, Ki
385	Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	R/BM-C	Fo, BW, To
386	Diederik Cuckoo	<i>Chrysococcyx caprius</i>	BM-VC	BW, Ki, Gr, Ko, Fy, To, Fa
391	Burchell's Coucal	<i>Centropus burchellii</i>	R-C	BW, To, Wa
392	Barn Owl	<i>Tyto alba</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, RC, To, Fa
395	Marsh Owl	<i>Asio capensis</i>	R-C	Gr, Fa, Wa
396	African Scops Owl	<i>Otus senegalensis</i>	R-C	BW, Ki
397	Whitefaced Owl	<i>Ptilopus granti</i>	R-C	BW, Ki
398	Pearlspotted Owl	<i>Glaucidium perlatum</i>	R-C	BW, Ki
401	Spotted Eagle Owl	<i>Bubo africanus</i>	R-C	Fo, BW, Ki, Gr, Ko, Ds, Fy, RC, To, Fa
402	Giant Eagle Owl	<i>Bubo lacteus</i>	R-U	BW, Ki
404	Eurasian Nightjar	<i>Caprimulgus europaeus</i>	R-U	BW, Ki, To, Fa
405	Fierynecked Nightjar	<i>Caprimulgus pectoralis</i>	R/BM-C	BW, Ki, To, Fa
406	Rufouscheeked Nightjar	<i>Caprimulgus rufigena</i>	BM-C	BW, Ki, Ko, Ds, Fa
408	Freckled Nightjar	<i>Caprimulgus tristigma</i>	R-C	RC
411	Eurasian Swift	<i>Apus apus</i>	NBM-C	BW, Ki, Gr, Ko, Ds, Fy, Mo, RC, To, Fa
412	Black Swift	<i>Apus barbatus</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, Mo, RC, To, Fa

Rob	English Name	Species	General Status	Habitats
415	Whiterumped Swift	<i>Apus caffer</i>	BM-VC	Ko, Ds, Mo, RC, To, Fa
416	Horus Swift	<i>Apus horus</i>	BM-LC	Gr, Mo, RC, Fa, Wa
417	Little Swift	<i>Apus affinis</i>	R/BM-VC	BW, Gr, Ko, Ds, Fy, Mo, RC, To, Fa
418	Alpine Swift	<i>Tachymarptis melba</i>	BM-C	BW, Ki, Gr, Ko, Ds, Fy, Mo, RC, Fa
421	Palm Swift	<i>Cypsiurus parvus</i>	R-C	BW, To
424	Speckled Mousebird	<i>Colius striatus</i>	R-C	BW, To
425	Whitebacked Mousebird	<i>Colius colius</i>	E-C	Ko, Ds, To
426	Redfaced Mousebird	<i>Urocolius indicus</i>	R-C	BW, Ko, Fy, To, Fa
428	Pied Kingfisher	<i>Ceryle rudis</i>	R-C	Wa, Ms
429	Giant Kingfisher	<i>Megaceryle maxima</i>	R-U	Wa, Ms
430	Halfcollared Kingfisher	<i>Alcedo semitorquata</i>	R-U	Wa
431	Malachite Kingfisher	<i>Alcedo cristata</i>	R-C	Wa
432	Pygmy Kingfisher	<i>Ispidina picta</i>	BM-LC	Fo, BW
433	Woodland Kingfisher	<i>Halcyon senegalensis</i>	BM-C	BW
435	Brownhooded Kingfisher	<i>Halcyon albiventris</i>	R-C	Fo, BW, RC, To
436	Greyhooded Kingfisher	<i>Halcyon leucocephala</i>	BM-U	BW
437	Striped Kingfisher	<i>Halcyon chelicuti</i>	R-C	BW
438	Eurasian Bee-eater	<i>Merops apiaster</i>	NBM/BM-C	BW, Ki, Gr, Ko, Ds, Fa
440	Bluecheeked Bee-eater	<i>Merops persicus</i>	NBM-LC	BW, Wa
441	Carmine Bee-eater	<i>Merops nubicoides</i>	NBM-LC	BW, Wa
443	Whitefronted Bee-eater	<i>Merops bullockoides</i>	R-C	BW, Wa
444	Little Bee-eater	<i>Merops pusillus</i>	R-C	BW, Wa
