

ISCOR VANDERBIJLPARK STEEL

ENVIRONMENTAL MASTER PLAN

SPECIALIST REPORT

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TERRESTRIAL ECOLOGY: ANIMAL LIFE

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JASPER MÜLLER ASSOCIATES

SERIES IV DOCUMENT IVS/SR/035 DECEMBER 2002



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TERRESTRIAL ECOLOGY: ANIMAL LIFE

BY **JASPER MÜLLER ASSOCIATES**

> **SERIES IV DOCUMENT IVS/SR/035 DECEMBER 2002**

Draft for discussion CONFIDENTIAL **Research for IVS**







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FINAL

ISCOR VANDERBIJLPARK STEEL

MASTER PLAN SPECIALIST REPORT

IVS/SR/035

TERRESTRIAL ECOLOGY ANIMAL LIFE

DATE: DECEMBER 2002

COMPILED BY:

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EXECUTIVE SUMMARY

This report represents one of a series of specialist Base Line Study Reports, compiled in fulfilment of the terms of reference for the compilation of an Environmental Master Plan for Iscor Vanderbijlpark Steel (IVS). Although this report represents a stand-alone document, the results generated during this study will be integrated into the Environmental Management and/or Environmental Monitoring actions proposed in the IVS Master Plan.

It is important that the results of this study be interpreted in context with the situation as it developed over a period of several decades at IVS. It is obvious that most of the developments which took place at the site, until very recently, did not focus formally on the protection of the terrestrial ecology, partly because the site was seen as an industrial site, and partly because Environmental Legislation and Guidance on the protection of the terrestrial ecosystems, only developed fairly recently. It is therefore not reasonable to expect all historical actions to be fully ecologically "friendly", neither within the bounds of the IVS perimeter, nor for that matter, in the immediate surrounding receiving environment.

The approach and methodology for the current investigation, therefore also took cognizance of the afore-mentioned. The following represent the main conclusions of the animal life base line study:

- The greater Vanderbijlpark area was subjected to high levels of industrial and urban development as well as agricultural activities. The natural grassland areas were mostly used as pastures and for crop farming.
- During the course of the study, the animals that might occur in the study area and its surrounding areas were identified.
- Only a few animals were observed during the site visit. It could, however, be expected that animals occurring in this disturbed area would be species that are very adaptable to a changing environment with a high rate of reproduction and a short life span.
- No endangered, vulnerable or rare species were observed in the area, the endangered species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may occur in this area, though this is unlikely.
- Natural undisturbed grasslands are rarely found, and usually small and fragmented. Therefore, this area is classified as disturbed, with a ecological quality varying from medium to low.
- The following impacts are those that mainly contributed to the current situation:
 - Decrease in species richness and diversity because of animals leaving area or animal deaths
 - Destruction of habitat
 - Disturbance in migration patterns
 - Increase in pest species
 - Loss of food source





- Exotic species are a potentially large threat as they are usually very tolerant to disturbance and have a high reproductive rate. If these exotic species are allowed to reproduce in this area, they will most probably replace the indigenous species which has a lower reproductive rate.
 - This impact can be mitigated by physical, chemical or biological measures. When using either chemical or biological measures, caution must be carried out when choosing the control agent. Chemical and biological agents used must be species specific, not threatening the survival or health of the indigenous species present in the area.
- The management objectives should incorporate the principles of integrated management. This means that the faunal environment should not be seen as separate from the development, but as an integral part thereof. Therefore it should be an objective of IVS to effectively protect the faunal environment from irreversible damage caused by the development. Unavoidable negative impacts caused during any of the developmental and/or operational stages should be mitigated as far as is economically viable.
- Monitoring of the environmental variables are necessary to prevent the degradation of the ecosystem taking place, and is an important mitigation measure. This monitoring can be done by a faunal survey conducted once a year, in which a species list is compiled as well as the abundance of each of the specific species. Throughout the year, any occurrence of animal deaths should be reported immediately, as well as signs of sickness or deformity in sighted animals.
 - Site visits should co-inside with the rainy season and should therefor be done between November and April each year.

Respectfully submitted

G.M. Cloete (PrSciNat)

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1. INTRODUCTION

This report represents one of a series of specialist Base Line Study Reports, compiled in fulfilment of the terms of reference for the compilation of an Environmental Master Plan for Iscor Vanderbijlpark Steel (IVS).

Although this report represents a stand-alone document, the results generated during this study will be integrated into the Environmental Management and/or Environmental Monitoring actions proposed in the IVS Master Plan.

2. APPROACH AND METHODOLOGY

It is important that the results of this study be interpreted in context with the situation as it developed over a period of several decades at IVS. It is obvious that most of the developments which took place at the site, until very recently, did not focus formally on the protection of the terrestrial ecology, partly because the site was seen as an industrial site, and partly because Environmental Legislation and Guidance on the protection of the terrestrial ecosystems, only developed fairly recently. It is therefore not reasonable to expect all historical actions to be fully ecologically "friendly", neither within the bounds of the IVS perimeter, nor for that matter, in the immediate surrounding receiving environment.

The approach and methodology for the current investigation, therefore also took cognizance of the afore-mentioned.

2.1 THE INVESTIGATING TEAM

The terrestrial ecosystems survey (Animal Life) was done by Jasper Müller Associates:

Contact person:	Mrs G. Cloete
Tel.:	(013) 665 1788

2.2 EXTENT AND DETAIL OF INVESTIGATION

The extent and detail of the investigation, was influenced by the following:

- Historical development of the site.
- Current governing Environmental Legislation.
- Terms of reference of the IVS Environmental Master Plan development.
- Requirements for future Environmental Monitoring.

The extent of the study area is shown on FIGURE 1, APPENDIX I. The following study area delineations are of significance:

- The Regional Study Area
- The Greater Vanderbijlpark Study Area
- The Master Plan Study Area
 - ► The IVS Plant and Perimeter
 - The Immediate Surrounding Receiving Environment





The extent and detail selected for this study, was primarily selected subject to the provisions of the National Environmental Management Act, Act 107 of 1998, which states the following:

"Sustainable development requires the consideration of all relevant factors including the following:

- i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimized and remedied;
- ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimized and remedied"

In order to comply with this act, the current situation of the natural environment should be assessed. This assessment, subject to the zoning discussed previously, and subject to the fact that the study area does not represent a "green fields" situation, was made by conducting a reconnaissance faunal survey on selected areas within the IVS perimeter, as well as in the area surrounding IVS (Receiving Environment beyond the IVS perimeter).

The investigation area, together with the sampling localities, is shown on FIGURE 2, APPENDIX I. During this investigation the following was recorded:

- Dominant species
- Endangered or rare species observed
- Exotic or invader species observed

During this survey, the species observed were recorded. A detailed literature survey was also conducted.

2.3 LIAISON WITH AUTHORITIES

DWAF and DACEL are represented on the IVS Master Plan steering committee.

3. SCOPE AND TERMS OF REFERENCE

This report was compiled by JASPER MÜLLER ASSOCIATES (JMA) as a specialist report in support of the IVS Environmental Master Plan.

The following is included in this report:

- Current Situation of the area
 - Species list
 - Dominant Species
 - Rare and Endangered Species
 - Exotic and Invader Species

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- Impact and risk assessment
- Management measures
- Monitoring actions

This study does not include the aquatic fauna. This aspect will form part of a separate Aquatic Ecosystems Base Line Study Report - REF: IVS/SR/033.

4. ACTIONS PERFORMED

4.1 REGIONAL AND GREATER VANDERBIJLPARK STUDY AREAS

These two study area components were assessed on a desk top study basis, with information obtained from literature as well as from local wildlife sanctuaries in the region - regional faunal species list attached as APPENDIX II.

4.2 MASTER PLAN STUDY AREA

Observations were done at the same sampling points selected for the floral study - see FIGURE 2, APPENDIX I. The current land use for the area is shown on FIGURE 3, APPENDIX I. Fauna observed during the site visit were identified and noted, whilst animals that might occur in this area and surrounding areas were identified. The results of this study can be found in APPENDIX II.

Threatened species which might occur in the area was also identified, and can be found in TABLES 5.1.1, 5.1.2, 5.2.1 & 5.2.2 in the text.

5. DESCRIPTION OF THE CURRENT SITUATION

5.1 **REGIONAL ECOLOGY**

The species list for the animals occurring in the region can be found in APPENDIX II. The following rare, endangered and threatened mammals and birds may occur in the region.

Scientific name	Common name	Conservation status
Felis lybica	African Wildcat	Vulnerable
Poecilogale albinuncha	African Striped weasel	Rare
Proteles cristatus	Aardwolf	Rare
Felis nigripes	Small spotted cat	Rare
Orycteropus afer	Aardvark	Vulnerable
Mystromys albicaudotus	White-tailed Mouse	Vulnerable

TABLE 5.1.1:List of rare, endangered and threatened mammals

Felis lybica

Even though this species has a high habitat tolerance, it requires cover. It feeds mainly on small rodents, but also on other mammals, birds, amphibians, insects and other invertebrates.

