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Basic Assessment for Ergo Goudkoppies Water Pipeline

Flora and Fauna Assessment Report

Project Number:

ERG3057

Prepared for:

Ergo Mining (PTY) Limited

December 2014

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Report Type:	Flora and Fauna Assessment Report
Project Name:	Basic Assessment for Ergo Goudkoppies Water Pipeline
Project Code:	ERG3057

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EXECUTIVE SUMMARY

Biodiversity is defined, according to the National Environmental Management Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA), as “the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems”. Terrestrial ecology is inclusive of vegetation and faunal structures within a habitat. The fauna are dependant on the cover and food source provided by the vegetation.

Digby Wells Environmental (Digby Wells) was commissioned by ERGO Mining (Pty) Ltd to complete a fauna and flora assessment for a proposed treated waste water pipeline that is intended to run from Pimville to Diepkloof, Soweto.

The proposed pipeline will comprise of the following specifications:

- 6 km in length buried at a depth of no more than 3 m;
- Welded with High Density Polyethylene (HDPE);
- Internal diameter of 500 mm; and
- Capacity of 231 litres per second.

The site visit to assess the fauna and flora at site along the pipeline route was conducted in November 2014. The pipeline route is situated in the Andesite Mountain Bushveld and Soweto Highveld Grasslands vegetation types. Vegetation was assessed at each point where the pipeline intersected natural habitat. Since vegetation was either sparsely distributed or largely disturbed or modified, conventional botanical survey techniques were not employed. The Rapid Botanical Survey (RBS) method was used, whereby a species list was compiled for each pipeline crossing. Any Species of Special Concern (SSC) would be recorded along with their localities. Any Alien Invasive Plants would be recorded.

The assessed sites are in close proximity to homes and there are human walkways throughout the site. Due to the relatively large anthropogenic footprint, the faunal activity was expected to be low. Although faunal species could be present (but not observed during the survey) the field survey was too brief to ascertain what the faunal diversity was in the study area.

Terrestrial areas were comprised of a grass assemblage including: *Eragrostis chloromelas*, *Hyparrhenia hirta* (Common Thatching Grass), *Lolium perenne* (Perennial Rye Grass) and *Paspalum dilitatum* (Dallis Grass). Forbs included: *Argemone mexicana* (Mexican Poppy), *Berlkeya erithisales*, *Datura stramonium*, *Plantago lanceolata* (Robwort Plantain), *Plantago major* (Broadleaf Plantain) and *Oenothera rosea*. A list of flora occurring along the pipeline route is found in Table 4-1 and Alien Invasive Plants that were present are listed in Table 4-2.

No Red Data mammal species were observed during the field survey. According to relevant faunal literature, 17 mammal species with Red Data designations occurred in the area

previously (IUCN, 2010), (Appendix B), when the habitat was suitable and the threats minimal. None of these species were found during the site investigation, none are they expected to be found in the area of interest. A total of eight bird species were recorded during the survey (Table 4-3). These bird species could rely on the area of interest for nesting sites and water. The artificial habitat created by the alien invasive plant species provides certain functions within the larger modified habitat that is the city of Johannesburg.

The site was found to have low/poor ecological function as the grassland is largely impacted upon and the river system as well. The conservational importance was found to be low due to the large impacts and disturbance the site has experienced. The disjointedness of the area impacts directly on faunal movements and the human populated areas as well.

The pipeline route is situated in an existing servitude that runs through a highly developed urban environment, thus the servitude and surrounding area has been impacted upon already. This places the terrestrial areas along the proposed pipeline route under significant anthropogenic pressure.

The impacts associated with the proposed pipeline, were identified to be during the construction phase. Owing to the poor ecological state of the vegetation along the proposed pipeline route, the presence of plant SCC is deemed as highly unlikely. Further to this, no Faunal SSC were recorded. The impact of the construction of the pipeline is regarded to be low due to a negligible loss of habitat in poor ecological condition.

The operation of the proposed pipeline and potential impacts is considered negligible in the event that the pipeline had to burst and water would escape from the pipeline as this is treated water.

The impacts during the decommissioning phase would be similar to the construction phase impacts. Thus overall impact during this phase would be of a low significance; even potentially a positive impact after rehabilitation has occurred.

It is recommended that concurrent rehabilitation take place, whereby topsoil is replaced over excavated pipeline channels. Re-seeding should include indigenous grass species such as: *Eragrostis* spp. and *Cynodon dactylon* (Couch Grass) and vehicles should be restricted to existing roads where possible to reduce the overall impact on natural vegetation.

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1 Introduction

This report describes the terrestrial biodiversity associated with a proposed water pipeline from Pimville to Diepkloof in Soweto, Gauteng, for Ergo Mining. Biodiversity is defined, according to the National Environmental Management Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA), as “the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems”. The NEMBA legislation upholds the country’s commitment to the protection of South Africa’s biological resources and it is imperative that development takes place in a sustainable way in order to achieve this.