445	Swallowtailed Bee-eater	<i>Merops hirundineus</i>	R-LC	BW, Ki, Ko, Ds
446	Eurasian Roller	<i>Coracias garrulus</i>	NBM-C	BW, Ki, Gr, Fa
447	Lilacbreasted Roller	<i>Coracias caudata</i>	R/LM-C	BW, Ki
449	Purple Roller	<i>Coracias naevia</i>	R-U	BW, Ki
450	Broadbilled Roller	<i>Eurystomus glaucurus</i>	BM-C	Fo, BW
451	African Hoopoe	<i>Upupa africana</i>	R(n)-C	BW, Ki, Ko, Ds, To, Fa
452	Redbilled Woodhoopoe	<i>Phoeniculus purpureus</i>	R-C	Fo, BW, RC, To, Fa
454	Scimitarbilled Woodhoopoe	<i>Rhinopomastus cyanomelas</i>	R-C	BW, Ki
457	Grey Hornbill	<i>Tockus nasutus</i>	R-C	BW, Ki
458	Redbilled Hornbill	<i>Tockus erythrorhynchus</i>	R-C	BW
459	Southern Yellowbilled Hornbill	<i>Tockus leucomelas</i>	Er-C	BW, Ki
463	Southern Ground Hornbill	<i>Bucorvus leadbeateri</i>	R-LC	BW, Fa
464	Blackcollared Barbet	<i>Lybius torquatus</i>	R-C	Fo, BW, To, Fa
465	Pied Barbet	<i>Tricholaema leucomelas</i>	Er-C	BW, Ki, Gr, Ko, Ds, To, Fa
470	Yellowfronted Tinker Barbet	<i>Pogoniulus chrysoconus</i>	R-C	BW
473	Crested Barbet	<i>Trachyphonus vaillantii</i>	R-C	BW, To, Fa
474	Greater Honeyguide	<i>Indicator indicator</i>	R-U	Fo, BW, Fa
476	Lesser Honeyguide	<i>Indicator minor</i>	R-LC	BW, To, Fa, Wa
478	Sharpbilled Honeyguide	<i>Prodotiscus regulus</i>	R-U	Fo, BW
481	Bennett's Woodpecker	<i>Campethera bennettii</i>	R-U	BW
483	Goldentailed Woodpecker	<i>Campethera abingoni</i>	R-C	Fo, BW, Ki, RC, To
486	Cardinal Woodpecker	<i>Dendropicus fuscescens</i>	R-C	Fo, BW, Ki, Ko, Ds, Fy, RC, To, Fa
487	Bearded Woodpecker	<i>Dendropicus namaquus</i>	R-C	BW
489	Redthroated Wryneck	<i>Jynx ruficollis</i>	R-C	BW, To, Fa
493	Monotonous Lark	<i>Mirafra passerina</i>	Er-C	BW, Ki
494	Rufousnaped Lark	<i>Mirafra africana</i>	R-C	BW, Gr, Fa

Rob	English Name	Species	General Status	Habitats
497	Fawncoloured Lark	<i>Calendulauda africanoides</i>	R-C	BW, Ki
498	Sabota Lark	<i>Calendulauda sabota</i>	Er-C	BW, Ki, Gr, Ko, Ds, RC
505	Dusky Lark	<i>Pinarocorys nigricans</i>	NBM-U	BW
507	Redcapped Lark	<i>Calandrella cinerea</i>	R(n)-C	BW, Ki, Gr, Ko, Ds, Fy, Mo, Fa
508	Pinkbilled Lark	<i>Spizocorys conirostris</i>	Er-C	Ki, Gr, Ko, Fa
515	Chestnutbacked Finchlark	<i>Eremopterix leucotis</i>	R(n)-C	BW, Gr, Fa
516	Greybacked Finchlark	<i>Eremopterix verticalis</i>	Er-VC	Ki, Gr, Ko, Ds, Fa
518	Eurasian Swallow	<i>Hirundo rustica</i>	NBM-A	BW, Ki, Gr, Ko, Ds, Fy, Mo, To, Fa, Wa
520	Whitethroated Swallow	<i>Hirundo albigularis</i>	BM-C	Gr, RC, To, Fa
523	Pearlbreasted Swallow	<i>Hirundo dimidiata</i>	R/BM-C	BW, Fa
524	Redbreasted Swallow	<i>Hirundo semirufa</i>	BM-C	BW, Gr, Fa