Poecilogale albinuncha

This long slender carnivore has a wide habitat tolerance, but have mostly been observed in grassland. It hunts small warm-blooded prey, particularly rodents.

Proteles cristatus

This medium-sized carnivore as a very wide habitat tolerance with a preference for open habitats. Its distribution is dictated by the availability of termites, its principal food.

Felis nigripes

The Small Spotted Cat occurs mostly in open, dry habitats with some vegetation cover. It feeds mostly on small rodents, but also takes reptiles, birds and insects.

Orycteropus afer

The Aardvark is a nocturnal and solitary animal. It is hardly ever seen because of its shy nature. A single baby is born in the period July to November, and by the age of six months the youngster can dig for itself.

Mystromys albicaudotus

This nocturnal rodent can be found in grassland and heath where it lies in burrows and cracks in the ground. It feeds on green pant material, seeds and insects.

TABLE 5.1.2:List of red data book birds

Scientific name	Common name	Conservation status
Circus ranivorus	African Marsh Harrier	Vulnerable
Anthropoides paradiseus	Blue Crane	Vulnerable
Falco naumanni	Lesser Kestrel	Vulnerable
Hydroprogne caspia	Caspian Tern	Rare
Polemaetus bellicosus	Martial Eagle	Vulnerable

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Circus ranivorus

This rare harrier occur in marshy areas or flooded grassland and surrounding areas.

Anthropoides paradiseus

This endemic crane can be found in wetlands, grasslands, karoo-shrubland and cultivated lands. Occur in small groups or in pairs, but non-breeding birds may be found in large flocks.

Falco naumanni

The Lesser Kestrel is a summer visitor that occur in open grassland and cultivated areas. It sleeps in groups in high trees in residential areas.

Hydroprogne caspia

This is by far the largest tern of the region. It mainly occurs on islands, bays, coastal waters and large rivers.

Polemaetus bellicosus

The Martial eagle is mainly a savanna species, but can be found in a wide variety of habitat. This bird is rarely found outside of large reserves.

5.2 ECOLOGY OF GREATER VANDERBIJLPARK AREA

The species list for the animals occurring in the region can be found in APPENDIX II. These animals occur in a variety of diverse habitats and have a variety of tolerance ranges ranging from sensitive to highly tolerant.

Even though no threatened animals have been observed on site during the investigation, the following rare, endangered and threatened mammals and birds may occur in the region.

 TABLE 5.2.1: List of rare, endangered and threatened mammals

 possibly occurring in the greater Vanderbijlpark area

Scientific name	Common name	Conservation status
Felis lybica	African Wildcat	Vulnerable
Poecilogale albinuncha	African Striped weasel	Rare
Proteles cristatus	Aardwolf	Rare
Genetta genetta	Small spotted genet	Rare
Felis nigripes	Small spotted cat	Rare
Orycteropus afer	Aardvark	Vulnerable

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TABLE 5.2.2: List of red data book birds possibly occurring in the greater Vanderbijlpark area

Scientific name	Common name	Conservation status
Circus ranivorus	African Marsh Harrier	Vulnerable
Anthropoides paradiseus	Blue Crane	Vulnerable
Falco naumanni	Lesser Kestrel	Vulnerable

Notes on Tables 5.1.1, 5.1.2, 5.2.1 & 5.2.2:

Vulnerable: Species believed to move into the endangered category in the near future if the causal factors continue operating. Included are species of which all or most are decreasing because of overexploitation, extensive destruction of habitat or other environmental disturbance, species with populations which have been seriously depleted and whose ultimate security is not yet assured, and species with populations which are still sizable but are under threat from serious adverse factors which are outside their range.

Rare: Species with small populations which are not at present endangered or vulnerable but which are at risk. These species are usually localized within certain geographical areas or habitats, or are thinly scattered over a somewhat more extensive range. In practice, species with only one or two colonies or less than 200 breeding pairs in South Africa have been classified as rare.

A description of each species, as well as their habitat preferences, are given in Section 5.1.

5.3 ECOLOGY OF MASTER PLAN STUDY AREA

The Master Plan Study Area comprise 9 sub-divisions:

Within Iscor Perimeter:

- Consolidated Residue Management Facility (CRMF)
- Consolidated Plant Area
- Open Veld Area Central
- Southern Slag Processing Area South-West
- Southern Slag Processing Area South-East
- Open Veld Area South East
- South-Western Park Area
- Kiewiet Area

Receiving Environment Beyond Iscor Perimeter:

• Adjacent area to the west, north, east and south

The areas including and immediately adjacent to the Rietkuilspruit to the west and the Leeuwspruit to the east, are discussed in the Aquatic Ecosystems Base Line Study Report.

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5.3.1 Consolidated Residue Management Facility (CRMF)

The CRMF area is fully operational residue management facility, and by its very nature, therefore constantly experiences high levels of disturbance. This area is characterized by several evaporation dams as well as solid waste dumps and product storage areas, separated by patches of pioneer grassland - see FIGURE 2 - APPENDIX I.

In the vegetation surrounding especially the evaporation dams, a large amount of birds were seen.

Species Composition

TABLES below list the faunal species which might occur within the CRMF area. Because of the lack of suitable habitat, it is unlikely that the larger mammal species will occur in the CRMF area. It is expected though that the small mammals such as the members of the family Rodentia will occur in the area.

Scientific name	Common Name	Observed	Conservation
		(Y/N)	Status
Atelerix frontalis	South African	N	Common
-	Hedgehog		
Hystrix africaeaustralis	Porcupine	N	Common
Procavia capensis	Rock Dassie	N	Common
Lepus capensis	Cape Hare	N	Common
Lepus saxatilis	Scrub Hare	Y	Common
Pronolagus randensis	Jameson's Red Rock	N	Common
	Rabbit		
Galerella sanguinea	Slender Mongoose	N	Common
Cynictis penicillata	Yellow Mongoose	Y	Common
Elephantulus myurus	Rock Elephant Shrew	N	Common
Crocidura cyanea	Reddish-grey Musk	N	Common
	Shrew		
Crocidura mariquensis	Swamp Musk Shrew	N	Common
Suncus varilla	Lesser Dwarf Shrew	N	Common
Eptesicus capensis	Cape Serotine Bat	N	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe	N	Common
	Bat		
Scotophilus dinganii	Yellow House Bat	N	Common
Miniopterus schreibersii	Schreibers's Long-	N	Common
	fingered Bat		
Tadarida aegyptiaca	Egyptian Free-tailed	N	Common
	Bat		
Cryptomys hottentotus	Common Molerat	N	Common
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	N	Common
Mastomys coucha	Multimammate Mouse	N	Common
Rhabdomys pumilio	Striped Mouse	N	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common

TABLE 5.3.1.1:	List of mammal species possibly occurring in
	CRMF area

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Scientific name	Common Name	Observed	Conservation
		(Y/N)	Status
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
	Dormouse		
Mystromys albicaudatus	White-tailed Mouse	N	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	N	Common
Rattus rattus	House Rat	N	Common
Tatera brantsii	Highveld Gerbil	N	Common
Pedetes capensis	Spring Hare	N	Common
Ictonyx striatus	Striped Polecat	N	Common
Suricata suricatta	Suricate	Y	Common
Poecilogale albinucha	Striped Weasel	N	Common

TABLE 5.3.1.2:Birds observed during the site investigation in
the CRMF area

Scientific Names	Common Names
Numida meleagris	Helmeted Guineafowl
Streptopelia senegalensis	Laughing pigeon
Euplectes orix	Southern Red Bishop
Francolinus swainsonii	Swainson's Falcolin
Eupodotis afraoides	Northern Black Korhaan
Ploceus velatus	Southern Masked Weaver
Streptopelia capicola	Cape Turtle dove
Egretta intermedia	Yellowbilled Egret
Bubulcus ibis	Cattle Egret
Vidua macroura	Pintailed Whydah
Euplectes progne	Long-tailed widow
Sagittarius serpentarius	Secretary bird
Anthus cinnamomeus	Grassveld pipit

TABLE 5.3.1.3:List of snakes possibly occurring in the
CRMF area

Common name		Scientific name
Brown House snak	ce	Lamprophis fuliginosus
Mole Snake		Pseudaspis cana
Common Egg-eate	ar	Dasypeltis scabra
Herald Snake		Crotaphopeltis hotamboeia
Striped Skaapsteke	er	Psammophylax rhombeatus
Rinkhals		Hemachetus haemachatus
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Common name	Scientific name
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

List of reptiles possibly occurring in the CRMF area

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

Threatened species

No endangered, vulnerable or rare species were observed in the area, the vulnerable species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may however occur in this region.

This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Ecological quality of the natural environment

The CRMF area is constantly undergoing new disturbances. This means that habitats are regularly being destroyed and new ones created. Local animal communities that have not adopted to this constant disturbance are most probably small and confined to small natural areas. Therefore, this area is classified as disturbed, with a ecological quality varying from medium to low.

Utilization of land

Large areas of the CRMF are used for waste disposal, and product storage, as well as for evaporation processes and slag reclamation.

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5.3.2 Consolidated Plant Area (CPA)

The CPA area represent the IVS plant and as such is a highly industrialized area, consisting of different plants and processes. Stockpiling of materials also occurs within this area - see FIGURE 2, APPENDIX I.

