

**ECOLOGICAL REPORT FOR THE PROPOSED UPGRADING OF THE  
VAAL-GAMAGARA PIPELINE, BETWEEN KATHU AND HOTAZEL  
NORTHERN CAPE PROVINCE**

Commissioned by  
**MDA Consultants**

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Compiled by  
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## **EXECUTIVE SUMMARY**

The aim of the proposed development is to upgrade the existing pipeline's capacity in order to ensure a better and more sustainable water supply to the various users along the pipeline route. The site was assessed for sensitive ecosystems and species, and whether the site is suitable in terms of environmental perspective.

A savanna community dominates the vegetation along the route between Kathu and Hotazel. A few Red Data listed species were found. Protected plant species in terms of the Forest Act have also been noted on site. The footprint of the proposed development is relatively small in terms of a local context and also small in terms of the regional context. The savanna community has a relatively medium biodiversity but a low conservation importance in a local, regional or national context.

There are sensitive habitats present along the pipeline route. Existing route goes through a number of pans including Kathu pan.

The construction of the proposed pipeline is not anticipated to impact significantly in terms of sensitive plant or faunal populations as there are already some impacts caused by the existing pipeline namely:

- The pipeline itself;
- The disturbance caused by the construction of the existing pipeline and
- The service road along the existing pipeline route.

## **Recommendations**

- It is recommended that a permit must be obtained for the removal of those Camel Thorn trees, False Camel Thorn tree, Shepherds trees and Devil's claw plants that would be affected by the development (permit must be obtained from the Northern Cape Forestry

office in Upington (Forest act) and the DENC offices in Kimberley (Northern Cape Nature Conservation Act (Act 9 of 2009)(NCNCA);

- to remove protected species in case they are situated in pipeline footprint area;
- Erosion control measures must be put in place during construction and operational phases.
- Dust control measures must be put in place during construction phases.

## DECLARATION OF INDEPENDENCE

I, Pieter Johannes du Preez, ID 6008215016087, declare that I:

- act as an independent specialist consultant in the field of botany, ecology and vegetation science;
- am assigned as specialist consultant by MDA Consultants for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- have or will not have any vested interest in the proposed activity proceeding;
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2006;
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.



PJ DU PREEZ

## **1. INTRODUCTION**

I was appointed by MDA Consultants to undertake an independent biodiversity assessment of the environment at the proposed Vaal – Gamagara water pipeline upgrade between Kathu and Hotazel, Northern Cape province. This assignment is in accordance with the EIA Regulations (No. R. 545, Department of Environmental Affairs and Tourism, 18 June 2010) deriving from Part 5 of the National Environmental Management Act 1998 (Act No. 107 of 1998).

The site visit was done: **07/12/ 2013**.

## **2. ASSIGNMENT AND TERMS OF REFERENCE**

The assignment is interpreted as follows:

- Compile a study on the vegetation and animal communities with special emphasis on the possible presence of Red Data species or protected on the proposed sites earmarked for the development;
- To identify sensitive ecosystems that would be affected negatively by the proposed development

## **3. RATIONALE**

To conserve natural resources in order to maintain ecological processes and life support systems for plants, invertebrates, vertebrates and humans is critical. An assessment of the environment before relevant authorities approve any development is important to ensure that sustainable development takes place. This is part of the legislation that protects the natural environment.

Acts such as the Environmental Conservation Act (Act 73 of 1989), the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998) and the National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004) as well as the Northern Cape Nature Conservation Act (Act 9 of 2009)(NCNCA) ensure the protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment. It also ensures the protection of the environment against disturbance, deterioration, defacement or

destruction as a result of man-made structures, installations, processes or products or human activities. A draft list of Threatened Ecosystems was published (Government Gazette 2009) as part of the National Environmental Management Biodiversity Act, 2004. (Act 10 of 2004). These Threatened Ecosystems are described by SANBI & DEAT (2009). The Northern Cape Nature Conservation Act (Act 9 of 2009)(NCNCA) state that no specimen of a protected plant or animal may be, without a permit, be picked, imported, exported, transported, cultivated or traded.

All components of the ecosystems (physical environment, vegetation, animals) of a site are interrelated and interdependent. A holistic approach is therefore imperative to effectively include the development, utilisation and where necessary conservation of the given natural resources in an integrated development plan, which will address all the needs of the modern human population (Bredenkamp & Brown 2001). It is therefore necessary to make a thorough inventory of the plant communities and biodiversity on the site, in order to evaluate the biodiversity and possible rare species. This inventory should then serve as a scientific and ecological basis for the planning exercises.

## **4 ASSUMPTIONS AND LIMITATIONS**

### **4.1 Assumptions**

- The biodiversity of the site will be destroyed along the pipeline route.