1.1 Locality

The proposed pipeline will travel from Ergo Mining’s Goudkoppies Waste Water Treatment Works (WWTW). The pipeline will start in Pimville, Soweto and end in Diepkloof, Soweto under the Municipality of Johannesburg City in the Gauteng Province. Figure 1-1 shows the local setting of the pipeline and the proposed route the pipeline is to follow.

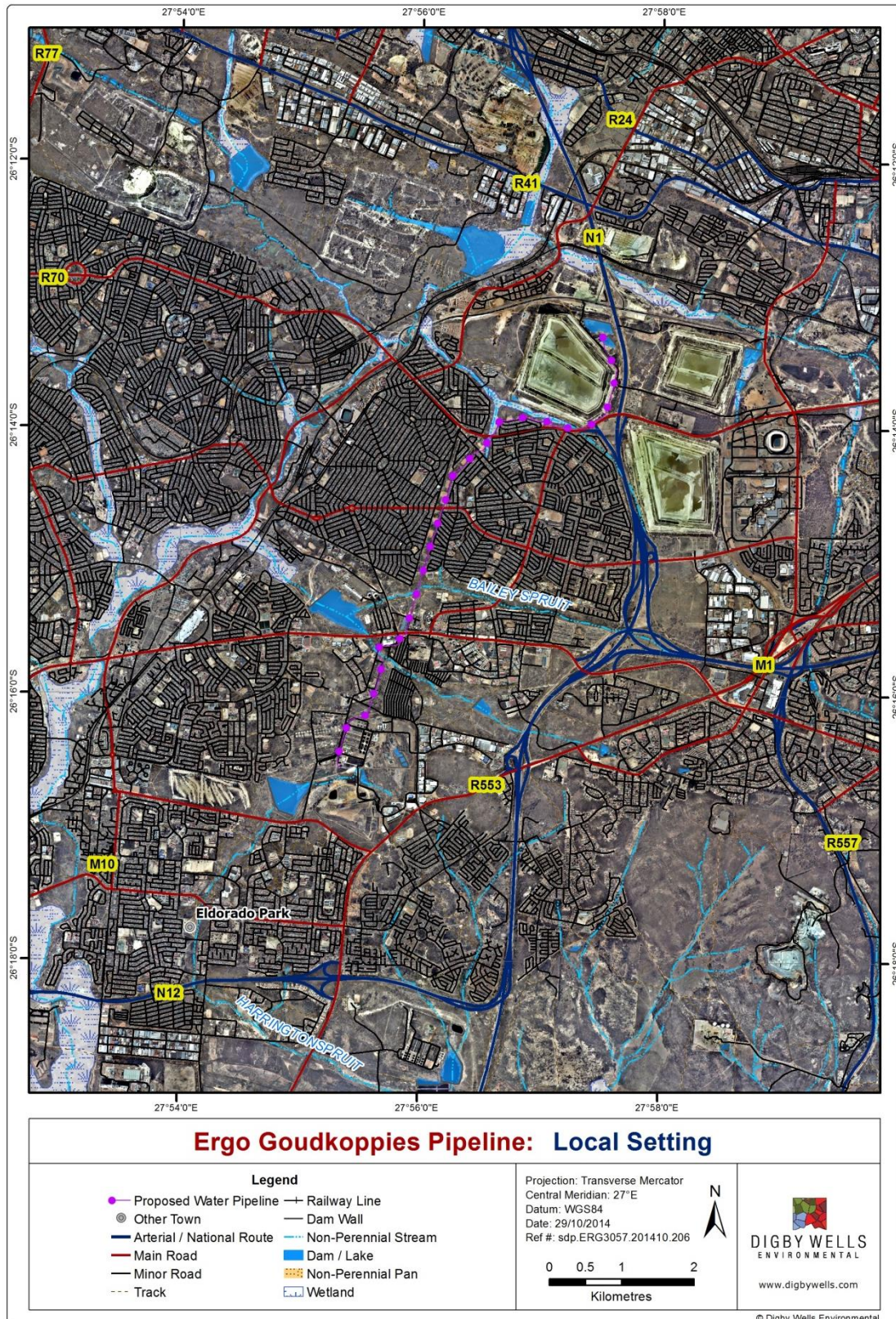


Figure 1-1: The local setting and route of the Goudkoppies Pipeline

1.2 Legal Regulations and Frameworks

The Fauna and Flora Assessment supports the following legal regulations and frameworks:

- International Union for Conservation of Nature (IUCN);
- The National Protected Areas Expansion Strategy;
- The National Vegetation Map (Mucina and Rutherford, 2006);
- The Gauteng C-Plan;
- The National List of Ecosystems that are Threatened and in need of Protection; and
- The National Spatial Biodiversity Assessment.