Because of the limited area covered by vegetation, only one location were identified where a species list could be compiled.

Species Composition

TABLES below list the faunal species which might occur within the CPA area. Due to the lack of suitable habitat, it is unlikely that the larger mammal species will occur in the CPA area. It is expected though that the small mammals such as the members of the family Rodentia will occur in the area.

Scientific name	Common Name	Observed (Y/N)	Conservation Status
Hystrix africaeaustralis	Porcupine	N	Common
Procavia capensis	Rock Dassie	Ň	Common
Lepus capensis	Cape Hare	N	Common
Lepus saxatilis	Scrub Hare	Y	Common
Pronolagus randensis	Jameson's Red Rock	N	Common
Galerella sanguinea	Slender Mongoose	N	Common
Cynictis penicillata	Yellow Mongoose	Y	Common
Elephantulus myurus	Rock Elephant Shrew	N	Common
Crocidura cyanea	Reddish-grey Musk	N	Common
Crocidura mariquensis	Swamp Musk Shrew	N	Common
Suncus varilla	Lesser Dwarf Shrew	N	Common
Eptesicus capensis	Cape Serotine Bat	N	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe	N	Common
Scotophilus dinganii	Yellow House Bat	N	Common
Miniopterus schreibersii	Schreibers's Long- fingered Bat	N	Common
Tadarida aegyptiaca	Egyptian Free-tailed	N	Common
Cryptomys hottentotus	Common Molerat	N	Common

TABLE 5.3.2.1:	List of mammal species possibly occurring in
	CPA area

Dra	64	fai	· eli	6611	ssi	ion	
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Scientific name	Common Name	Observed (Y/N)	Conservation Status
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	Ñ	Common
Mastomys coucha	Multimammate Mouse	N	Common
Rhabdomys pumilio	Striped Mouse	N	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
Mystromys albicaudatus	White-tailed Mouse	Ň	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	N	Common
Rattus rattus	House Rat	N	Common
Tatera brantsii	Highveld Gerbil	N Comm	
Pedetes capensis	Spring Hare	N	Common
Ictonyx striatus	Striped Polecat	N	Common
Suricata suricatta	Suricate	Y	Common
Poecilogale albinucha	Striped Weasel	N	Common

TABLE 5.3.2.2:	Birds observed during the site investigation in	1
	the CPA area	

Scientific Names	Common Names
Numida meleagris	Helmeted Guineafowl
Streptopelia senegalensis	Laughing pigeon
Euplectes orix	Southern Red Bishop
Francolinus swainsonii	Swainson's Falcolin
Eupodotis afraoides	Northern Black Korhaan
Ploceus velatus	Southern Masked Weaver
Streptopelia capicola	Cape Turtle dove
Egretta intermedia	Yellowbilled Egret
Bubulcus ibis	Cattle Egret
Vidua macroura	Pintailed Whydah
Euplectes progne	Long-tailed widow
Sagittarius serpentarius	Secretary bird

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Scientific Names	Common Names
Anthus cinnamomeus	Grassveld pipit

TABLE 5.3.1.6: List of snakes possibly occurring in the CPA area

Common name	Scientific name
Brown House snake	Lamprophis fuliginosus
Mole Snake	Pseudaspis cana
Common Egg-eater	Dasypeltis scabra
Herald Snake	Crotaphopeltis hotamboeia
Striped Skaapsteker	Psammophylax rhombeatus
Rinkhals	Hemachetus haemachatus
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

List of reptiles possibly occurring in the CPA area

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

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This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

No endangered, vulnerable or rare species were observed in the area, the vulnerable species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may however occur in this region.

Due to the Level of disturbance, the possibility of these threatened species occurring in the area is very small.

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Ecological quality of the natural environment

The CPA area is constantly undergoing new disturbances. This means that habitats are regularly being destroyed and new ones created. The percentage of green areas located in this area is also very small. Therefore, this area is classified as disturbed, with a low ecological quality.

Utilization of land

The CPA is utilized for Iron and Steel production processes, material storage and other plant activities.

5.3.3 Open Veld Area (OVA) - Central

The Central Open Veld area consists mainly of pioneer grassland fragmented by several railway lines. Even though no species lists were compiled for this area, the species found in localities Splist 3 and 4 can be used to describe the area as both localities lie on the perimeter of the CRMF, next to OVA Central - see FIGURE 2, APPENDIX I.

Species Composition

TABLES below list the faunal species which might occur within the OVA - Central area. Due to the lack of suitable habitat, it is unlikely that the larger mammal species will occur in this area. It is expected though that the small mammals such as the members of the family Rodentia will occur in the area..

Scientific name	Common Name	Observed (Y/N)	Conservation Status			
Atelerix frontalis	South African	N	Common			
Procavia capensis	Rock Dassie	N	Common			
Lepus capensis	Cape Hare	N	Common			
Lepus saxatilis	Scrub Hare	Y	Common			
Pronolagus randensis	Jameson's Red Rock	N	Common			
Galerella sanguinea	Slender Mongoose	N	Common			
Cynictis penicillata	Yellow Mongoose	Y	Common			
Elephantulus myurus	Rock Elephant Shrew	N	Common			
Crocidura cyanea	Reddish-grey Musk	N	Common			
Crocidura mariquensis	Swamp Musk Shrew	N	Common			
Suncus varilla	Lesser Dwarf Shrew	N	Common			

TABLE 5.3.3.1:List of mammal species possibly occurring in
the OVA Central area

Scientific name	Common Name	Observed	Conservation
		(Y/N)	Status
Eptesicus capensis	Cape Serotine Bat	N	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe	N	Common
Scotophilus dinganii	Yellow House Bat	N	Common
Miniopterus schreibersii	Schreibers's Long- fingered Bat	Ň	Common
Tadarida aegyptiaca	Egyptian Free-tailed	Ň	Common
Cryptomys hottentotus	Common Molerat	Ň	Common
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	N	Common
Mastomys coucha	Multimammate Mouse	Ň	Common
Rhabdomys pumilio	Striped Mouse	N	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
Mystromys albicaudatus	White-tailed Mouse	Ň	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	Ň	Common
Rattus rattus	House Rat	N	Common
Tatera brantsii	Highveld Gerbil	N	Common
Pedetes capensis	Spring Hare	N	Common
Ictonyx striatus	Striped Polecat	N	Common
Suricata suricatta	Suricate	Y	Common
Poecilogale albinucha	Striped Weasel	N	Common

TABLE 5.3.3.2:Birds observed during the site investigation in
the OVA Central area

Scientific Names	Common Names
Numida meleagris	Helmeted Guineafowl
Streptopelia senegalensis	Laughing pigeon
Euplectes orix	Southern Red Bishop
Francolinus swainsonii	Swainson's Falcolin
Eupodotis afraoides	Northern Black Korhaan

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Scientific Names	Common Names	
Ploceus velatus	Southern Masked Weaver	
Streptopelia capicola	Cape Turtle dove	
Egretta intermedia	Yellowbilled Egret	
Bubulcus ibis	Cattle Egret	
Vidua macroura	Pintailed Whydah	
Euplectes progne	Long-tailed widow	
Sagittarius serpentarius	Secretary bird	
Anthus cinnamomeus	Grassveld pipit	

TABLE 5.3.3.3: List of snakes possibly occurring in the OVACentral area

Common name	Scientific name
Brown House snake	Lamprophis fuliginosus
Mole Snake	Pseudaspis cana
Common Egg-eater	Dasypeltis scabra
Herald Snake	Crotaphopeltis hotamboeia
Striped Skaapsteker	Psammophylax rhombeatus
Rinkhals	Hemachetus haemachatus
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

List of reptiles possibly occurring in the OVA Central area

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

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This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

No endangered, vulnerable or rare species were observed in the area, the vulnerable species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may however occur in this region.

Ecological quality of the natural environment

The OVA-Central area is constantly undergoing new disturbances. This means that habitats are regularly being destroyed and new ones created. Local animal communities that have not adopted to this constant disturbance are most probably small and confined to small natural areas. Therefore, this area is classified as disturbed, with a ecological quality varying from medium to low.

Utilization of land

The OVA Central is an open veld area. The only infrastructure comprise some railway lines and two tar tanks, the latter located right in the south-eastern most corner of the area.

5.3.4 Southern Slag Processing Area - South-West

The Southern Slag Processing area is characterized by slag cooling and related slag processing activities. Due to the nature of the area, localities were not selected here to compile species lists - see FIGURE 2, APPENDIX I.

Species Composition

It is expected that the small mammals such as the members of the family Rodentia will be the dominant species occurring in the area. This is due to the lack of suitable habitat for larger mammal species. The members of the Rodent family are also highly adaptable to disturbances. They also thrive in habitats unsuitable for most other mammal species. It is not expected that many birds will live in this area. Those bird species that do occur in the area most likely nest in other regions.

List of reptiles possibly occurring in the area

Cape Dwarf Gecko Striped Skink Cape (three lined) Skink

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This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

As mentioned previously, no species lists were compiled for this area. However, it is unlikely that any of these species will occur within the study area as it is already highly disturbed. A list of the threatened species possibly occurring within the Vanderbijlpark area can be found in TABLE 5.2.1 and TABLE 5.2.2.