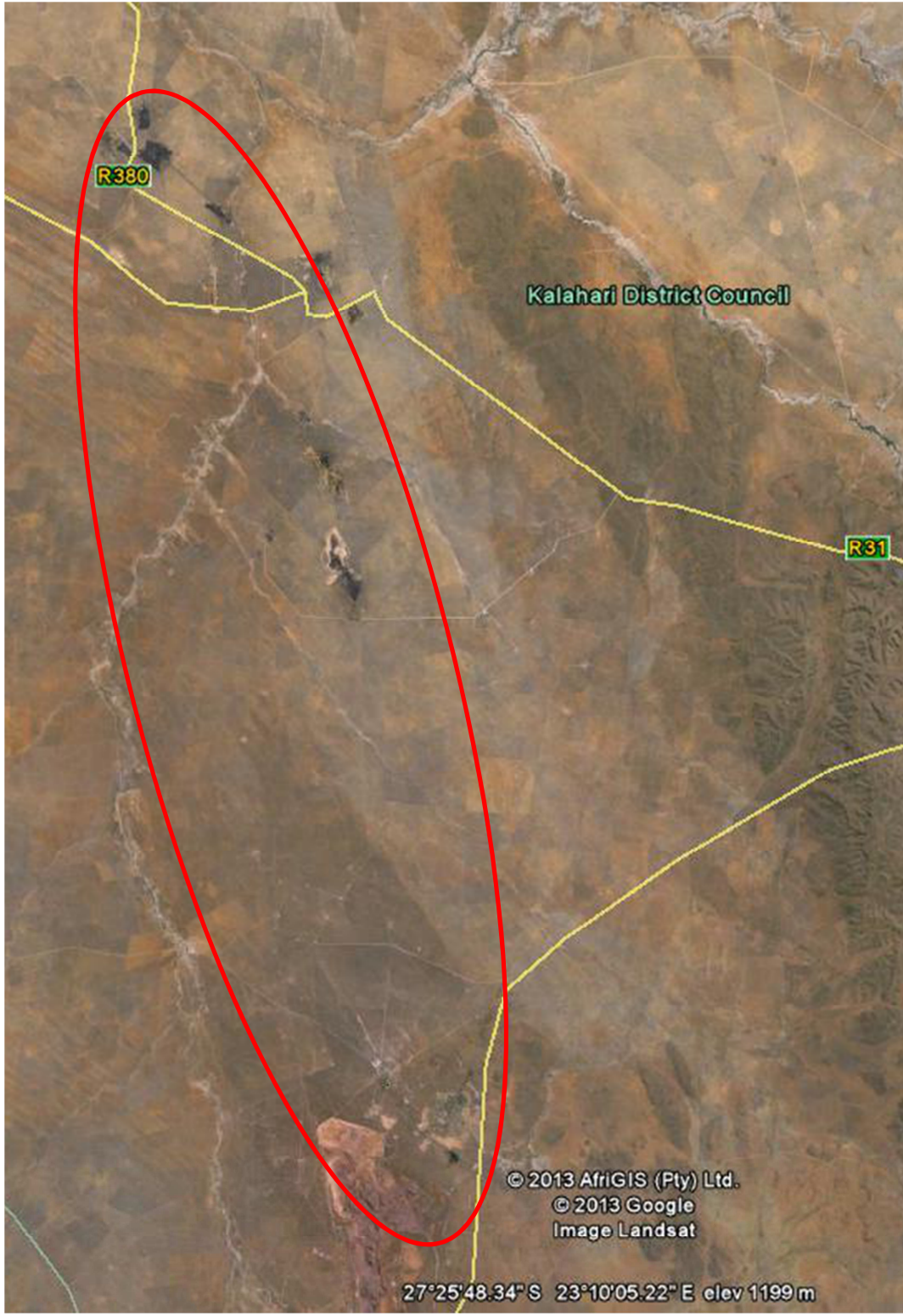
### **4.2 Limitations**

- None

## **5. STUDY AREA**

### **5.1 Location**

The study area is situated between Kathu and Hotazel (Figure 1 & 2).



**Figure 1:** A Google photo of the pipeline route between Kathu and Hotazel



## 6 GENERAL CONCLUSIONS AND RECOMMENDATIONS

The entire study area is located in the Kathu Bushveld (SVk12) except for a small area south of Hotazel where the Gordonia Duneveld (SVkd1)(Mucina & Rutherford 2006) occurs. Neither of the two vegetation types has been listed as endangered. Both have a conservation status of “least threatened” (Mucina & Rutherford 2006) and large areas are protected in provincial and private nature reserves.