526	Greater Striped Swallow	<i>Hirundo cucullata</i>	BM-C	Ki, Gr, Ko, Fy, Mo, RC, To, Fa
527	Lesser Striped Swallow	<i>Hirundo abyssinica</i>	R/BM-C	BW, RC, To, Fa
528	South African Cliff Swallow	<i>Hirundo spilodera</i>	Ebm-LC	BW, Gr, Fa
529	Rock Martin	<i>Hirundo fuligula</i>	R-C	Ki, Mo, RC, To, Fa
530	House Martin	<i>Delichon urbica</i>	NBM-LC	Gr, RC, Fa
532	Sand Martin	<i>Riparia riparia</i>	NBM-C	Gr, Fa, Wa
533	Brownthroated Martin	<i>Riparia paludicola</i>	R-C	Gr, Wa
534	Banded Martin	<i>Riparia cincta</i>	BM-U	Gr, Fa, Wa
538	Black Cuckooshrike	<i>Campephaga flava</i>	R-U	Fo, BW
541	Forktailed Drongo	<i>Dicrurus adsimilis</i>	R-C	BW, Ki, RC, To, Fa
543	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	NBM-U	BW, Ki, Fa
545	Blackheaded Oriole	<i>Oriolus larvatus</i>	R-C	Fo, BW, To, Fa
548	Pied Crow	<i>Corvus albus</i>	R-A	BW, Gr, Ko, Ds, To, Fa
552	Ashy Tit	<i>Parus cinerascens</i>	Er-U	BW, Ki
554	Southern Black Tit	<i>Parus niger</i>	Er-C	Fo, BW, To, Fa
557	Cape Penduline Tit	<i>Anthoscopus minutus</i>	Er-C	BW, Ki, Ko, Ds, Fy, Fa
558	Grey Penduline Tit	<i>Anthoscopus caroli</i>	R-C	BW
560	Arrowmarked Babbler	<i>Turdoides jardineii</i>	R-VC	BW, Fa
563	Pied Babbler	<i>Turdoides bicolor</i>	E-C	BW, Ki
567	Redeyed Bulbul	<i>Pycnonotus nigricans</i>	Er-VC	BW, Gr, Ko, Ds, To, Fa
568	Blackeyed Bulbul	<i>Pycnonotus tricolor</i>	R-VC	BW, Mo, To, Fa
569	Terrestrial Bulbul	<i>Phyllastrephus terrestris</i>	R-C	Fo, BW
574	Yellowbellied Bulbul	<i>Chlorocichla flaviventris</i>	R-C	Fo
576	Kurrichane Thrush	<i>Turdus libonyanus</i>	R-C	BW, To, Fa
580	Groundscraper Thrush	<i>Psophocichla litsipsirupa</i>	R-C	BW, Ki, To, Fa
586	Mountain Chat	<i>Oenanthe monticola</i>	Er-C	Ko, Ds, Mo, RC, To, Fa
587	Capped Wheatear	<i>Oenanthe pileata</i>	R/BM-C	BW, Ki, Gr, Ko, Fa
589	Familiar Chat	<i>Cercomela familiaris</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, Mo, RC, To, Fa
593	Mocking Chat	<i>Thamnolaea cinnamomeiventris</i>	R-C	RC
595	Anteating Chat	<i>Myrmecocichla formicivora</i>	E-C	Ki, Gr, Ko, Fa
596	Stonechat	<i>Saxicola torquata</i>	R-VC	Gr, Fy, Mo, Fa
601	Cape Robin	<i>Cossypha caffra</i>	R-C	Fo, Fy, RC, To
602	Whitethroated Robin	<i>Cossypha humeralis</i>	E-C	BW
613	Whitebrowed Robin	<i>Cercotrichas leucophrys</i>	R-C	BW
615	Kalahari Robin	<i>Cercotrichas paena</i>	Er-C	BW, Ki
619	Garden Warbler	<i>Sylvia borin</i>	NBM-C	Fo, BW, To
620	Whitethroat	<i>Sylvia communis</i>	NBM-U	BW

Rob	English Name	Species	General Status	Habitats
621	Titbabbler	<i>Parisoma subcaeruleum</i>	Er-C	BW, Ki, Ko, Ds
625	Icterine Warbler	<i>Hippolais icterina</i>	NBM-C	BW, Ki
626	Olivetree Warbler	<i>Hippolais olivetorum</i>	NBM-U	BW