2 Methodology

2.1 Literature Review and Desktop Study

A desktop study was undertaken, aiming to identify:

- Potential species within the site area according to the South African National Biodiversity Institute (SANBI);
- Potential Red Data species and their current status;
- Expected vegetation type and community structure, (Low & Rebelo, and Mucina & Rutherford 2006); and
- Current Biodiversity and Ecosystem Status.

2.2 Vegetation Analysis

Vegetation was assessed at each point where the pipeline intersected natural habitat. Since vegetation was either sparsely distributed or largely disturbed or modified, conventional botanical survey techniques were not employed. The Rapid Botanical Survey (RBS) method was used, whereby a species list was compiled for each pipeline crossing. Any Species of Special Concern (SSC) were recorded along with their localities. To be fully comprehensive, this list includes plants on each of the following lists:

- South African National Biodiversity Institute (SANBI) Red List of South African plants version 2012.1;
- NEMBA listed species;
- National Forests Act, 1998 (Act No. 84 of 1998) (NFA) Protected Trees; and
- An initial list of SSC expected to be found within the study area comprises Possible Species of Special Concern (PSSC).

The South African Red Data list uses the same criteria as that defined by the IUCN. According to the IUCN all species are classified in nine groups, set through criteria such as

rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation (IUCN, 2010). The categories are described in Table 2-1 below.

Table 2-1: Red Data Categories (IUCN, 2010)

Category		Description
Extinct	(EX)	No known individuals remaining.
Extinct in the Wild	(EW)	Known only to survive in captivity.
Critically Endangered	(CR)	Extremely high risk of extinction in the wild.
Endangered	(EN)	High risk of extinction in the wild
Vulnerable	(VU)	High risk of endangerment in the wild.
Near Threatened	(NT)	Likely to become endangered in the near future.
Least Concern	(LC)	Lowest risk. Does not qualify for a more at risk category. Widespread and abundant taxa are included in this category.
Data Deficient	(DD)	Not enough data to make an assessment of its risk of extinction.
Not Evaluated	(NE)	Has not yet been evaluated against the criteria.

The online IUCN data base was referenced to identify Red Data species and their various threat status categorisations.

In addition, alien invasive species are recorded from each of the sample plots, as well as through opportunistic sightings throughout the study area. Alien invasive species are those that are classified by the Alien and Invasive Species Lists, 2014 published (GN R599 in GG 37886 of 1 August 2014) as part of NEMBA list of the alien weeds or invasive plants. Each of the categories defined by this Act has associated legislated control measures

2.3 Fauna

2.3.1 Mammals

Visual sightings and ecological indications were used to identify the animal inhabitants for the study area; this includes scats, tracks and faunal activity such as burrows, nests and dens. Scats, dropping and spoor were photographed with a scale and identified.

2.3.2 Avifauna

Birds were noted during the survey by call and by sight, slow attentive walks were completed within the available habitat types present on site.

Bird species were confirmed using the South African Bird Atlas Project (SABAP 2014) and Robert's Field guide for Birds of Southern Africa (2009).

2.3.3 Herpetofauna

Reptiles and amphibians were searched for on-site in areas where species would be most likely to occur, such as near water sources and rocky areas and rubble. Branch (2001), Du Preez and Caruthers (2009) and Carruthers (2009) was used to confirm the identification of herpetofauna where necessary.

3 Project Area Description

The study site does not fall within any formally Protected Areas, Important Bird Areas (IBA's) or any areas demarcated for future protected status. The site is situated in an informal residential area, where much of the natural habitat has been altered from its natural state.

3.1 Regional Vegetation

The study area falls within the Soweto Highveld Grassland (Gm8) and Andesite Mountain Bushveld (SVcb11) vegetation units as described by Mucina and Rutherford (2006), Figure 3-1. These vegetation units are characterised by summer rainfall and dry winters, frost occurs in the Soweto Highveld Unit during the winter months.

3.1.1 Soweto Highveld Grassland

The Soweto Highveld Grassland supports short medium to dense vegetation dominated by tufted grasses such as *Themeda triandra*, *Eragrostis racemosa* and *Tristachya leucotrix*, other important taxa are listed in Table 3-1. The soils found with the Soweto Highveld Grassland are shale, sandstone or mudstone originating from the Madziringwe Formation (Karoo Supergroup) with the Karoo Suite dolerites featuring prominently. The south is characterised by Volksrust Formation. This vegetation unit has, as of 2006, close to 50% of its state transformed by agriculture and urban development. A few patches are conserved in the Waldrif, Suikerbosrand, Krugersdorp Nature Reserves.