### Sensitive habitats or species present on site:

- sensitive habitats occur on site (Kathu pan & a few small pans);
- There are a few protected plant species on site:
  - *Acacia erioloba* Red data species (status: declining) and (protected species in terms of the Forest Act)
  - *Acacia haematoxylon* (protected species in terms of the Forest Act)
  - *Boscia albitrunca* (protected species in terms of the Forest Act)
  - *Harpagophytum procumbens* (Red data)

### Recommendations

- It is recommended that a permit must be obtained for the removal of those Camel Thorn trees, Shepherds trees and Devil’s claw plants that would be affected by the development (permit must be obtained from the Northern Cape Forestry office in Upington (Forest act) and the DENC offices in Kimberley (Northern Cape Nature Conservation Act (Act 9 of 2009)(NCNCA);
- High run-off from the proposed development could have a negative impact especially in terms of erosion of the sandy soil. Measures to control storm water must be put in place to prevent erosion.
- Dust control measures must be put in place during construction phases.

## **8 REFERENCES**

Bredenkamp, G.J. & Brown, L.R. 2001. Vegetation – A reliable ecological basis for environmental planning. *Urban Greenfile* Nov-Dec 2001: 38-39.

Henderson, L. 2001. Alien weeds and invasive plants. ATC, Pretoria.

Mucina, L, & Rutherford, M.C. (Eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

# **PART A: FLORA AND VEGETATION REPORT FOR THE PROPOSED UPGRADING OF THE VAAL-GAMAGARA PIPELINE, BETWEEN KATHU AND HOTAZEL, NORTHERN CAPE PROVINCE**

Compiled by Johann du Preez PhD PrSciNat (No 400271/07)(Botany & Ecology)

## **A1 METHODS**

In order to compile the vegetation and flora study, the following had to be done:

### **A1.1 Preliminary preparations:**

Obtain all relevant maps, aerial and or satellite images of the study area. Collect information on the natural environment of the concerned area. This includes a Red data species list for the flora.

### **A1.2 Vegetation and habitat survey:**

#### **a) In each vegetation type / plant community on site:**

- Determine relatively homogeneous potential ecological units / plant communities / ecosystems on aerial photographs.
- List the plant species (trees, shrubs, grasses and herbaceous species of special interest) present in each ecological unit for plant community and ecosystem description.
- Identify Red data plant species, possible encroacher species and exotic plant species.

#### **b) Plant community delimitation and description**

- Process data (vegetation and habitat) to determine vegetation types / ecosystems on an ecological basis.
- Describe the habitat and vegetation
- Prepare a vegetation map of the area if more than one plant community is present.
- Prepare an ecosystem sensitivity map for the planning of the development.

### c) **General**

- Identify and describe ecologically sensitive areas.
- Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.
- Make recommendations on aspects that should be monitored during development.

#### **A1.3 Conservation Priority / Sensitivity**

The following **conservation priority / sensitivity** categories were used for each site:

**High:** Ecologically sensitive and valuable land with high species richness and/or sensitive ecosystems or red data species that should be conserved and no developed allowed.

**Medium-high:** Land where sections are disturbed but which is in general ecologically sensitive to development/disturbances.

**Medium:** Land on which low impact development with limited impact on the vegetation / ecosystem could be considered for development. It is recommended that certain portions of the natural vegetation be maintained as open space.

**Medium-low:** Land of which small sections could be considered to conserve but where the area in general has little conservation value.

**Low:** Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation.

#### **A1.4 Species Richness**

Species Richness is interpreted as follows: Number of indigenous species recorded in the sample plots representing the plant community. Alien woody species and weeds are not included.

**Table 1: Species richness categories**

<b>Number of species</b>	<b>Species richness category</b>
1 – 24	Low
25 – 39	Medium
40 – 59	High
60+	Very high

## **A2. RESULTS: VEGETATION AND FLORA**

### **A2.1 General description - Vegetation Types**

According to Mucina & Rutherford (2006) the site is situated in the Kathu Bushveld (SVk12) except for a small area south of Hotazel where the Gordonia Duneveld (SVkd1)(Mucina & Rutherford 2006) occurs. Neither of the two vegetation types has been listed as endangered. Both have a conservation status of “least threatened” (Mucina & Rutherford 2006) and large areas are protected in provincial and private nature reserves.

### **A2.2 Description of the plant communities**

The development is planned on the site where a relatively natural vegetation occurs. One plant community occurs on site. A summary of the Species Richness and Ecological Sensitivity of the plant communities is as follows:

<b>Plant community</b>	<b>Species richness</b>	<b>Sensitivity</b>
1. <i>Sporobolus ioclados</i> – <i>Felicia muricata</i> pan community	Low	Low
2. <i>Acacia mellifera</i> – <i>Acacia tortillis</i> community	Medium	Low

**A2.2.1 *Sporobolus ioclados* – *Felicia muricata* pan community** (Fig A1 – A3)

This community is restricted to the calcrete depressions in and around Kathu pan. The vegetation differs from the typical Kalahari savannah because of the presence of limestone (calcrete) in the pan. A few *Acacia mellifera* and *A tortillis* individuals occur in the pan.