627	River Warbler	<i>Locustella fluviatilis</i>	NBM-R	BW
628	Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	NBM-C	To, Fa, Wa
631	African Marsh Warbler	<i>Acrocephalus baeticatus</i>	BM-C	Wa
633	Eurasian Marsh Warbler	<i>Acrocephalus palustris</i>	NBM-C	Fo, BW, To, Wa
634	Eurasian Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	NBM-C	Wa
635	Cape Reed Warbler	<i>Acrocephalus gracilirostris</i>	R-C	Wa
638	African Sedge Warbler	<i>Bradypterus baboecala</i>	R-C	Wa
643	Willow Warbler	<i>Phylloscopus trochilus</i>	NBM-VC	Fo, BW, Ki, To, Fa
645	Barthroated Apalis	<i>Apalis thoracica</i>	R-C	Fo, BW, Fy, RC, To
651	Longbilled Crombec	<i>Sylvietta rufescens</i>	R-C	BW, Ki, Ko
653	Yellowbellied Eremomela	<i>Eremomela icteropygialis</i>	R-U	BW, Ki, Ko, Ds
656	Burntnecked Eremomela	<i>Eremomela usticollis</i>	R-C	BW
657.1	Greybacked Bleating Warbler	<i>Camaroptera brevicaudata</i>	R-C	BW
658	Desert Barred Warbler	<i>Calamonastes fasciolatus</i>	Er-C	BW, Ki
664	Fantailed Cisticola	<i>Cisticola juncidis</i>	R-VC	Gr, Fa
665	Desert Cisticola	<i>Cisticola aridulus</i>	R-C	Gr, Fa
671	Tinkling Cisticola	<i>Cisticola rufilatus</i>	R-U	BW, Ki, Gr
672	Rattling Cisticola	<i>Cisticola chinianus</i>	R-C	BW, Ki
674	Redfaced Cisticola	<i>Cisticola erythrops</i>	R-C	Fa, Wa
677	Levaillant's Cisticola	<i>Cisticola tinniens</i>	R-C	Gr, Fa, Wa
679	Lazy Cisticola	<i>Cisticola aberrans</i>	R-C	Fo, BW, Mo, RC
681	Neddicky	<i>Cisticola fulvicapillus</i>	R-C	Fo, BW, Gr, Fy, RC, To, Fa
683	Tawnyflanked Prinia	<i>Prinia subflava</i>	R-C	BW, To, Fa, Wa
685	Blackchedsted Prinia	<i>Prinia flavicans</i>	Er-C	BW, Ki, Gr, Ds, To, Fa
689	Spotted Flycatcher	<i>Muscicapa striata</i>	NBM-C	BW, Ki, Ko, To, Fa
691	Bluegrey Flycatcher	<i>Muscicapa caeruleascens</i>	R-C	Fo, BW, RC
693	Fantailed Flycatcher	<i>Myioparus plumbeus</i>	R-U	Fo, BW
694	Black Flycatcher	<i>Melaenornis pammelaina</i>	R-C	Fo, BW, To, Fa
695	Marico Flycatcher	<i>Bradornis mariquensis</i>	Er-C	BW, Ki
696	Pallid Flycatcher	<i>Bradornis pallidus</i>	R-C	BW
698	Fiscal Flycatcher	<i>Sigelus silens</i>	E-C	BW, Ko, To
701	Chinspot Batis	<i>Batis molitor</i>	R-C	BW
706	Fairy Flycatcher	<i>Stenostira scita</i>	E-C	BW, Ko, Fy, Mo, To, Fa
710	Paradise Flycatcher	<i>Terpsiphone viridis</i>	BM-C	Fo, BW, To, Fa
711	African Pied Wagtail	<i>Motacilla aguimp</i>	R-C	RC, To, Fa, Wa, Ms
713	Cape Wagtail	<i>Motacilla capensis</i>	R-C	Gr, Fy, To, Fa, Wa
714	Yellow Wagtail	<i>Motacilla flava</i>	NBM-U	Gr, Fa, Wa
716	Grassveld Pipit	<i>Anthus cinnamomeus</i>	R-C	BW, Gr, Fa
717	Longbilled Pipit	<i>Anthus similis</i>	R-C	Ko, Mo