3.1.2 Andesite Mountain Bushveld

The Andesite Mountain Bushveld is characterised by dense medium to tall shrubs and trees with a grass layer on hill slopes and valleys. Trees that are found in this vegetation unit include trees such as *Acacia caffra*, *A. karroo*, *Celtis africana* and *Protea caffra*, other important taxa are listed in Table 3-1. The soils found are tholeitic basalt of the Kliprivierberg Group (Randian Ventersdorp Supergroup) and also dark shale and thin coal seams of the Madziringwe Formation (andesite and conglomerate of the Pretoria Group). 7% of the unit is conserved mainly in the Suikerbosrand Nature Reserve with much of the unit (15%) already transformed by agriculture and urban development by 2006.

Table 3-1: The Important Flora taxa found with the vegetation units

Soweto Highveld Grassland	Andesite Mountain Bushveld
<p>Graminoids: (grasses and sedges): <i>Andropogon appendiculatis</i>, <i>Brachiaria serrata</i>, <i>Cymbopogon pospischilii</i>, <i>Cynodon dactylon</i>, <i>Elionurus muticus</i>, <i>Eragrostis capensis</i>, <i>Eragrostis chloromelas</i>, <i>Eragrostis curvula</i>, <i>Eragrostis plana</i>, <i>Eragrostis planiculmis</i>, <i>Eragrostis racemosa</i>, <i>Heteropogon contortus</i>, <i>Hyparrhenia hirta</i>, <i>Setaria nigrirostris</i>, <i>Setaria sphacelata</i>, <i>Themeda triandra</i>, <i>Tristachya leucothrix</i>, <i>Andropogon schirensis</i>, <i>Aristida adscensionis</i>, <i>Aristida bipartite</i>, <i>Aristida congesta</i>, <i>Aristida junciformis</i> subsp. <i>galpinii</i>, <i>Cymbopogon caesius</i>, <i>Digitaria diagonalis</i>, <i>Diheteropogon amplexans</i>, <i>Eragrostis micrantha</i>, <i>Eragrostis superba</i>, <i>Harporchloa flax</i>, <i>Microchloa caffra</i>, <i>Paspalum dilatatum</i></p>	<p>Graminoids: <i>Eragrostis curvula</i>, <i>Hyparrhenia hirta</i>, <i>Setaria sphacelata</i>, <i>Themeda triandra</i>, <i>Cymbopogon pospischilii</i>, <i>Digitaria eriantha</i> subsp. <i>eriantha</i>, <i>Elionurus muticus</i>, <i>Eragrostis racemosa</i>, <i>Eragrostis superba</i>, <i>Panicum maximum</i></p>
<p>Forbs: <i>Hermannia depressa</i>, <i>Acalypha angustata</i>, <i>Berkheya setifera</i>, <i>Dicoma anomala</i>, <i>Euryops gilfillanii</i>, <i>Geigeria aspera</i> var. <i>aspera</i>, <i>Graderia subintegra</i>, <i>Haplocarpa scaposa</i>, <i>Helichrysum miconiifolium</i>, <i>Helichrysum nudifolium</i> var. <i>nudifolium</i>, <i>Helichrysum rugulosum</i>, <i>Hibiscus pusillus</i>, <i>Justicia anagalloides</i>, <i>Lippia scaberrima</i>, <i>Rhynchosia effusa</i>, <i>Schistostephium crataegifolium</i>, <i>Selago</i></p>	<p>Forbs: <i>Commelina Africana</i>, <i>Vernonia galpinii</i>, <i>Vernonia oligocephala</i>, <i>Aloe greatheadii</i> var. <i>davyana</i></p>

<p><i>densiflora</i>, <i>Senecio coronatus</i>, <i>Vernonia oligocephala</i>, <i>Wahlenbergia undulata</i>,</p>	
<p>Geophytes: <i>Haemunthus humulis</i> subsp, <i>hirsutus</i>, <i>Haemunthus montanus</i></p>	<p>Shrubs: <i>Asparagus laricinus</i>, <i>Euclea crispa</i> subsp. <i>crispa</i>, <i>Rhus pyroides</i> var. <i>pyroides</i>, <i>Diospyros lyciodes</i> subsp. <i>lyciodes</i>, <i>Gymnosporia polyacantha</i>, <i>Lippia javanica</i>, <i>Rhamnus prinoides</i>, <i>Asparagus suaveolens</i>, <i>Searsia rigida</i> var. <i>margaretae</i>, <i>Teucrium trifidum</i>, <i>Isoglossa grantii</i></p>
<p>Climber: <i>Rhynchosia totta</i>,</p>	<p>Climber: <i>Rhoicissus tridentate</i></p>
<p>Shrubs: <i>Anthospermum hispidulum</i>, <i>Anthospermum rigidum</i> subsp. <i>pumilum</i>, <i>Berkheya annectens</i>, <i>Felicia muricata</i>, <i>Ziziphus zeyheriana</i>.</p>	<p>Trees: <i>Acacia caffra</i>, <i>Acacia karroo</i>, <i>Celtis africana</i>, <i>Protea caffra</i>, <i>Zanthoylum capense</i>, <i>Ziziphus mucronata</i></p>