No alien plants were noted in the natural vegetation but a few were noted along pipeline route and service road.

**Table 2: Table of the common plant species present along the route on calcretes at Kathu pan.**

<b>Tree</b>	<b>Shrub</b>	<b>Grass</b>	<b>Forb</b>
	<i>Acacia mellifera</i>	<i>Sporobolus ludwigii</i>	<i>Felicia muricata</i>
		<i>Sporobolus ioclados</i>	<i>Hermannia comosa</i>
		<i>Eragrostis truncata</i>	<i>Chrysocoma ciliata</i>
		<i>Eragrostis lehmanniana</i>	
		<i>Aristida congesta</i>	
		<i>Enneapogon desvauxii</i>	



**Figure A1:** A view of the existing pipeline through Kathu pan.



**Figure A2:** Typical vegetation of Kathu pan.



**Figure A3:** View of the pipeline and service road in Kathu pan.

### A2.2.2 *Acacia mellifera* – *Acacia tortillis* savanna community (Fig A4 – A8)

This community is very extensive and occurs on relatively shallow rocky soils as well as on deep Kalahari-sand. In places the vegetation is in a relatively degraded state because of previous human activities on the site as well as overgrazing. Due to the overgrazing impact, *Acacia mellifera* tends to encroach and it forms dense stands.

No alien plants were noted in the natural vegetation but a few were noted along pipeline route and service road.

**Table 1: Table of the common plant species present along the route on deep sand.**

<b>Tree</b>	<b>Shrub</b>	<b>Grass</b>	<b>Forb</b>
<i>Acacia erioloba</i>	<i>Acacia hebeclada</i>	<i>Themeda triandra</i>	<i>Hermannia tomentosa</i>
<i>Acacia tortillis</i>	<i>Acacia mellifera</i>	<i>Schmidtia pappophoroides</i>	<i>Hermannia comosa</i>
<i>Rhus lancea</i>	<i>Diospyros lycioides</i>	<i>Heteropogon contortus</i>	<i>Gnidia polycephala</i>
<i>Ziziphus mucronata</i>	<i>Asparagus laricinus</i>	<i>Eragrostis lehmanniana</i>	<i>Heliotropium lineare</i>
	<i>Lycium cinereum</i>	<i>Pogonarthria squarrosa</i>	<i>Limeum arenicolum</i>
	<i>Lycium hirsutum</i>	<i>Aristida congesta</i>	<i>Acanthosicyos naudinianus</i>
	<i>Gymnosporea buxifolia</i>	<i>Aristida meridionalis</i>	<i>Tribulus zeyheri</i>
	<i>Tarchonanthus camphoratus</i>	<i>Stipagrostis zeyheri</i>	<i>Chascanum pinnatifidum</i>
		<i>Brachiaria serrata</i>	<i>Sesamum triphyllum</i>
		<i>Cynodon dactylon</i>	
		<i>Cenchrus ciliaris</i>	
		<i>Enneapogon cenchroides</i>	





**Figure A4:** A Camel Thorn (*Acacia erioloba*) next to the pipeline route.



**Figure A5:** *Acacia mellifera* encroachment.



**Figure A6:** *Acacia hematoxylon*.



**Figure A7:** Devil's claw (*Harpagophytum procumbens*).



**Figure A8:** Typical vegetation of the Gordonia Duneveld near Hotazel.

### **A3 SPECIES OF CONSERVATION CONCERN**

Threatened species and species of Conservation Concern list for the area was obtained from the POSA database (SANBI). Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered, Endangered and Vulnerable. Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo *et al.* 2009).

Red Listed species are: Camel Thorn (*Acacia erioloba*)(Status: declining)

Devil's claw (*Harpagophytum procumbens*).

The GPS readings of each individual of protected species along the pipeline route is not available at present because the exact pipeline route is currently not available.

#### **A4 GENERAL DISCUSSION AND CONCLUSION: VEGETATION STUDY**

Two different plant communities occur along the pipeline route namely the *Sporobolus ioclados* – *Felicia muricata* pan community and *Acacia mellifera* – *Acacia tortillis* savanna community. In terms of Red listed species the False Camel Thorn (*Acacia hematoxylon*), Camel Thorn (*Acacia erioloba*) (Status: declining) and Devil's Claw (*Harpagophytum procumbens*) occur along the pipeline route.

Should the development occur in the study area, the vegetation of the footprint area of the proposed development will be destroyed along with its specific species richness. The footprint of the proposed development is relatively small in terms of the regional context and the plant community has a relatively low biodiversity conservation importance in a local, regional or national context.