718	Plainbacked Pipit	<i>Anthus leucophrys</i>	R-C	Gr, Mo, Fa
719	Buffy Pipit	<i>Anthus vaalensis</i>	R-U	Ki, Gr, Fa
720	Striped Pipit	<i>Anthus lineiventris</i>	R-LC	BW, RC
722	Tree Pipit	<i>Anthus trivialis</i>	NBM-U	BW
723	Bushveld Pipit	<i>Anthus caffer</i>	R-LC	BW
731	Lesser Grey Shrike	<i>Lanius minor</i>	NBM-C	BW, Ki, Gr
732	Fiscal Shrike	<i>Lanius collaris</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, Mo, To, Fa

Rob	English Name	Species	General Status	Habitats
733	Redbacked Shrike	<i>Lanius collurio</i>	NBM-C	BW, Ki, Gr, Fa
735	Longtailed Shrike	<i>Corvinella melanoleuca</i>	R-C	BW
736	Southern Boubou	<i>Laniarius ferrugineus</i>	E-C	Fo, BW, Fy, To
737	Tropical Boubou	<i>Laniarius aethiopicus</i>	R-C	Fo
739	Crimsonbreasted Shrike	<i>Laniarius atrococcineus</i>	Er-C	BW, Ki, Ko, Ds
740	Puffback	<i>Dryoscopus cubla</i>	R-C	Fo, BW
741	Brubru	<i>Nilaus afer</i>	R-C	BW
743	Threestreaked Tchagra	<i>Tchagra australis</i>	R-C	BW
744	Blackcrowned Tchagra	<i>Tchagra senegala</i>	R-C	BW
748	Orangebreasted Bush Shrike	<i>Telophorus sulfureopectus</i>	R-C	BW
751	Greyheaded Bush Shrike	<i>Malaconotus blanchoti</i>	R-C	BW, To
753	White Helmetshrike	<i>Prionops plumatus</i>	R-C	BW
756	Whitecrowned Shrike	<i>Eurocephalus anguitimens</i>	Er-C	BW, Ki
760	Wattled Starling	<i>Creatophora cinerea</i>	R(n)-LA	BW, Ki, Gr, Ko, Ds, To, Fa
761	Plumcoloured Starling	<i>Cinnyricinclus leucogaster</i>	BM-U	BW
762	Burchell's Starling	<i>Lamprotornis australis</i>	Er-C	BW, Ki
763	Longtailed Starling	<i>Lamprotornis mevesii</i>	R-LC	BW
764	Glossy Starling	<i>Lamprotornis nitens</i>	Er-C	BW, Ki, Ko, Ds, To, Fa
765	Greater Blue-eared Starling	<i>Lamprotornis chalybaeus</i>	R-C	BW
769	Redwinged Starling	<i>Onychognathus morio</i>	R-VC	Fy, Mo, RC, To, Fa
772	Redbilled Oxpecker	<i>Buphagus erythrorhynchus</i>	R-C	BW
779	Marico Sunbird	<i>Cinnyris mariquensis</i>	R-C	BW, To
787	Whitebellied Sunbird	<i>Cinnyris talatala</i>	R-C	BW, To
792	Black Sunbird	<i>Chalcomitra amethystina</i>	R-C	Fo, BW, To
796	Cape White-eye	<i>Zosterops virens</i>	E-VC	Fo, BW, Ko, Fy, To, Fa
798	Redbilled Buffalo Weaver	<i>Bubalornis niger</i>	R-LC	BW
799	Whitebrowed Sparrowweaver	<i>Plocepasser mahali</i>	R-VC	BW, Ki, Fa
801	House Sparrow	<i>Passer domesticus</i>	R-VC	To, Fa
802	Great Sparrow	<i>Passer motitensis</i>	R-U	BW, Ki, Ds
803	Cape Sparrow	<i>Passer melanurus</i>	Er-VC	BW, Ki, Ko, Ds, Fy, To, Fa
804	Southern Greyheaded Sparrow	<i>Passer diffusus</i>	Er-C	BW, Ki, Ko, To, Fa
805	Yellowthroated Sparrow	<i>Petronia supercilialis</i>	R-U	BW, Fa
806	Scalyfeathered Finch	<i>Sporopipes squamifrons</i>	Er-C	BW, Ki, Ko, Ds, Fa