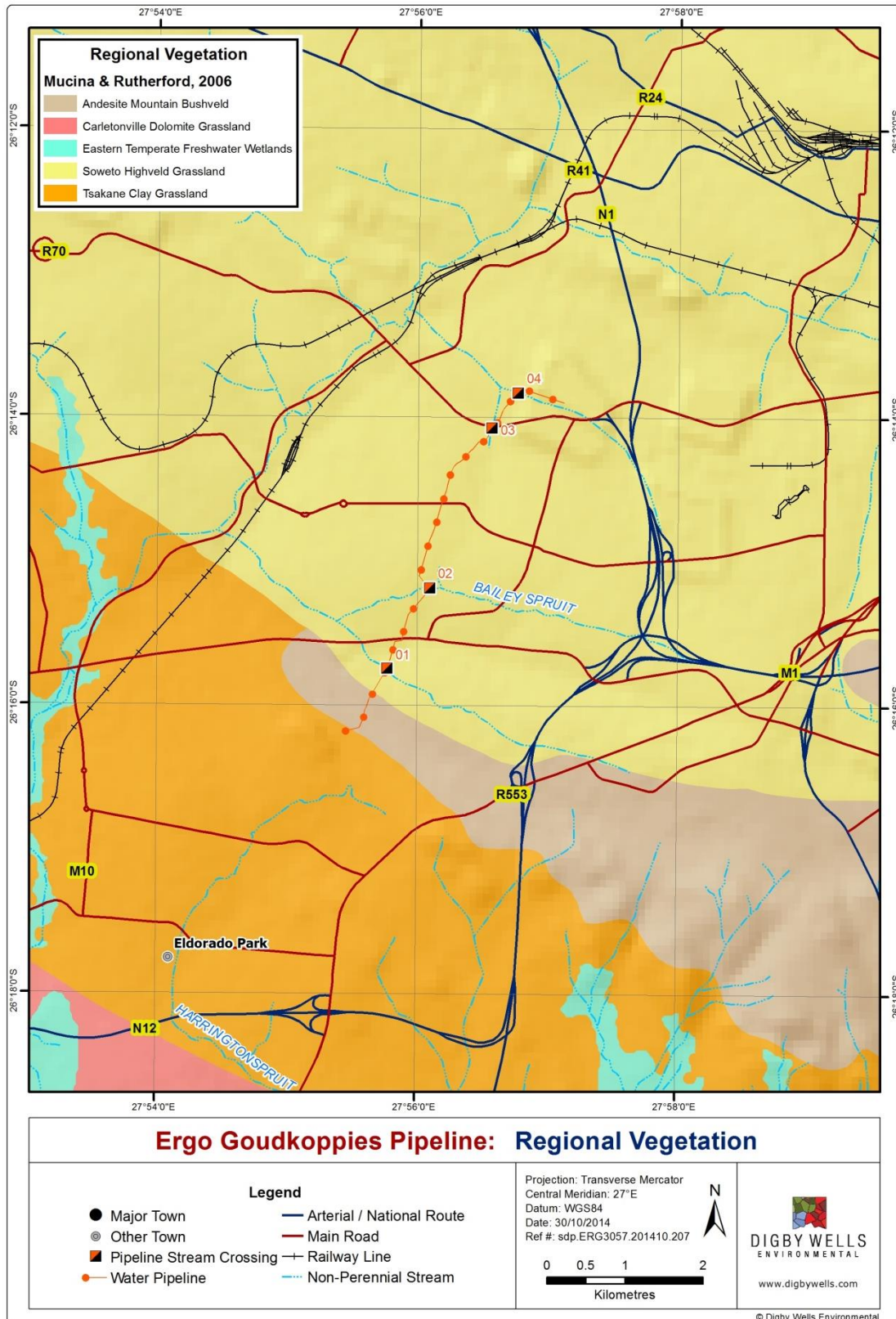


Figure 3-1: The Regional vegetation relative to the pipeline route (Mucina and Rutherford, 2006)

3.2 Sites

The proposed pipeline route was studied at desktop level and it was determined that the areas most likely to be most impacted upon by the proposed activity are the sections of the route that cross wetlands (watercourses) The pipeline follows an existing servitude that is in a highly developed urban environment. Figure 3-2 below indicates the position of the Aquaticassessment site, which were the same sites assessed for the Fauna and FloraAssessment.