#### **Recommendations**

- It is recommended that a permit must be obtained for the removal of those Camel Thorn trees, Shepherds trees and Devil's claw plants that would be affected by the development (permit must be obtained from the Northern Cape Forestry office in Upington (Forest act) and the DENC offices in Kimberley (Northern Cape Nature Conservation Act (Act 9 of 2009)(NCNCA);
- High run-off from the proposed development could have a negative impact especially in terms of erosion of the sandy soil. Measures to control storm water must be put in place to prevent erosion.
- Dust control measures must be put in place during construction phases.

#### **A4 REFERENCES**

Bredenkamp, G.J. & Brown, L.R. 2001. Vegetation – A reliable ecological basis for environmental planning. Urban Greenfile Nov-Dec 2001: 38-39.

Henderson, L. 2001. Alien weeds and invasive plants. ATC, Pretoria.

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Mucina, L., Bredenkamp, G.J., Hoare, D.B. & McDonald, D.J. 2000. A National vegetation database for South Africa. *South Africa Journal of Science* 96:497-498.

Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C. Kamundi, D.A. & Manyama, P.A. (Eds.). 2009. Red list of South African plants 2009. *Strelitzia* 25:1-668.

SANBI & DEAT. 2009. Threatened Ecosystems in South Africa: Descriptions and Maps. DRAFT for Comment. South African National Biodiversity Institute, Pretoria, South Africa.

The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

The Environmental Conservation Act, 1989 (Act No. 73 of 1989)

The Natural Forests Act, 1998. (Act 84 of 1998).

The National Environment Management Act, 1998 (Act No. 107 of 1998)

The National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004). Government Gazette RSA Vol. 467, 26436, Cape Town, June 2004.

The National Environmental Management Biodiversity Act, 2004. (Act 10 of 2004).

Draft List of Threatened Ecosystems. Government Gazette RSA Vol. 1477, 32689, Cape Town, 6 Nov 2009.

The Natural Scientific Professions Act (Act 27 of 2003)

# **PART B: FAUNA REPORT FOR THE PROPOSED UPGRADING OF THE VAAL-GAMAGARA PIPELINE, BETWEEN KATHU AND HOTAZEL, NORTHERN CAPE PROVINCE**

Compiled by Johann du Preez PhD PrSciNat (No 400271/07)(Botany & Ecology)

## **B1 Introduction**

This brief biological/ecological survey was carried out on the basis of site visit carried out. Strong emphasis was placed on establishing whether or not threatened animal species (amphibian, reptile, avifauna-birds and mammals) occur, or are likely to occur, within the proposed development site. The site is dominated by **Kathu Bushveld** and **Gordonia Duneveld** in various stages of transformation. Literature investigations, personal records, previous surveys and historic data supplemented the current survey.

### **B1.1 Objectives of the initial faunal survey/habitat assessment**

- To provide a description of the mammals, birds, reptiles and amphibians occurring on and in close proximity of the proposed development.
- To identify species (mammals, birds, reptiles and amphibians) of conservation importance which potentially occur on the proposed development site;

### **B1.2 Scope of study**

- An initial/brief mammal, bird, reptile and amphibian survey recording sightings and/or evidence of existing fauna.
- An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the current status of threatened animal species (Red Data Species), within the proposed site and adjacent areas.

### **B1.3 Constraints or limitations to the survey included:**

- The majority of threatened species are seasonal only emerging after sufficient summer rainfall between October and February

- The majority of threatened species extremely secretive (especially Giant Bullfrogs, Striped Harlequin Snake) and difficult to observe during intensive field surveys conducted over several seasons.
- Limitation of historic data and available data-bases. Insufficient knowledge on the specific habitat requirements (migratory, foraging and breeding) of the majority of threatened species;
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, S.A.F.A.P data, personal records and previous surveys conducted in similar habitat).

## **B2 Methodology**

This faunal survey focused mainly on mammals, birds, reptiles and amphibians of the proposed development site. The survey focused on the current status of threatened animal species occurring, or likely to occur within the study area, describing the available and sensitive habitats, identifying potential impacts resulting from the development and providing mitigation measures for the identified impacts.

### **Predictive methods**

A 1:50 000 map of the study area was provided showing existing infrastructure. This was used as far as possible in order to identify potential “hot-spots” or specialised habitats e.g. patches of open savanna vegetation, rivers, wetlands and dams. Satellite imagery of the area was obtained from Google Earth was studied in order to get a three dimensional impression of the topography and current land use.

### **Literature Survey**

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur within the area. The literature search was undertaken utilising *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al*, 2009) as well as internet using POSA (<http://posa.sanbi.org>). *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the*

*Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) as well as ADU's Mammal MAP ([http://vmus.adu.org.za/vm\\_sp\\_list.php](http://vmus.adu.org.za/vm_sp_list.php)) for mammals. Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (eds). 2005. *Roberts- Birds of Southern Africa VII<sup>th</sup> ed.* And BARNES, K.N. (ed.) (2000) *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland* for avifauna (birds) as well as internet SABAP2 (<http://sabap2.adu.org.za>). *A Complete Guide to the Frogs of Southern Africa* (du Preez & Carruthers 2009) and *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter et al. 2004) for amphibians as well as SAFAP FrogMAP (<http://vmus.adu.org.za>). *The Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book- Reptiles and Amphibians* (Branch 1988) as well as SARCA (<http://sarca.adu.org.za>) for reptiles.