810	Spectacled Weaver	<i>Ploceus ocularis</i>	R-C	Fo, BW, To
811	Spottedbacked Weaver	<i>Ploceus cucullatus</i>	R-VC	Fo, BW, To, Fa
813	Cape Weaver	<i>Ploceus capensis</i>	E-C	BW, Fy, To, Fa, Wa
814	Masked Weaver	<i>Ploceus velatus</i>	R-C	BW, Ki, Gr, Ko, Ds, Mo, To, Fa, Wa
815	Lesser Masked Weaver	<i>Ploceus intermedius</i>	R-LC	BW, To, Wa
819	Redheaded Weaver	<i>Anaplectes rubriceps</i>	R-C	BW
820	Cuckoofinch	<i>Anomalospiza imberbis</i>	R/BM-U	BW, Gr, Fa
821	Redbilled Quelea	<i>Quelea quelea</i>	R(n)-LA	BW, Ki, Gr, Fa
824	Red Bishop	<i>Euplectes orix</i>	R-C	Gr, To, Fa, Wa
826	Golden Bishop	<i>Euplectes afer</i>	R(n)-LC	Gr, Fa, Wa
829	Whitewinged Widow	<i>Euplectes albonotatus</i>	R(n)-LC	BW, Gr, Fa
831	Redcollared Widow	<i>Euplectes ardens</i>	R(n)-LC	BW, Gr, Mo, Fa
834	Melba Finch	<i>Pytilia melba</i>	R-C	BW, Ki, Ko, Ds
841	Jameson's Firefinch	<i>Lagonosticta rhodopareia</i>	R-C	BW, Fa
842	Redbilled Firefinch	<i>Lagonosticta senegala</i>	R-C	BW, Gr, Ko, To, Fa
844	Blue Waxbill	<i>Uraeginthus angolensis</i>	R-C	BW, To, Fa

Rob	English Name	Species	General Status	Habitats
845	Violeteared Waxbill	<i>Granatina granatina</i>	Er-LC	BW, Ki, Fa
846	Common Waxbill	<i>Estrilda astrild</i>	R-C	Gr, To, Fa, Wa
847	Blackcheeked Waxbill	<i>Estrilda erythronotos</i>	R-LC	BW, Ki
852	Quail Finch	<i>Ortygospiza atricollis</i>	R-C	Gr
854	Orangebreasted Waxbill	<i>Amandava subflava</i>	R-LC	Gr
855	Cutthroat Finch	<i>Amadina fasciata</i>	R(n)-U	BW, Ki
856	Redheaded Finch	<i>Amadina erythrocephala</i>	Er-VC	Gr, Fa
857	Bronze Mannikin	<i>Lonchura cucullata</i>	R-VC	Fo, BW, To, Fa
860	Pintailed Whydah	<i>Vidua macroura</i>	R(n)-C	BW, Gr, To, Fa
861	Shafttailed Whydah	<i>Vidua regia</i>	Er-C	BW, Ki, Ko
862	Paradise Whydah	<i>Vidua paradisaea</i>	R-C	BW, To, Fa
864	Black Widowfinch	<i>Vidua funerea</i>	R(n)-LC	BW, To, Fa
865	Purple Widowfinch	<i>Vidua purpurascens</i>	R-U	BW, Fa
867	Steelblue Widowfinch	<i>Vidua chalybeata</i>	R(n)-C	BW, To, Fa
869	Yelloweyed Canary	<i>Serinus mozambicus</i>	R-C	Fo, BW, To, Fa
870	Blackthroated Canary	<i>Serinus atrogularis</i>	R-C	BW, Ki, Gr, Ko, Ds, Fy, To, Fa
878	Yellow Canary	<i>Serinus flaviventris</i>	Er-C	Ki, Gr, Ko, Ds, Fy, Mo, To, Fa
881	Streakyheaded Canary	<i>Serinus gularis</i>	R-C	Fo, BW, Gr, Mo, To, Fa
884	Goldenbreasted Bunting	<i>Emberiza flaviventris</i>	R-U	BW, To, Fa
885	Cape Bunting	<i>Emberiza capensis</i>	R-C	Ko, Ds, Fy, Mo, RC
886	Rock Bunting	<i>Emberiza tahapisi</i>	R(n)-LC	Mo, RC
887	Larklike Bunting	<i>Emberiza impetuani</i>	Er-VC	Ko, Ds, Fy

Table 18: Abbreviation explanations for Table 17.