Ecological quality of the community

Due to the high level of disturbance, the area's ecological quality is classified as low.

Utilization of land

The Southern Slag Processing area is utilized for slag cooling and general slag processing activities.

5.3.5 Southern Slag Processing Area - South-East

The Southern Slag Processing area consists of scrap yards, skull yards, storage facilities as well as hot metal and slag pits. Due to the nature of the area, no localities were selected in this area to compile species lists - see FIGURE 2, APPENDIX I.

Species Composition

It is expected that the small mammals such as the members of the family Rodentia will be the dominant species occurring in the area. This is due to the lack of suitable habitat for larger mammal species. The members of the Rodent family are also highly adaptable to disturbances. They also thrive in habitats unsuitable for most other mammal species. It is not expected that many birds will live in this area. Those bird species that do occur in the area most likely nest in other regions.

List of reptiles possibly occurring in the area

Cape Dwarf Gecko Striped Skink Cape (three lined) Skink

This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns

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of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

As mentioned previously, no species lists were compiled for this area. However, it is unlikely that any of these species will occur within the study area as it is already highly disturbed. A list of the threatened species possibly occurring within the Vanderbijlpark area can be found in TABLE 5.2.1 and TABLE 5.2.2.

Ecological quality of the community

Due to the high level of disturbance, the area's ecological quality is classified as low.

Utilization of land

The Southern Slag Processing area is utilized for scrap metal disposal, dumps, storage facilities as well as the cooling and processing of hot metals and slag.

5.3.6 Open Veld Area - South East

The South Eastern Open Veld area is characterized by marshy areas and flood attenuation areas - see FIGURE 2, APPENDIX I.

There were no species identification localities selected in this area because of the high level of fragmentation of dry grassland and the location of the area.

Species Composition

TABLES below list the faunal species which might occur within the South Eastern Open Veld Area. Because of the lack of suitable habitat, it is unlikely that the larger mammal species will occur in this area. It is expected though that the small mammals such as the members of the family Rodentia will occur in the area.

TABLE 5.3.6.1:List of mammal species possibly occurring in
this study area

Scientific name	Common Name	Observed (Y/N)	Conservation Status	
Atelerix frontalis	South African	N	Common	
Procavia capensis	Rock Dassie	N	Common	
Lepus capensis	Cape Hare	N	Common	
Lepus saxatilis	Scrub Hare	Y	Common	

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Scientific name	Common Name	Observed (Y/N)	Conservation Status
Pronolagus randensis	Jameson's Red Rock	N	Common
Galerella sanguinea	Slender Mongoose	N	Common
Cynictis penicillata	Yellow Mongoose	Y	Common
Elephantulus myurus	Rock Elephant Shrew	N	Common
Crocidura cyanea	Reddish-grey Musk	N	Common
Crocidura mariquensis	Swamp Musk Shrew	N	Common
Suncus varilla	Lesser Dwarf Shrew	Ň	Common
Eptesicus capensis	Cape Serotine Bat	N	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe	N	Common
Scotophilus dinganii	Yellow House Bat	N	Common
Miniopterus schreibersii	Schreibers's Long- fingered Bat	N	Common
Tadarida aegyptiaca	Egyptian Free-tailed	N	Common
Cryptomys hottentotus	Common Molerat	N	Common
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	N	Common
Mastomys coucha	Multimammate Mouse	N	Common
Rhabdomys pumilio	Striped Mouse	N	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
Mystromys albicaudatus	White-tailed Mouse	N	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	N	Common
Rattus rattus	House Rat	N	Common
Tatera brantsii	Highveld Gerbil	N	Common
Pedetes capensis	Spring Hare	N	Common
Ictonyx striatus	Striped Polecat	N	Common
Suricata suricatta	Suricate	Y	Common
Poecilogale albinucha	Striped Weasel	N	Common

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Scientific Names	Common Names
Numida meleagris	Helmeted Guineafowl
Streptopelia senegalensis	Laughing pigeon
Euplectes orix	Southern Red Bishop
Francolinus swainsonii	Swainson's Falcolin
Eupodotis afraoides	Northern Black Korhaan
Ploceus velatus	Southern Masked Weaver
Streptopelia capicola	Cape Turtle dove
Egretta intermedia	Yellowbilled Egret
Bubulcus ibis	Cattle Egret
Vidua macroura	Pintailed Whydah
Euplectes progne	Long-tailed widow
Sagittarius serpentarius	Secretary bird
Anthus cinnamomeus	Grassveld pipit

TABLE 5.3.6.2:Birds observed during the site investigation

TABLE 5.3.6.3: List of snakes possibly occurring in this area

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Common name	Scientific name
Brown House snake	Lamprophis fuliginosus
Mole Snake	Pseudaspis cana
Common Egg-eater	Dasypeltis scabra
Herald Snake	Crotaphopeltis hotamboeia
Striped Skaapsteker	Psammophylax rhombeatus
Rinkhals	Hemachetus haemachatus
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

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List of reptiles possibly occurring in the area

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

As mentioned previously, no species lists were compiled for this area. However, it is unlikely that any of these species will occur within the study area as it is already highly disturbed. A list of the threatened species possibly occurring within the Vanderbijlpark area can be found in TABLE 5.2.1 and TABLE 5.2.2.

Ecological quality of the community

Due to the high level of disturbance, the area's ecological quality is classified as medium to low.

Utilization of land

The South Eastern Open Veld area is for flood attenuation. Several canals, weirs and sumps are also located in the area.

5.3.7 South-Western Park Area

The South Western Park area is characterized by large areas covered by lawns. This area's vegetation has been artificially introduced and can therefore not be taken as a natural habitat.

Ecological quality of the community

Because this is a manmade feature, the ecological quality is classified as very low.

Nature of habitat and physical landscape

This area is a manmade landscape with artificially introduced vegetation.

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Utilization of land

The South Western Park area is utilized as a park area for esthetic purposes.

5.3.8 Kiewiet Area

The Kiewiet Area is currently being rehabilitated and several grass species have been introduced. This is currently classified as a pioneer grassland - see FIGURE 2, APPENDIX I.

Six vegetation sampling localities were selected, from where the fauna were observed. These are listed in the table below.

# on Map	Location description	Characteristics	Importance	%of study area
Sample 5	Southern Kiewiet site area	Pioneer grassland	Low ecological importance	3%
Sample 6	South-eastern Kiewiet site area	Pioneer grassland	Low ecological importance	3%
Sample 7	Eastern Kiewiet site area	Pioneer grassland	Low ecological importance	3%
Sample 8	North-eastern Kiewiet site area	Pioneer grassland	Low ecological importance	3%
Sample 9	Northern Kiewiet site area	Pioneer grassland	Low ecological importance	3%
Sample 10	Western Kiewiet site area	Pioneer grassland	Medium - low ecological importance	3%

TABLE 5.3.8.1:Description of sampling localities

Species Composition

It can be expected that several small mammal species will occur in this area. Grassland bird species will also occur in the area. Red hartebeest and Ostriches have been artificially introduced to this area as part of the conversion to a game farm.

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TABLE 5.3.8.2:List of mammal species possibly occurring in
this area

Scientific name	Common Name	Observed (Y/N)	Conservation Status
Atelerix frontalis	South African	N	Common
Hystrix africaeaustralis	Porcupine	N	Common
Procavia capensis	Rock Dassie	N	Common
Lepus capensis	Cape Hare	N	Common
Lepus saxatilis	Scrub Hare	Y	Common
Pronolagus randensis	Jameson's Red Rock	N	Common
Galerella sanguinea	Slender Mongoose	N	Common
Cynictis penicillata	Yellow Mongoose	Ŷ	Common
Elephantulus myurus	Rock Elephant Shrew	N	Common
Crocidura cyanea	Reddish-grey Musk	N	Common
Crocidura mariquensis	Swamp Musk Shrew	N	Common
Suncus varilla	Lesser Dwarf Shrew	N	Common
Eptesicus capensis	Cape Serotine Bat	N	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe	N	Common
Scotophilus dinganii	Yellow House Bat	N	Common
Miniopterus schreibersii	Schreibers's Long- fingered Bat	N	Common
Tadarida aegyptiaca	Egyptian Free-tailed	N	Common
Cryptomys hottentotus	Common Molerat	N	Common
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	N	Common
Mastomys coucha	Multimammate Mouse	N	Common
Rhabdomys pumilio	Striped Mouse	N	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
Mystromys albicaudatus	White-tailed Mouse	N	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	N	Common
Rattus rattus	House Rat	N	Common

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Scientific name	Common Name	Observed (Y/N)	Conservation Status
Tatera brantsii	Highveld Gerbil	N	Common
Pedetes capensis	Spring Hare	N	Common
Ictonyx striatus	Striped Polecat	N	Common
Suricata suricatta	Suricate	Y	Common
Poecilogale albinucha	Striped Weasel	N	Common

TABLE 5.3.8.3:Birds observed during the site investigation

Scientific Names	Common Names
Numida meleagris	Helmeted Guineafowl
Streptopelia senegalensis	Laughing pigeon
Euplectes orix	Southern Red Bishop
Francolinus swainsonii	Swainson's Falcolin
Eupodotis afraoides	Northern Black Korhaan
Ploceus velatus	Southern Masked Weaver
Streptopelia capicola	Cape Turtle dove
Egretta intermedia	Yellowbilled Egret
Bubulcus ibis	Cattle Egret
Vidua macroura	Pintailed Whydah
Euplectes progne	Long-tailed widow
Sagittarius serpentarius	Secretary bird
Anthus cinnamomeus	Grassveld pipit

TABLE 5.3.8.4: List of snakes possibly occurring in this area

Common name	Scientific name
Brown House snake	Lamprophis fuliginosus
Mole Snake	Pseudaspis cana
Common Egg-eater	Dasypeltis scabra
Herald Snake	Crotaphopeltis hotamboeia
Striped Skaapsteker	Psammophylax rhombeatus
Rinkhals	Hemachetus haemachatus
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.