### **Site Investigation Methodology**

An assessment was conducted of the status, spatial requirements and habitat preferences of all priority species likely to occur on the proposed **pipeline site**. For certain species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature.

A survey of the proposed development areas was carried out by driving around the site by car and closer inspection of the actual site carried out on foot during daylight hours. The site comprises of the **Kathu Bushveld** and **Gordonia Duneveld** in various stages of transformation and degradation. The savanna has been transformed due to previous developmental and agricultural activities as well as degraded due to overgrazing. The majority of the savanna vegetation around the site has been totally transformed by previous agricultural activities (ploughing and tilling of soils).

Faunal data was obtained during a survey of the proposed development site carried out on foot. All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as nests, feathers and animal tracks (footprints, droppings) to identify animals. The data was supplemented by literature investigations; personal records and historic data. Different habitats were explored to identify any sensitive or specialised species. It should be stressed that the faunal lists provided are not exhaustive, due to the relatively short duration of the field work.



## **B3 INITIAL FAUNAL SURVEY-HABITAT ASSESSMENT**

### **B3.1 Amphibians**

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989). The majority of frog species in the **Northern Cape Province** can be classified as explosive breeders emerging after sufficient summer rainfall between October and March. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles.

As the survey was undertaken for a brief period during the spring the majority of species are in torpor or hibernating. Ideally, a herpetological survey should be undertaken throughout the duration of the wet season (October-March). It is only during this period accurate frog lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from previous surveys; personal records; data from the South African Frog Atlas Project (SAFAP) and published data, and the list provided below is therefore regarded as likely to be fairly comprehensive (See Appendix A).

#### **B3.1.1 Amphibian Species of Conservation Concern**

The Giant Bullfrog (*Pyxicephalus adspersus*) is a protected frog species whose conservation status has been revised and will be included as a Red Data Species under the category 'Lower Risk near threatened'. Giant Bullfrogs have been recorded breeding at suitable sites around **Kathu** area. Bullfrogs breed in the shallow margins of seasonal pans and dams. Bullfrogs may occasionally also breed in shallow seasonally inundated depressions.

### **B3.2 Reptiles**

Reptile lists require intensive surveys conducted for several years. Reptiles are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons. The majority reptile species are sensitive to severe habitat alteration and fragmentation. Due to previous agricultural activities in the area coupled with increased habitat destruction for urban expansion, degradation (alien plant invasion) and disturbances are all causal factors in the alteration of reptile species occurring in these areas. The indiscriminate

killing of all snake species as well as the illegal collecting of certain species for private and the commercial pet industry reduces reptile populations especially snake populations drastically. The frequent burning of the site will have a high impact on remaining reptiles. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks. Continual destruction of suitable habitats especially crop production, and has resulted in the disappearance of numerous reptile species in the **Savanna**. Appendix A lists reptile species recorded from the region.

### **B3.2.1 Reptile Species of Conservation Concern**

No reptile species of conservation concern were found on the property however suitable habitats are present.

### **B3.3 Avifauna/Birds**

Potential impacts on bird species that are present in the area are associated with the construction phase and destruction of vegetation, and disturbance during the construction phase.

### **B3.4 Mammals**

No small mammal trappings were conducted during brief field survey. The area was traversed on foot to ascertain the presence of available refuges. Refuges such as burrows, limited loose rock and stumps were investigated. Fieldwork was augmented with previous surveys in similar habitats as well as published data. The majority of larger mammal species are likely to have been eradicated or have moved away from the area, as a result of previous agricultural activities, hunting and poaching as well as habitat alteration and degradation. Spring Hare, Porcupine, Blacked-Back Jackal and Caracal have however been recorded from surrounding areas.

Mammal species recorded within the study area as well as those that may occur within the study area, on the basis of available distribution records is included in Appendix A.

### **B3.4.1 Mammal Species of Conservation Concern**

No sensitive or endangered mammals were recorded within the study area. The majority of larger mammal species are likely to have been eradicated or have moved away from the area, as a result of hunting and poaching as well as habitat alteration and degradation. Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cats and dogs. According to the “South African Red Data Book of Terrestrial Mammals” (Smithers 1986) and Skinner and Smithers (1990), the study area falls within the distribution ranges of a number of species which are placed into one of known threatened species (Endangered, Vulnerable and Rare). Due to the high level of human activity surrounding the study area it is however unlikely that the study area comprises significant habitat for any species of threatened larger mammals.