Status	Occurrence	Endemic Status	Red Data Species	Habitats
R = Resident BM = Breeding Migrant NBM = Non-breeding migrant V = Vagrant	A = Abundant VC = Very Common C = Common U = Uncommon R = Rare o	E = wholly endemic species Er = species with range largely confined to Southern Africa Es = endemic sub-species which is potentially a full species Ebr = species with breeding range wholly confined to Southern Africa.	RE = regionally extinct CR = critically endangered EN = endangered VU = vulnerable NT = near threatened.	Fo = Forest BW = Bushveld and Woodland Ki = Kalahari Gr = Grassland Ko = Karoo Ds = Desert Fy = Fynbos Mo = Mountains RC = Rocks and Cliffs To = Towns and Gardens Fa = Farmland Wa = Wetland (Inland Water) Mp = Marine pelagic Ms = Marine Shoreline

Table 19: Expected reptile list (based on known historical distribution lists taken from Branch, 1998) for the proposed development site. RDL status is also given.

Name	Species	RDL Status	Endemic status
Leopard tortoise	<i>Geochelone pardalis</i>		
Serrated or Kalahari tent tortoise	<i>Psammobates oculiferus</i>	Endem	1
Speke's hinged tortoise	<i>Kinixys spekii</i>		
Marsh (=Helmeted) terrapin	<i>Pelomedusa subrufa</i>		
Serrated hinged terrapin	<i>Pelusios sinuatus</i>		
Delalande's beaked blind snake	<i>Rhinotyphlops lalandei</i>	Endem	1
Cape thread snake	<i>Leptotyphlops conjunctus incognitus</i>		
Peter's thread snake	<i>Leptotyphlops scutifrons scutifrons</i>	Endem	1
Southern African python	<i>Python natalensis</i>	VU	
Southern or Bibron's burrowing asp	<i>Atractaspis bibronii</i>		
Duerden's or beaked burrowing asp	<i>Atractaspis duerdeni</i>	Endem	1
Cape centipede eater	<i>Aparallactus capensis</i>		
Common purple-glossed snake	<i>Amblyodipsas polylepis polylepis</i>		
Bicoloured quill-snaouted snake	<i>Xenocalamus bicolor bicolor</i>		
Common brown water snake	<i>Lycodonomorphus rufulus</i>	Endem	1
Brown house snake	<i>Lamprophis capensis (=fuliginosus)</i>		
Cape wolf snake	<i>Lycophidion capense capense</i>		
Mole snake	<i>Pseudoaspis cana</i>		
Two-stripe shovel-snout	<i>Prosymna bivittata</i>	Endem	1
Eastern bark or Mopane snake	<i>Hemirhagerrhis nototaenia</i>		
Striped skaapsteker	<i>Psammophyllax tritaeniatus</i>		
Jalla's sand snake	<i>Psammophis jallae</i>		
Short-snouted grass snake	<i>Psammophis brevirostris brevirostris</i>		
Stripe-bellied sand snake	<i>Psammophis subtaeniatus subtaeniatus</i>		
Spotted bush snake	<i>Philothamnus semivariegatus</i>		
Common egg-eater	<i>Dasypeltis scabra</i>		
Common (=Eastern) tiger snake	<i>Telescopous semiannulatus semiannulatus</i>		
Boomslang	<i>Dispholidus typus typus</i>		
Vine or twig snake	<i>Thelotornis capensis capensis</i>		
Shield-nose snake	<i>Aspidelaps scutatus scutatus</i>	Endem	1
Boulenger's garter snake	<i>Elapsoidea boulengeri</i>		
Snouted (=Egyptian) cobra	<i>Naja annulifera annulifera</i>		
Mozambique spitting cobra (=M'fezi)	<i>Naja mossambica</i>		