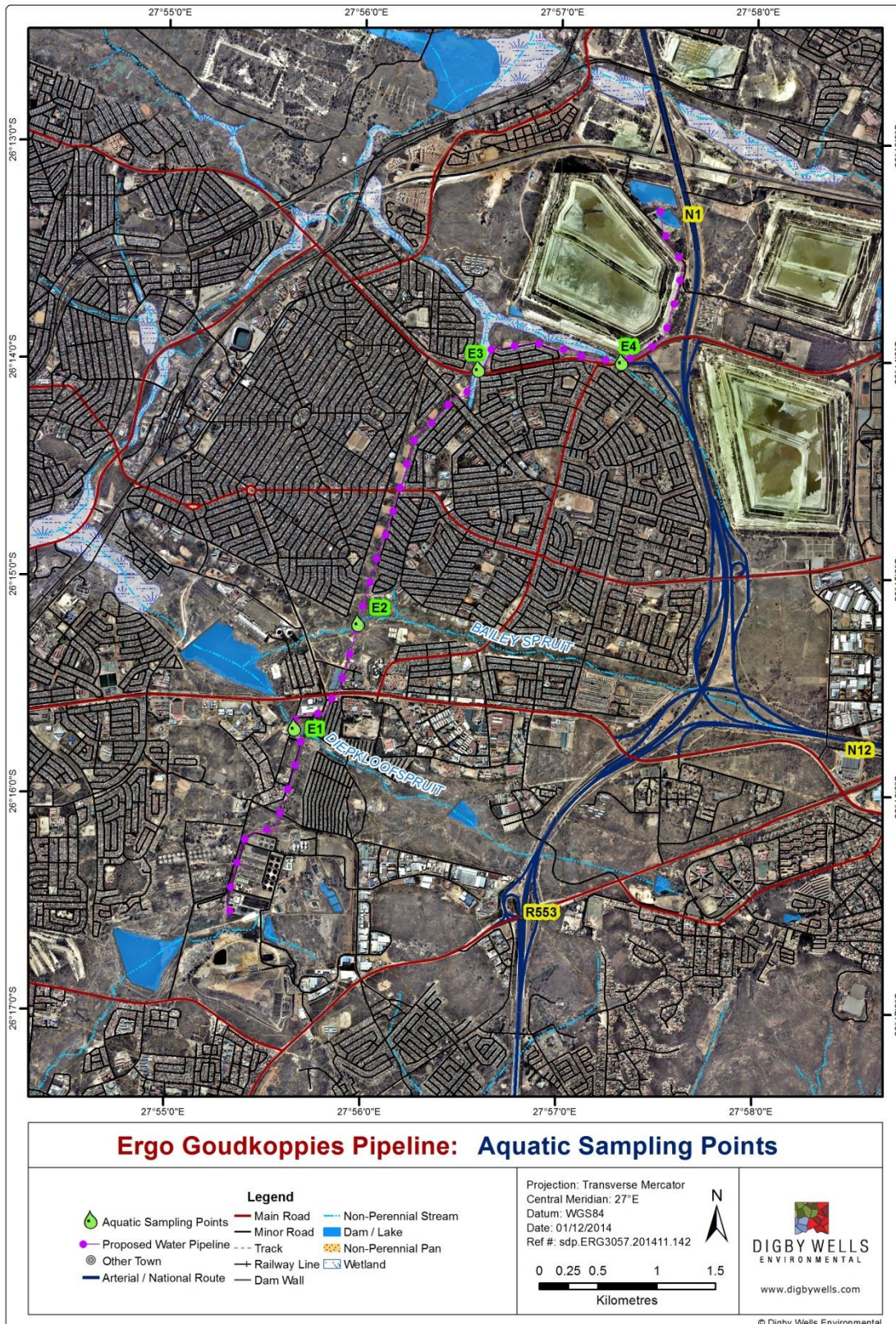


Figure 3-2: Aquatic sampling points where Fauna and Flora were assessed

4 Findings

The fauna and flora survey was conducted in November 2014, which coincides with the beginning of the wet season.

4.1 Vegetation

The proposed pipeline crossing sites that were assessed during the wetland survey had been largely impacted and subsequently modified due to the extensive developments that surround and encroach the natural grassland areas. The site had been largely colonised by alien vegetation that had replaced native species. Wetlands support *Typha capensis* (Giant Bulrush) and *Phragmites australis* (Giant Reed), in the stream channels, as well as *Imperata cylindrica* (Cottonwool Grass), *Juncus effusus* (Common Rush) and *Cyperus* species in seepage zones of wetland flats. The Wetlands Assessment for the Goudkoppies Water Pipeline (Digby Wells 2014) describes the Present Ecological State (PES) of wetlands on site.