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Common name	Scientific name
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

List of reptiles possibly occurring in the area

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

This area is enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

No endangered, vulnerable or rare species were observed in the area, the vulnerable species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may however occur in this region.

Ecological quality of the community

Within the Kiewiet species communities could not be identified due to the early stage of the community. As previously mentioned, a large number of alien and weedy species were recorded in the area as well as species associated with disturbed conditions. This area is therefore classified as disturbed, with a medium ecological quality.

Utilization of land

The Kiewiet Area is currently being rehabilitated. It was previously used as a shooting range, for effluent irrigation, whilst some borrow pits were also located in the area. After the rehabilitation is completed it will be utilized as an open veld area and game farm.

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5.3.9 Receiving Environment Beyond IVS Perimeter

Subject to the major land use of the area, the receiving environment beyond the IVS perimeter can be divided into two main regions:

- West and North of IVS Works Mainly used for agricultural activities
- South and East of IVS Works Mainly influenced by urbanization (industrial and residential)

5.3.9.1 West and North of IVS Works

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This area is characterized by small holdings and cultivated land. Large sections of formerly cultivated land are currently used for the grazing of cattle.

Description of localities used for observation purposes

Reconnaissance surveys on the area surrounding ISCOR Vanderbijlpark Steel (IVS) were done in December 2001, during which the species observed were recorded. The vegetation survey sampling localities were used here as a basis for observing the animals. The description of these sites located in the area to the North and West if IVS can be found in the following TABLE.

TABLE 5.3.9.1: Description of sampling localities

# on Map	Location description	Characteristics	Importance	%of study area
Sample 11	North of IVS in open veld	Grassland	Medium - low ecological importance	5%
Sample 12	South-west of IVS in artificial pasture	Pioneer grassland	Low ecological importance	10%
Sample 13	West of IVS next to dam	Grassland	Low - medium ecological importance	5%
Sample 14	West of IVS in Steel valley small holdings area	Grassland	Low - medium ecological importance	5%
Sample 15	West of IVS in Drakeville small holdings area	Grassland	Low - medium ecological importance	5%
Sample 16	West of IVS in Linkholm small holdings area	Grassland	Low - medium ecological importance	5%

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# on Map	Location description	Characteristics	Importance	%of study area
Sample 17	West of IVS in Linkholm small holdings area	Grassland	Low - medium ecological importance	5%
Sample 20	Southwest of IVS in open veld near Rietspruit	Grassland	Medium ecological importance	5%
Sample 21	West of IVS in Louisrus small holdings area	Grassland	Low - medium ecological importance	5%
Sample 22	Northwest of IVS in open veld	Grassland	Low - medium ecological importance	5%
Sample 23	North of IVS in open veld	Grassland	Low - medium ecological importance	5%
Sample 24	Far East of IVS in open grassland (Reference Site)	Grassland	Medium ecological importance	5%

Species Composition

Bird species observed in the surrounding grassland areas were also recorded, as it is most likely that these species will occur in the area under investigation as well.

Animals and birds observed during the reconnaissance survey were recorded, distribution lists and conservation status of these animals were then noted. Animal and bird tracks were also recorded during field visits.

TABLE 5.3.9.2:	List	óf	mammal	species	possibly	occurring i	n
	this	stu	idy area				

Scientific name	Common Name	Observed (Y/N)	Conservation Status
Atelerix frontalis	South African	N	Common
Hystrix africaeaustralis	Porcupine	N	Common
Procavia capensis	Rock Dassie	N	Common
Lepus capensis	Cape Hare	N	Common
Lepus saxatilis	Scrub Hare	Ŷ	Common
Pronolagus randensis	Jameson's Red Rock	N	Common
Scientific name	Common Name	Observed (Y/N)	Conservation Status
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Galerella sanguinea	Slender Mongoose	N	Common
Cynictis penicillata	Yellow Mongoose	Y	Common
Genetta genetta	Small-spotted Genet	N	Rare
Canis mesomelas	Blackbacked Jackal	N	Common
Elephantulus myurus	Rock Elephant Shrew	N	Common
Crocidura cyanea	Reddish-grey Musk	N	Common
Crocidura mariquensis	Swamp Musk Shrew	N	Common
Suncus varilla	Lesser Dwarf Shrew	N	Common
Galago moholi	Lesser Bushbaby	N	Common
Sylvicapra grimmia	Common Duiker	N	Common
Raphicerus campestris	Steenbok	N	Common
Oreotragus oreotragus	Klipspringer	N	Common
Pelea capreolus	Grey Rhebok	N	Common
Eptesicus capensis	Cape Serotine Bat	Ň	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe	N	Common
Scotophilus dinganii	Yellow House Bat	N	Common
Miniopterus schreibersii	Schreibers's Long-	N	Common
Tadarida aegyptiaca	Egyptian Free-tailed	N	Common
Cryptomys hottentotus	Common Molerat	N	Common
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	N	Common
Mastomys coucha	Multimammate Mouse	N	Common
Rhabdomys pumilio	Striped Mouse	Ň	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
Mystromys albicaudatus	White-tailed Mouse	N	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	N	Common
Rattus rattus	House Rat	N	Common
Tatera brantsii	Highveld Gerbil	N	Common
Pedetes capensis	Spring Hare	N	Common
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Scientific name	Common Name	Observed (Y/N)	Conservation Status
Proteles cristatus	Aardwolf	N	Rare
Ictonyx striatus	Striped Polecat	N	Common
Raphicerus melanotis	Grysbok	N	Common
Suricata suricatta	Suricate	Y	Common
Vulpes chama	Cape Fox	N	Common
Poecilogale albinucha	Striped Weasel	N	Common
Felis silvestris lybica	African Wild Cat	N	Vulnerable
Felis nigripes	Small-spotted Cat	N	Rare
Orycteropus afer	Aardvark	N	Vulnerable

TABLE 5.3.9.3:Birds observed during the site investigation

Scientific Names	Common Names
Numida meleagris	Helmeted Guineafowl
Streptopelia senegalensis	Laughing pigeon
Euplectes orix	Southern Red Bishop
Francolinus swainsonii	Swainson's Falcolin
Eupodotis afraoides	Northern Black Korhaan
Ploceus velatus	Southern Masked Weaver
Streptopelia capicola	Cape Turtle dove
Egretta intermedia	Yellowbilled Egret
Bubulcus ibis	Cattle Egret
Vidua macroura	Pintailed Whydah
Euplectes progne	Long-tailed widow
Sagittarius serpentarius	Secretary bird
Anthus cinnamomeus	Grassveld pipit

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TABLE 5.3.9.4:List of snakes possibly occurring in the areasurrounding IVS

Common name	Scientific name
Brown House snake	Lamprophis fuliginosus
Mole Snake	Pseudaspis cana
Common Egg-eater	Dasypeltis scabra
Herald Snake	Crotaphopeltis hotamboeia
Striped Skaapsteker	Psammophylax rhombeatus
Rinkhals	Hemachetus haemachatus
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

List of reptiles possibly occurring in the area surrounding IVS

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

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> Large areas of the study area are enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

No endangered, vulnerable or rare species were observed in the area, the vulnerable species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may however occur in this region.

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Ecological quality of the natural environment

The regions to the North and West of the IVS Works are subjected to high levels of agricultural activities. The natural grassland areas were mostly used as pastures and for crop farming. Natural undisturbed grasslands are rarely found, and are usually small and fragmented. Local animal communities that have not adopted to this disturbance are most probably small and confined to small natural areas. Therefore, this area is classified as disturbed, with an ecological quality varying from medium to low.

Utilization of land

As previously mentioned the area is utilized for agricultural purposes comprising small holdings, limited crop farming and pastures - see FIGURE 2, APPENDIX I.

5.3.9.2 South and East of IVS Works

This area is characterized by a high level of urbanization. Formal as well as informal settlement cover largest part of this area, whilst light industries are also present. Signs of trampling, clearing of plant material and solid, liquid and air pollution, emphasizes the impact these activities have on the region.