According to the “South African Red Data Book of Terrestrial Mammals” (Smithers 1986) and Skinner and Smithers (1990) updated by the IUCN Council in December 1995, the study area falls within the distribution ranges of a few species which are placed into one of known threatened species (Endangered, Vulnerable and Rare). Due to the high level of human activity within the study area it is however unlikely that the study area comprises significant habitat for any species of threatened larger mammals.

Table B2 lists red data species found in habitat typical of The Study Area and surrounding areas.

**Table B2: Red Listed fauna species for the region**

Scientific name	Common name	Threatened Status
<i>Atelerix frontalis</i>	South African Hedgehog	NT
<i>Poecilogale albinucha</i>	African Weasel	DD

<i>Pedetes capensis</i>	Spring Hare	VU
<i>Mastomys albicaudatus</i>	White-tailed mouse	VU

#### **B4. POTENTIAL IMPACTS OF THE PROPOSED RETAIL DEVELOPMENT ON THE FAUNA AND IMMEDIATE ENVIRONMENT**

##### **B4.1 Loss of Faunal Habitats**

Development of the proposed retail site will most likely have a **medium-low** negative, long-term impact on the remaining (albeit limited) faunal component, residing in or utilising the affected natural areas. Alteration of the savanna vegetation along the proposed development will directly, and indirectly, impact on the smaller sedentary species (insects, arachnids, reptiles, amphibians and mammals) adapted to their ground dwelling habitats. Larger, more agile species (birds and mammals) will flee the area and re-locate in suitable habitats away from the development.

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**Appendix A:** Faunal species present in the region Appendix A: Vertebrates that could occur in the area.

Order	Family	Scientific name	Common name
Phylum Vertebrata; Class Amphibia			
Aneura			
	Brevipectidae	<i>Poyntonophrynus vertebralis</i>	Southern Pygmy Toad
	Bufoidea	<i>Amietophrynus rangeri</i>	Raucous Toad
		<i>Amietophrynus gutturalis</i>	Guttural Toad
		<i>Vandijkophrynus gariiepensis</i>	Karoo Toad
	Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina
	Pipidae	<i>Xenopus laevis</i>	Common Platanna
	Pixycephalidae	<i>Cacosternum boettgeri</i>	Boettger's Caco
		<i>Amietia fuscigula</i>	Cape River Frog
		<i>Amieta angolensis</i>	Common River Frog
		<i>Pixycephalus adspersus</i>	Giant Bullfrog
		<i>Tomopterna cryptotis</i>	Tremolo Sand Frog
		<i>Tomopterna tandyi</i>	Tandy's Sand Frog
Phylum Vertebrata; Class Reptilia			
Testudines	Testudinidae	<i>Geochelone pardalis</i>	Leopard Tortoise
		<i>Homopus femoralis</i>	Greater Padloper
		<i>Psammobates oculiferus</i>	Kalahari Tent Tortoise
	Trionychidae	<i>Pelomedusa subrufa</i>	Marsh Terrapin

Order	Family	Scientific name	Common name
Squamata	Typhlopidae	<i>Rhinotyphlops lalandei</i>	Delalande's Blind Snake
	Leptotyphlopidae	<i>Leptotyphlops scutifrons</i>	Peter's Thread Snake
	Leptotyphlopidae	<i>Lycodonomorphus rufulus</i>	Common Brown Water Snake
	Atractaspidae	<i>Atractaspis bibronii</i>	Bibron's burrowing Asp
	Colubridae	<i>Lamprophis fuliginosus</i>	Brown House Snake
		<i>Lamprophis aurora</i>	Aurora House Snake
		<i>Lycophidion capense</i>	Cape Wolf Snake
		<i>Pseudaspis cana</i>	Mole Snake
		<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout
		<i>Psammophylax rhombeatus</i>	Rhombic Skaapsteker
		<i>Psammophis notostrictus</i>	Karoo Sand Snake
		<i>Psammophis leightonii</i>	Cape Fork-marked Snake
		<i>Psammophis crucifer</i>	Cross-marked Snake
		<i>Dasypeltis scabra</i>	Common Egg Eater
		<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake
		<i>Telescopus semiannulatus</i>	Eastern Tiger Snake