Terrestrial areas were comprised of a grass assemblage including: *Eragrostis chloromelas*, *Hyparrhenia hirta* (Common Thatching Grass), *Lolium perenne* (Perennial Rye Grass) and *Paspalum dilatatum* (Dallis Grass). Forbs included: *Argemone mexicana* (Mexican Poppy), *Berkeya erithisales*, *Datura stramonium*, *Plantago lanceolata* (Robwort Plantain), *Plantago major* (Broadleaf Plantain) and *Oenothera rosea*.

Landscape examples of the site are represented in Figure 4-1 and Figure 4-2 and the complete species list is found in Table 4-1.



**Figure 4-1: Vegetation associated with the pipeline route (a) Site E1 (b) Site E2
(c) Site E3 (d) Site E4 (Figure 3-2)**



Figure 4-2: Vegetation of the study area

Table 4-1: Flora Species identified on site

Family	Species	Threat status
ALLIACEAE	<i>Tulbaghia acutiloba</i> Harv.	LC
ALLIACEAE	<i>Tulbaghia leucantha</i> Baker	LC
APIACEAE	<i>Foeniculum vulgare</i> Mill. var. <i>vulgare</i>	Not Evaluated
ASTERACEAE	<i>Conyza</i> spp.	LC
ASTERACEAE	<i>Cosmos bipinnatus</i> Cav.	Not Evaluated
ASTERACEAE	<i>Helichrysum acutatum</i> DC.	LC
ASTERACEAE	<i>Helichrysum athrixiifolium</i> (Kuntze) Moeser	LC
ASTERACEAE	<i>Helichrysum aureonitens</i> Sch.Bip.	LC
ASTERACEAE	<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>monocephalum</i> (DC.) Hilliard	LC
ASTERACEAE	<i>Helichrysum caespitium</i> (DC.) Harv.	LC
ASTERACEAE	<i>Helichrysum callicomum</i> Harv.	LC
ASTERACEAE	<i>Helichrysum cephaloideum</i> DC.	LC
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>oxyphyllum</i> (DC.) Beentje	LC
ASTERACEAE	<i>Helichrysum oreophilum</i> Klatt	LC
ASTERACEAE	<i>Helichrysum paronychioides</i> DC.	LC
ASTERACEAE	<i>Helichrysum polycladum</i> Klatt	LC
ASTERACEAE	<i>Helichrysum rugulosum</i> Less.	LC
ASTERACEAE	<i>Helichrysum setosum</i> Harv.	LC
ASTERACEAE	<i>Helichrysum stenopterum</i> DC.	LC
ASTERACEAE	<i>Seriphium plumosum</i> L.	Not Evaluated
ASTERACEAE	<i>Tagetes minuta</i> L.	Not Evaluated
CYPERACEAE	<i>Cyperus esculentus</i> L. var. <i>esculentus</i>	LC

CYPERACEAE	<i>Cyperus longus</i> L. var. <i>tenuiflorus</i> (Rottb.) Boeck.	LC
CYPERACEAE	<i>Cyperus margaritaceus</i> Vahl var. <i>margaritaceus</i>	LC
CYPERACEAE	<i>Cyperus marginatus</i> Thunb.	LC
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl var. <i>flavissimus</i> (Schrad.) Boeck.	LC
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	LC
CYPERACEAE	<i>Cyperus rupestris</i> Kunth var. <i>rupestris</i>	LC
CYPERACEAE	<i>Cyperus semitrifidus</i> Schrad.	LC
CYPERACEAE	<i>Cyperus sexangularis</i> Nees	LC
CYPERACEAE	<i>Cyperus sphaerospermus</i> Schrad.	LC
CYPERACEAE	<i>Cyperus uitenhagensis</i> (Steud.) C.Archer & Goetgh.	LC
FABACEAE	<i>Indigofera comosa</i> N.E.Br.	LC
FABACEAE	<i>Indigofera zeyheri</i> Spreng. ex Eckl. & Zeyh.	LC
HYACINTHACEAE	<i>Ledebouria revoluta</i> (L.f.) Jessop	LC
PLANTAGINACEAE	<i>Plantago lanceolata</i>	LC
PLANTAGINACEAE	<i>Plantago major</i> L.	Alien
POACEAE	<i>Agrostis lachnantha</i>	LC
POACEAE	<i>Eragrostis chloromelas</i> Steud.	LC
POACEAE	<i>Hyparrhenia hirta</i> (L.) Stapf	LC
POACEAE	<i>Imperata cylindrica</i> (L.) Raeusch.	LC
POACEAE	<i>Pennisetum thunbergii</i> Kunth	LC
POACEAE	<i>Phragmites australis</i> (Cav.) Steud.	LC
POACEAE	<i>Themeda triandra</i> Forssk.	LC
VERBENACEAE	<i>Verbena bonariensis</i> L.	Not Evaluated
VERBENACEAE	<i>Verbena brasiliensis</i> Vell.	Not Evaluated
ASTERACEAE	<i>Argemone mexicana</i>	Alien