Description of localities used for observation purposes

Reconnaissance surveys on the area surrounding ISCOR Vanderbijlpark Steel (IVS) were done in December 2001, during which the species observed were recorded. The vegetation survey sampling localities were used here as a basis for observing the animals. The description of these sites located in the area to the North and East of IVS can be found in the following TABLE.

# оп Мар	Location description	Characteristics	Importance	% of study area
Sample	South of IVS in open veld	Grassland	Low ecological importance	5%
Sample 2	South of IVS in open yeld	Grassland	Low - medium ecological	5%

Pioneer grassland

Pioneer grassland

TABLE 5.3.9.5:Description of sampling localities

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Sample

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Sample

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East of IVS in old

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importance

importance

importance

Low ecological

Low ecological

7.5%

7.5%

# on Map	Location description	Characteristics	Importance	% of study area
Sample 18	South-west of IVS in open veld near squatter camp	Grassland	Low ecological importance	5%
Sample 19	Southwest of IVS in open veld near airstrip	Pioneer Grassland	Low - medium ecological importance	5%

TABLE 5.3.9.6:Locations in Master Plan study area where
species lists were compiled

Number on Map	Location description	Characteristics	Importance
SpList 9	Artificial Pasture East of IVS	Pioneer grassland	Low ecological importance

Species Composition

Bird species observed in the surrounding grassland areas were also recorded, as it is most likely that these species will occur in the area under investigation as well.

Animals and birds observed during the reconnaissance survey were recorded, distribution lists and conservation status of these animals were then noted. Animal and bird tracks were also recorded during field visits.

TABLE 5.3.9.7:List of mammal species possibly occurring in
study area

Scientific name	Common Name	Observed (Y/N)	Conservation Status
Elephantulus myurus	Rock Elephant Shrew	N	Common
Crocidura cyanea	Reddish-grey Musk	N	Common
Crocidura mariquensis	Swamp Musk Shrew	N	Common
Suncus varilla	Lesser Dwarf Shrew	N	Common
Eptesicus capensis	Cape Serotine Bat	N	Common
Nycteris thebaica	Egyptian Slitfaced Bat	N	Common
Rhinolophus clivosus	Geoffrey's Horseshoe Bat	N	Common
Scotophilus dinganii	Yellow House Bat	N	Common

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Scientific name	Common Name	Observed (Y/N)	Conservation Status
Miniopterus schreibersii	Schreibers's Long- fingered Bat	N	Common
Tadarida aegyptiaca	Egyptian Free-tailed Bat	N	Common
Cryptomys hottentotus	Common Molerat	N	Common
Cryptomys damarensis	Damara Molerat	N	Common
Mus musculus	House Mouse	N	Common
Mus minutoides	Pygmy Mouse	N	Common
Mastomys coucha	Multimammate Mouse	N	Common
Rhabdomys pumilio	Striped Mouse	N	Common
Otomys angoniensis	Angoni Vlei Rat	N	Common
Graphiurus murinus	Woodland Dormouse	N	Common
Graphiurus parvus	Lesser Savanna	N	Common
Mystromys albicaudatus	White-tailed Mouse	N	Common
Dendromus melanotis	Grey Climbing Mouse	N	Common
Aethomys namaquensis	Namaqua Rock Mouse	N	Common
Rattus rattus	House Rat	N	Common
Tatera brantsii	Highveld Gerbil	N	Common
Poecilogale albinucha	Striped Weasel	N	Common

TABLE 5.3.9.8:

Birds observed during the site investigation

Common Names
Helmeted Guineafowl
Laughing pigeon
Southern Red Bishop
Swainson's Falcolin
Northern Black Korhaan
Southern Masked Weaver
Cape Turtle dove
Yellowbilled Egret
Cattle Egret
Pintailed Whydah
Long-tailed widow
Grassveld pipit

TABLE 5.3.9.9:List of snakes possibly occurring in the areasurrounding IVS

Common name	Scientific name
Brown House snake	Lamprophis fuliginosus
Mole Snake	Pseudaspis cana
Common Egg-eater	Dasypeltis scabra
Herald Snake	Crotaphopeltis hotamboeia
Striped Skaapsteker	Psammophylax rhombeatus
Rinkhals	Hemachetus haemachatus
Common Night Adder	Causus rhombeatus
Puff Adder	Bitis arietans
Blind Snakes	Typhlops sp.
Blind Snakes	Rhinotyphlops sp.
Thread Snakes	Leptotyphlops sp.
Cape Wolf Snake	Lycophidion capense
Common Slug Eater	Duberria lutrix
Aurora House Snake	Lamprophis aurora

List of reptiles possibly occurring in the area surrounding IVS

Leopard Tortoise Cape Dwarf Gecko Flapnecked Chameleon Ground Agama Striped Skink Cape (three lined) Skink

Large areas of the study area are enclosed within a wire fencing, thus forming a barrier for migration of larger animals from and to the area. The migration patterns of smaller animals are however less affected by these barriers as they can easily pass through the fencing.

Threatened species

No endangered, vulnerable or rare species were observed in the area, the vulnerable species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may however occur in this region.

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Ecological quality of the natural environment

The regions to the South and East of the IVS Works is subjected to high levels of urbanization. Natural undisturbed grassland are rarely found, and are usually small and fragmented. Local animal communities that have not adopted to this disturbance are most probably small and confined to small natural areas. Therefore, this area is classified as disturbed, with an ecological quality varying from medium to low.

Utilization of land

As previously mentioned the area is mainly urbanized. The open areas which still exist are utilized for agricultural purposes - see FIGURE 2, APPENDIX I.

6. BIOLOGICAL IMPACT ASSESSMENT

It is quite apparent from the report up till this point, that the entire study area represents an already impacted situation as a result of a range of activities varying from residential, agricultural, industrial and other anthropogenic activities. The impact assessment to be performed now, will attempt to put the causes and impacts into perspective and to highlight those aspects which could be managed to minimize or perhaps even prevent future impacts. The impact assessment will focus on the current land use applications for essentially the medium term, that is for the duration of activities as they exist today.

6.1 IMPACT ASSESSMENT METHODOLOGY

The criteria used to determine the significance of an impact on the environment is that used in Carter, 1977 and Munn, 1979. This criteria can be found in APPENDIX III.

Additional criteria for the determination of the significance of an impact on animal life, as described in Fortlage, 1990, were also used:

The environmental impacts on the faunal regime may be considered to be significant if they influence:

- Bird, fish, insect and small mammal species such as mice and rabbits which can tolerate some disturbance but which are essential components of the ecosystem.
- Large animals who are subject to disturbance of feeding or breeding territories.
- Insect species, some of whom play an essential role in commercial pollination or biological control of insect pests.
- Aquatic species which include amphibians, fish, waterfowl, snails, and aquatic stages of these.

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- Rare and protected species of wildlife.
- Migrating species which make use of land adjoining or affected by the development.
- Existing environmental effects which may already have put the fauna at risk.

The causes for the impacts observed are all related to physical activities associated with urbanization, agriculture and industry, and are therefore fairly generic. This implies that the impacts can be discussed almost generically for the main activities listed, i.e. industry, urbanization and agriculture.

The impact assessment will therefore not focus on the individual Master Plan zones, but will rather be structured according to the nature of the activities. The discussion will be done for the following zones:

- Area within the IVS Perimeter industrial
- Receiving Environment beyond the IVS Perimeter urbanization and agriculture. This zone will have two subdivisions:
 - West and North of IVS Works agriculture
 - ► East and South of IVS Works urbanization, light industrial

6.2 IMPACT ASSESSMENT

6.2.1 Areas within the IVS Perimeter

The area within the IVS Works is a highly disturbed area. These disturbances are mainly caused by industrial activities including the stockpiling of raw materials, the deposition of waste and waste water, construction and usage of buildings, plants, access roads, rail lines and dams.

The following impacts are those that mainly contributed to the current situation:

- Decrease in species richness and diversity because of animals leaving area or animal deaths
- Disturbance in migration patterns
- Increase in pest species
- Loss of food source

Each of the listed impacts will now be discussed in more detail. It should be noted that the area in which these impacts occur, is zoned for heavy industrial activity.

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<u>Nature of impact:</u>	Decrease in species richness and diversity because of animals leaving area or animal deaths
Cause of impact:	Fencing of area, loss of habitat (food sources & breeding sites) due to industrial activities, clearing of vegetation.
Duration:	Long Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	None.
Significance:	Medium Significance.
Nature of impact:	Disturbance in migration patterns of animals
Cause of impact:	Fencing of area, access roads.
Duration:	Medium Term.
Extent:	Local.
Intensity:	Low.
Probability:	Highly probable.
Mitigation options:	None.
Significance:	Low Significance.
Nature of impact:	Increase in pest species
Cause of impact:	Disruption in community structure (predator - prey relationships) due to construction & operation activities.
Duration:	Long Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	Control pest species using chemical, biological
0	or manual measures.
Significance:	Medium Significance.
Nature of impact:	Loss of food source
Cause of impact:	Animal community disruption, loss of natural vegetation could cause loss of a food source. Invader plants may not always be palatable.
Duration:	Medium Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	Control of invader species, manually, chemically or biologically.
Significance:	Medium Significance.