Black mamba	<i>Dendroaspis polylepis</i>		
Puff adder	<i>Bitis arietans arietans</i>		
Horned adder	<i>Bitis caudalis</i>		
Kalahari round-headed worm lizard	<i>Zygaspis quadrifrons</i>		
Dusky spade-snouted worm lizard	<i>Monopeltis infuscata</i>		
Percival's legless skink	<i>Acontias percivali occidentalis</i>		
Sundervall's writhing skink	<i>Lygosoma sundervallii sundervallii</i>		
Cape skink	<i>Mabuya capensis</i>		
Five-lined or rainbow skink	<i>Mabuya quinquetaeniata</i>		
Striped skink	<i>Mabuya striata punctatissima</i>		
Variable skink	<i>Mabuya varia</i>		
Variiegated skink	<i>Mabuya variegata punctulata</i>		
Spotted-neck snake-eyed skink	<i>Panaspis sp.</i>		

Name	Species	RDL Status	Endemic status
Bushveld lizard	<i>Heliobolus lugubris</i>		
Cape rough-scaled lizard	<i>Ichnotropis capensis</i>		
Common rough-scaled lizard	<i>Ichnotropis squamulosa</i>		
Spotted sandveld lizard	<i>Nucras intertexta</i>	Endem	1
Holub's sandveld lizard	<i>Nucras holubi</i>		
Spotted sand lizard	<i>Pedioplanis lineocellata lineocellata</i>	Endem	1
Yellow-throated plated lizard	<i>Gerrhosaurus flavigularis</i>		
Tropical girdled lizard	<i>Cordylus tropidosternum jonesi</i>		
Rock (=White-throated) monitor	<i>Varanus albigularis albigularis</i>		
Nile (=Water) monitor	<i>Varanus niloticus</i>		
Ground agama	<i>Agama aculeata distanti</i>		
Southern tree agama	<i>Acanthocercus atricollis atricollis</i>		
Flap-neck chameleon	<i>Chamaeleo dilepis</i>		
Moreau's tropical house gecko	<i>Hemidactylus mabouia</i>		
Wahlberg's velvet gecko	<i>Homopholis wahlbergi</i>	Endem	1
Cape dwarf gecko	<i>Lygodactylus capensis capensis</i>		
Transvaal thick-toed gecko	<i>Pachydactylus affinis</i>	Endem	2
Cape thick-toed gecko	<i>Pachydactylus capensis</i>	Endem	1
Turner's thick-toed gecko	<i>Pachydactylus turneri</i>		
Nile crocodile	<i>Crocodylus niloticus</i>		

(* Endemic status – 1=Endemic to southern African sub-region; 2=Endemic to SA.)

Table 20: Expected amphibian list (based on known historical distribution lists taken from Carruthers, 2001) for the proposed development site. RDL and endemic status* are also given.

Common name	Species	RDL status	Endemic Status
Platanna, Common	<i>Xenopus laevis</i>		0
Rubber frog, Banded	<i>Phrynomantis bifasciatus</i>		0
Shovel-nosed frog, Mottled	<i>Hemisis marmoratus</i>		0
Kassina, Bubbling	<i>Kassina senegalensis</i>		0
Frog, Foam nest	<i>Chiromantis xerampelina</i>		0
Rain frog, Bushveld	<i>Breviceps adspersus</i>		0
Bullfrog, Giant	<i>Pyxicephalus adspersus</i>	VU	0
Frog, Ornate	<i>Hildebrandtia ornata</i>		0
Sand frog, Tremolo	<i>Tomopterna cryptotus</i>		0
Toad, Flat-backed	<i>Bufo maculatus</i>		0
Toad, Western olive	<i>Bufo poweri</i>		
Pygmy toad, Northern	<i>Bufo fenoulheti</i>		1
Toad, Red	<i>Schismaderma carens</i>		0
Grass frog, Plain	<i>Ptychadena anchietae</i>		0
Caco, Common	<i>Cacosternum boettgeri</i>		1

(* Endemic status – 1=Endemic to southern African sub-region; 2=Endemic to SA.)