Order	Family	Scientific name	Common name
	Elapinae	<i>Elapsoidea boulengeri</i>	Boulenger's Garter Snake
		<i>Elapsoidea sundevallii</i>	Sundevall's Garter Snake
		<i>Naja nivea</i>	Cape Cobra
		<i>Hemachatus haemachatus</i>	Rinkhals
	Viperidae	<i>Bitis arietans</i>	Puff Adder
	Amphisbaenidae	<i>Zygaspis quadrifrons</i>	Cape Spade-snouted Worm Lizard
	Scincidae	<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink
		<i>Mabuya capensis</i>	Cape Skink
		<i>Mabuya striata</i>	Striped Skink
		<i>Mabuya sulcata</i>	Western Rock Skink
		<i>Mabuya variegata</i>	Variegated Skink
	Lacertidae	<i>Ichnotropis squamulosa</i>	Common Rough-scaled Lizard
		<i>Nucras intertexta</i>	Spotted Sandveld-Lizard
		<i>Pedioplanis lineocellata</i>	Spotted Sand lizard
		<i>Nucras holubii</i>	Holub's Sandveld Lizard
		<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard
		<i>Cordylus polyzonus</i>	Karoo Girdled Lizard
	Varanidae	<i>Varanus albigularis</i>	Rock Monitor

Order	Family	Scientific name	Common name
		<i>Varanus niloticus</i>	Water Monitor
	Agamidae	<i>Agama aculeate</i>	Ground Agama
		<i>Agama atra</i>	Southern Rock Agama
		<i>Agama hispida</i>	Southern Spiny Agama
	Chamaeleonidae	<i>Chamaeleo dilepis</i>	Flap-neck Chameleon
	Gekkonidae	<i>Lygodactylus capensis</i>	Cape Dwarf Gecko
		<i>Pachydactylus bibronii</i>	Bibron's Thick-toed Gecko
		<i>Pachydactylus capensis</i>	Cape Thick-toed Gecko
		<i>Pachydactylus mariquensis</i>	Marico Thick-toed Gecko
Phylum Vertebrata; Class Mammalia			
Insectivora	Erinaceidae	<i>Atelerix frontalis</i>	Hedgehog
	Soricidae	<i>Suncus varilla</i>	Lesser Dwarf Shrew
		<i>Crocidura cyanea</i>	Reddish-grey musk shrew
		<i>Elephantulus myurus</i>	Rock Elephant Shrew
		<i>Chlorotalpa sclateri</i>	Sclater's Golden mole
Rodentia	Bathyergidae	<i>Cryptomys hottentotus</i>	Common Molerat

Order	Family	Scientific name	Common name
	Muridae	<i>Tatera leucogaster</i>	Bushveld Gerbil
		<i>Mastomys coucha</i>	Multimammate Mouse
		<i>Saccostomys campestris</i>	Pouched Mouse
		<i>Graphyurus murinus</i>	Woodland dormouse
		<i>Otomys angolensis</i>	Angoni vlei rat
		<i>Otomys iroratus</i>	Vlei rat
		<i>Rabdomys pumilio</i>	Striped mouse
		<i>Mus musculus</i>	House mouse
		<i>Mus minutoides</i>	Pygmy mouse
		<i>Mastomys natalensis</i>	Multimammate mouse
		<i>Aethomys namaquensis</i>	Namaqua rock mouse
		<i>Aethomys chrysophilus</i>	Red veld rat
		<i>Rattus rattus</i>	House rat
		<i>Desmodillus auricularis</i>	Short-tailed gerbil
		<i>Gerbillus pæba</i>	Hairy-footed gerbil
		<i>Tatera leucogaster</i>	Bushveld Gerbil
		<i>Tatera brandsii</i>	Highveld Gerbil
		<i>Mastomys albicaudatus</i>	White-tailed mouse
		<i>Malacothrix typical</i>	Large-eared mouse
		<i>Dendromys melanotis</i>	Grey climbing mouse
	Sciuridae	<i>Xerus inauris</i>	Cape Ground Squirrel
	Pedetidae	<i>Pedetes capensis</i>	Spring Hare

Order	Family	Scientific name	Common name
	Hystricidae	<i>Hystrix africaeaustralis</i>	South African Porcupine
Lagomorpha	Leporidae	<i>Lepus saxatilis</i>	Scrub Hare
Carnivora		<i>Lepus capensis</i>	Cape Hare
	Canidae	<i>Canis mesomelas</i>	Black-backed Jackal
		<i>Vulpes chama</i>	Cape Fox
		<i>Otocyon megalotis</i>	Bad-eared Fox
	Herpestidae	<i>Suricata suricata</i>	Meerkat
		<i>Cynictis penicillata</i>	Yellow mongoose
		<i>Galerella sanguinea</i>	Slender Mongoose
	Mustelidae	<i>Ictonix striatus</i>	Zorilla
		<i>Poecilogale albinucha</i>	Striped Weasel
	Viverridae	<i>Genetta genetta</i>	Common genet
	Felidae	<i>Caracal caracal</i>	Caracal
		<i>Felis nigripes</i>	Black-footed Cat
		<i>Felis sylvestrus</i>	Wild Cat
Tubulidentata	Orycteropidae	<i>Orycteropus afer</i>	Aardvark
Artiodactyla	Bovidae	<i>Raphicerus campestris</i>	Steenbok
		<i>Sylvicapra grimmia</i>	Common Duiker