6.2.2 Receiving Environment Beyond the IVS Perimeter

Subject to the major land use of the area, the receiving environment beyond the IVS perimeter, can be divided into two main regions:

- West and North of IVS Works Mainly used for agricultural activities
- South and East of IVS Works Mainly influenced by urbanization (industrial and residential)

6.2.2.1 West and North of IVS Works

This area is characterized by small holdings and cultivated land. Large sections of formerly cultivated land are currently used for the grazing of cattle.

The following impacts are those that mainly contributed to the current situation:

- Decrease in species richness and diversity because of animals leaving area or animal deaths
- Destruction of habitat
- Disturbance in migration patterns
- Increase in pest species
- Loss of food source

Each of these impacts will now be discussed in detail:

<u>Nature of impact:</u>	Decrease in species richness and diversity because of animals leaving area or animal deaths
Cause of impact:	Fencing of area, massive loss of habitat (food sources & breeding sites) due to agricultural activities, clearing of vegetation.
Duration:	Long Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	None.
Significance:	High Significance.

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Nature of impact: Habitat destruction

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Cause of impact:	Replacement of natural vegetation by agricultural lands.
Duration:	Long Term.
Extent:	Local
Intensity:	Medium
Drobobility:	Wighly probable
Probability:	Norre
Mugation options:	INONE.
Significance:	High Significance.
<u>Nature of impact:</u>	Disturbance in migration patterns of animals
Cause of impact:	Fencing of area, access roads.
Duration:	Medium Term.
Extent:	Local.
Intensity:	Low.
Probability.	Highly probable
Mitigation ontions	None
Significance:	Low Significance
Significance.	Low Significance.
<u>Nature of impact:</u>	Increase in pest species
Cause of impact:	Disruption in community structure (predator - prey relationships) due to agricultural activities.
Duration:	Long Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	Control pest species using chemical, biological
	or manual measures.
Significance	Medium Significance
Significance.	Within Significande.
Nature of impact:	Loss of food source
Cause of impact:	Animal community disruption, loss of natural vegetation could cause loss of a food source. Invader plants may not always be palatable, replacement of natural vegetation by single crops.
Duration:	Medium Term.
Extent:	Local.
Intensity:	Medium.
Probability.	Highly probable
Mitigation antion	Pather than single area species implement
wingation options:	National and single crop species, implement
Circuif	mixeu agriculture.
Significance:	meutum Significance.

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6.2.2.2 South and East of IVS Works

This area is characterized by a high level of urbanization. Formal as well as informal settlement cover the largest part of this area, whilst light industries are also present. Isolated patches of agricultural activities also occur. Signs of trampling, clearing of plant material and solid, liquid and air pollution emphasizes the impact these activities have on the region.

The following impacts are those that mainly contributed to the current situation:

- Decrease in species richness and diversity because of animals leaving area or animal deaths
- Habitat destruction
- Disturbance in migration patterns
- Increase in pest species
- Loss of food source

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The listed impacts will now be discussed in more detail:

Nature of impact:	Decrease in species richness and diversity
	because of animals leaving area or animal deaths
Cause of impact:	Fencing of area, massive loss of habitat (food
	sources & breeding sites) due to urbanization,
	clearing of vegetation and vehicular traffic.
Duration:	Long Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	None.
Significance:	High Significance.
Nature of impact:	Habitat destruction
Cause of impact:	Replacement of natural faunal habitat by
	residential and industrial activities.
Duration:	Long Term.
Extent:	Local.
Intensity:	Medium.
Probability:	Highly probable.
Mitigation options:	None.
Significance:	High Significance.

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Nature of impact:	Disturbance in	n migration	patterns o	f animals
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Cause of impact:
Duration:
Extent:
Intensity:
Probability:
Mitigation options:
Significance:

Fencing of area, Access roads Medium Term Local Low Highly probable None. Low Significance

Nature of impact:

Cause of impact:

Duration: Extent: Intensity: Probability: Mitigation options:

Significance:

Increase in pest species Disruption in community structure (predator prey relationships) due to urbanization. Long Term. Local. Medium. Highly probable. Control pest species using chemical, biological or manual measures. Medium Significance.

Nature of impact: I

Cause of impact:

Duration:MExtent:LoIntensity:MProbability:HiMitigation options:NoSignificance:M

Loss of food source

Animal community disruption, loss of natural vegetation could cause loss of a food source. Invader plants may not always be palatable. Medium Term. Local. Medium. Highly probable. None. Medium Significance.

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7. BIOLOGICAL MANAGEMENT OBJECTIVES

The activities occurring on the IVS site represent heavy industrial activities and therefore significant impacts on the animal life is to be expected. Similarly, the surrounding residential, agricultural and light industrial areas, also cause significant impacts on animal life. This statement is clearly borne out by the description of the current situation and the impact assessment performed in preceding sections of this report.

Despite all this, the principles of integrated management should nevertheless be implemented where possible. This means that the faunal environment should be seen as an integrated part of the total environment. Therefore it should be an objective of IVS to effectively protect the faunal environment from irreversible damage caused by their activities, within the bounds applicable to industrial site utilization. Other contributors to the impact on animal life should of course also strive towards the same goals. The unavoidable negative impacts caused by IVS during any of their activities should be mitigated as far as is economically and practically viable.

Due to the fact that the impact on the animal life will continue throughout the operational life time of IVS, the short term and medium term management objectives proposed, relate primarily to preparatory work and monitoring to support rehabilitation actions over the long term.

7.1 SHORT TERM MANAGEMENT OBJECTIVES

Identify and protect all threatened species present in the area surrounding the IVS works.

These species can be prioritized as follow:

- Critically endangered species
- Endangered species
- Vulnerable species
- Rare species
- Indeterminate species
- Insufficiently known species

7.2 MEDIUM TERM MANAGEMENT OBJECTIVES

Along with the general health of the fauna surrounding the IVS works, it should be an objective to monitor the progress and health of the threatened species occurring in the area. Medium term objectives are applicable for the entire operational phase of any IVS related activity.

7.3 LONG TERM MANAGEMENT OBJECTIVES

During the rehabilitation phase it should be attempted to restore the faunal regime to a healthy condition, where communities within the rehabilitated area have a high species richness as well as a high species diversity.

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8. AVAILABLE/ PROPOSED MANAGEMENT MEASURES

8.1 AREAS WITHIN THE IVS PERIMETER

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Due to the generic nature of impacts and objectives for animal life, generic management measures will be given. These measures are to be selected subject to the actual activity and resulting impact within a specific Master Plan zone, for implementation according to the life cycle phase of the specific activity and impact.

IMPACT	MANAGEMENT MEASURE
Habitat destruction	Vandalism
	To limit habitat destruction it is proposed that access of the workers should be limited to the area directly surrounding the current development.
	A buffer zone between the surrounding habitats and the development should be clearly marked off.
	Clearing of site
	Optimize design to clear smallest area possible.
Poaching	Limit access of workers to the surrounding area. Prohibit the hunting of small game or birds.
Vehicular traffic	Vehicular traffic causes the death of various animals trying to cross roads. Implementation of speed limits can prevent some of these deaths.
Fragmentation of habitat	Mitigate this impact by limiting the access roads cutting through the natural vegetation.
Increase in pest species	Control poaching especially of natural predator species.
Loss of food	Invader plants
	The replacement of indigenous species by invader species can be mitigated by physical, chemical or biological measures. When using either chemical or biological measures, caution must be carried out when choosing the control agent. Chemical and biological agents used must be species specific, not threatening the survival or health of the indigenous species present in the area.

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8.2 RECEIVING ENVIRONMENT BEYOND IVS PERIMETER

West and North of IVS Works

IMPACT	MANAGEMENT MEASURE
Habitat destruction	Clearing of vegetation
	Ensure that as large areas as possible are kept natural grasslands and not cultivated. This provides amongst others habitat for predator species feeding on crop feeding species.
	<u>Vandalism</u>
	To limit habitat destruction it is proposed that access of the farm workers should be limited to the area directly surrounding the current development.
	A buffer zone between the surrounding habitat and the development should be clearly marked off.
	Clearing of site
	Optimize design to clear smallest area possible.
Poaching	Limit access of workers to the surrounding area. Prohibit the hunting of game or birds.
Vehicular traffic	Vehicular traffic causes the death of various animals trying to cross roads. Implementation of speed limits can prevent some of these deaths.
Fragmentation of habitat	Mitigate this impact by limiting the access roads cutting through the natural vegetation.
Increase in pest	Combat poaching especially of natural predator species.
species	Do not plant crops all year round as this will cause a continuous food supply for pest species like mice which will then be able to breed throughout the year.
Loss of food	Invader plants
source	The replacement of indigenous species by invader species can be mitigated by physical, chemical or biological measures. When using either chemical or biological measures, caution must be carried out when choosing the control agent. Chemical and biological agents used must be species specific, not threatening the survival or health of the indigenous species present in the area.

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South and East of IVS Works

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IMPACT	MANAGEMENT MEASURE
Habitat destruction	Protected areas
	Identify natural areas to be protected. Implement measures to achieve this protection.
	Clearing of vegetation
	Ensure that as large areas as possible are kept natural grasslands and not used for urbanization. This provides amongst others habitat for predator species feeding on pest species.
	<u>Vandalism</u>
	To limit habitat destruction it is proposed that environmental education should be a priority for the local government. During this education, the community should be taught the importance of protecting the environment as well as sustainable use of the environment.
	Clearing of site
	Optimize design to clear smallest area possible.
Poaching	Prohibit the hunting of game or birds. Educate community on the importance of environmental protection.
Vehicular traffic	Vehicular traffic causes the death of various animals trying to cross the road. Implementation of speed limits can prevent some of these deaths.
Fragmentation of habitat	Mitigate this impact by limiting the access roads cutting through the natural vegetation.
Increase in pest species	Combat poaching especially of natural predator species.
Loss of food	Invader plants
	The replacement of indigenous species by invader species can be mitigated by physical, chemical or biological measures. When using either chemical or biological measures, caution must be carried out when choosing the control agent. Chemical and biological agents used must be species specific, not threatening the survival or health of the indigenous species present in the area.

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9. MONITORING ACTIONS

The environmental variables which influence the suitability of the environment for the animals currently occurring in the study area, can at any stage change, causing a replacement of current species and possibly even communities with species or communities, more adapted to the changed environment. In the case where the environment becomes more polluted, more tolerant species will replace the more sensitive species. These tolerant species are often exotic species.

The species diversity will decrease as the environment harshens and the interspecies connections will bear more strain. With a decreased species diversity, the local ecosystem may become unstable, when the environment undergoes further change, whole ecosystems may collapse.

Monitoring of the environmental variables are therefore necessary to prevent this degradation taking place. This monitoring can be done by a faunal survey conducted once a year, in which a species list is compiled and the abundance of each of the constituent species recorded. Throughout the year, any occurrence of death should be reported immediately, as well as signs of sickness or deformity in sighted animals.

The findings of these surveys will be described in an annual report, from which management decisions should be made.

Site visits should co-inside with the rainy season and should therefore be done between October and April each year.

10. SUMMARY AND CONCLUSION

The following represent the main conclusions of the animal life survey base line study:

- The greater Vanderbijlpark area was subjected to high levels of industrial and urban development as well as agricultural activities. The natural grassland areas were mostly used as pastures and for crop farming.
- During the course of the study, the animals that might occur in the study area and its surrounding areas were identified.
- Only a few animals were observed during the site visit. It could, however, be expected that animals occurring in this disturbed area would be species that are very adaptable to a changing environment with a high rate of reproduction and a short life span.
- No endangered, vulnerable or rare species were observed in the area, the endangered species mentioned in TABLE 5.2.1 and TABLE 5.2.2 may occur in this area, though this is unlikely.
- Natural undisturbed grasslands are rarely found, and usually small and fragmented. Therefore, this area is classified as disturbed, with a ecological quality varying from medium to low.

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- The following impacts are those that mainly contributed to the current situation:
 - Decrease in species richness and diversity because of animals leaving area or animal deaths
 - Destruction of habitat
 - Disturbance in migration patterns
 - Increase in pest species
 - Loss of food source
- Exotic species are a potentially large threat as they are usually very tolerant to disturbance and have a high reproductive rate. If these exotic species are allowed to reproduce in this area, they will most probably replace the indigenous species which has a lower reproductive rate.
- This impact can be mitigated by physical, chemical or biological measures. When using either chemical or biological measures, caution must be carried out when choosing the control agent. Chemical and biological agents used must be species specific, not threatening the survival or health of the indigenous species present in the area.
- The management objectives should incorporate the principles of integrated management. This means that the faunal environment should not be seen as separate from the development, but as an integral part thereof. Therefore it should be an objective of IVS to effectively protect the faunal environment from irreversible damage caused by the development. Unavoidable negative impacts caused during any of the developmental and/or operational stages should be mitigated as far as is economically viable.
- Monitoring of the environmental variables are necessary to prevent the degradation of the ecosystem taking place, and is an important mitigation measure. This monitoring can be done by a faunal survey conducted once a year, in which a species list is compiled as well as the abundance of each of the specific species. Throughout the year, any occurrence of animal deaths should be reported immediately, as well as signs of sickness or deformity in sighted animals.
- Site visits should co-inside with the rainy season and should therefor be done between November and April each year.

Respectfully submitted



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APPENDIX I

- FIGURE 1: Extent of the Study Area
- FIGURE 2: Study Area showing Sampling Localities
- FIGURE 3: Current Land use in the Study Area





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APPENDIX II

FAUNAL SPECIES LIST





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Scientific name	Common Name
Atelerix frontalis	South African Hedgehog
Hystrix africaeaustralis	Porcupine
Proceedia canonsis	Rock Dassie
I anus canonsis	Cane Hare
Lepus cupensis Lapus sovatilis	Scrub Hare
Depus suruinis Depus suruinis	Jameson's Red Rock Rabbit
Calavalla sanoninaa	Slender Mongoose
Guierella sanguinea	Valley Mongoose
Cyniciis peniciitata	Small spotted Const
Genella genella	Plaathaakad Jaakal
Canis mesometas	Blackbacked Jackal Book Elephont Shrow
Chephaniulus myurus	Rock Elephant Shrew
Crociaura cyanea	Severe March Shrew
Crociaura mariquensis	Swamp Musk Shrew
Suncus varilla	Lesser Dwart Shrew
Galago monoli	Lesser Bushbaby
Sylvicapra grimmia	Common Duiker
<i>Kaphicerus campestris</i>	Steenbok
Oreotragus oreotragus	Klipspringer
Pelea capreolus	Grey Rhebok
Eptesicus capensis	Cape Serotine Bat
Nycteris thebaica	Egyptian Slitlaced Bat
Rhinolophus clivosus	Geoffrey's Horseshoe Bat
Scotophilus dinganii	Yellow House Bat
Miniopterus schreibersii	Schreibers's Long-fingered Ba
l'adarida aegyptiaca	Egyptian Free-tailed Bat
Cryptomys hottentotus	Common Molerat
Cryptomys damarensis	Damara Molerat
Mus musculus	House Mouse
Mus minutoides	Pygmy Mouse
Mastomys coucha	Multimammate Mouse
Rhabdomys pumilio	Striped Mouse
Otomys angoniensis	Angoni Vlei Rat
Graphiurus murinus	Woodland Dormouse
Graphiurus parvus	Lesser Savanna Dormouse
Mystromys albicaudatus	White-tailed Mouse
Dendromus melanotis	Grey Climbing Mouse
Aethomys namaquensis	Namaqua Rock Mouse
Rattus rattus	House Rat
Tatera brantsii	Highveld Gerbil
Pedetes capensis	Spring Hare
Proteles cristatus	Aardwolf
lctonyx striatus	Striped Polecat
Raphicerus melanotis	Grysbok
Suricata suricatta	Suricate
Vulpes chama	Cape Fox
Poecilogale albinucha	Striped Weasel
	African Wild Cat
Felis lybica	
Felis lybica Felis nigripes	Small-spotted Cat

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THE CRITERIA USED TO DETERMINE THE SIGNIFICANCE OF AN IMPACT OF A DEVELOPMENT ON THE ENVIRONMENT

According to Carter, 1977 and Munn, 1979, the significance of the impact on the environment is determined by:

1. The nature of the impact of the action on the environment:

The nature of the impact can have significant impacts on the environment and it is therefor very important to look at this factor when the significance of an impact is being determined.

2. The extent of the impact. This is the physical and spatial size of the impact, and is classified as follows:

Local:	The impacted area extends only as far as the activity
Regional:	The impact could effect the entire development area.
National:	The impact could directly or indirectly affect places of international interest

3. The duration of the impact. The lifetime of the impact is places in the following categories:

Short term:	The impact will either disappear with mitigation or will be mitigated through	
	natural processes in a span shorter than any of the project phases.	
Medium term:	The impact will last up to the end of the phases, where after it will end.	
Long term:	The impact will continue or last for the entire operation phase, but will be	
	mitigated by direct human action or by natural processes there after.	

4. The intensity of the impact:

Low:	The natural processes or functions of the environment is not effected by the
	alterations the impact makes to the affected environment.
Medium:	The affected environment is altered in such a way that the functions and
	processes continue, but in a modified way.
High:	The functions and processes of the affected environment is disturbed to the
	extent where is temporarily or permanently ceases.

5. The probability of the impact occurring:

Improbable:	The possibility of the impact occurring is very low, due either to
	circumstances, design or experience.
Probable:	There is a possibility that the impact will occur to the extent that provisions
	must be made therefor.
Highly probable:	The likelihood of the impacts occurring at some or other stage of the
	development is very high. Plans must therefor be drawn up before
	undertaking the activity

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6. Mitigation options:

The significance of an impact may be decreased with proper mitigation. This op **Drait** for discussion contract in the determination of the significance of an impact.



Using the above criteria the impact is classified as the following level of significance:

I. No Significance

The impact is not substantial and does not require any mitigatory action.

II. Low Significance

The impact is of importance, but may require limited mitigation.

III. Medium Significance

The impact is of importance and therefor considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

IV. High Significance

The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefor essential.