AMARANTHACEAE	<i>Amaranthus hybridus</i>	Alien
ONAGRACEAE	<i>Oenothera rosea</i>	Alien
POACEAE	<i>Harpochloa falx</i>	LC
FABACEAE	<i>Sesbania punicea</i>	Alien
SOLANACEAE	<i>Datura stramonium</i>	Alien
APOCYNACEAE	<i>Gomphocarpus fruticosus</i>	LC
POACEAE	<i>Paspalum dilitatum</i>	Alien
ASTERACEAE	<i>Hilliardiella oligocephala</i>	LC
RUBIACEAE	<i>Richardia brasiliensis</i>	Alien
MELIACEAE	<i>Melia azederach</i>	Alien
TYPHACEAE	<i>Typha capensis</i>	LC
JUNCACEAE	<i>Juncus effusus</i>	LC
ASTERACEAE	<i>Berkeya erithisales</i>	Alien
AZOLLACEAE	<i>Azolla filiculoides</i>	Alien
POACEAE	<i>Perotis patens</i>	LC



Figure 4-3: Flora Species identified on site (a) *Eragrostis chloromelas* (b) *Cyperus esculentus* (c) *Sesbania puniceus* Alien Invasive Plants

Alien plants are considered to be non-native plants that invade formerly pristine environments (Bromilow 2010). Invasions by alien plants cause a change in the composition and functioning of ecosystems and delivery of ecosystem services (Wilgen and de Lange 2011). If alien invasive species are not controlled, they exhibit the ability to transform heterogeneous landscapes to homogenous, often dominated by single species or scattered mono-specific clumps, thereby replacing natural vegetation. Further to this, alien bushclumps can alter hydraulic properties, such as infestations of *Pinus* in the Fynbos biome, rendering a water deficit for native plants in the area (Foxcroft 2002). In 2002, the estimated area of alien plant cover in South Africa was 10 million ha, which resulted in an

annual water use of 3.3 billion m³ in excess of natural vegetation (Wilgen and de Lange 2011). Although this is a preliminary estimate, based on desktop studies, it is a good indication of the water losses that incur due to alien plant invasion.

Alien plant species in South Africa have been classified according to NEMBA, as published in August 2014 (GN R599 in GG 37886 of 1 August 2014) into the following categories:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

Alien invasive plants were identified on site in abundance, especially *Argemone ochroleuca* and *Eucalyptus camaldulensis* (Figure 4-4). The other identified alien invasives are shown in Table 4-2 below:

Table 4-2: Alien Invasive Plants identified on site

Family	Species	Category
FABACEAE	<i>Acacia mearnsii</i>	2
MYRTACEAE	<i>Eucalyptus camaldulensis</i>	1b
PAPAVERACEAE	<i>Argemone ochroleuca</i>	1b
SOLANACEAE	<i>Datura ferox</i>	1b
SOLANACEAE	<i>Datura stramonium</i>	1b
SOLANACEAE	<i>Solanum mauritianum</i>	1b



**Figure 4-4: Alien Invasive Plants identified on site (a) *Argemone orchuluca*
(b) *Eucalyptus camaldulensis***

4.2 Fauna

As aforementioned, the proposed pipeline route is located in a densely populated area in southern Johannesburg (Soweto). The assessed sites are in close proximity to homes and there are human walkways throughout the site. Due to the relatively large anthropogenic footprint, the faunal activity was expected to be low. Although faunal species could be present (but not observed during the survey) the field survey was too brief to ascertain what the faunal diversity was in the study area.

4.2.1 Mammals

4.2.1.1 Mammal desktop study

The pipeline route is situated in a highly disturbed area which does not resemble the vegetation type originally present on the site. The placing of the slimes dams on the natural occurring vegetation effectively removed the vegetation and created favourable habitat for alien invasive plant species that readily colonise open or disturbed areas. From this premise the assumption was made that very little animal life will be found.

4.2.1.2 Mammals observed and recorded in the area

No mammals were observed in the area or the vicinity of the pipeline or slimes dam with no evidence of the presence of any mammal species found. Feral dogs were spotted and this may have had a negative impact on naturally occurring species.

4.2.1.3 Red Data mammal species

No Red Data mammal species were observed during the field survey. According to relevant faunal literature, 17 mammal species with Red Data designations occurred in the area previously (IUCN, 2010), (Appendix B), when the habitat was suitable and the threats minimal. None of these species were found during the site investigation, nor are they expected to be found in the area of interest.

4.2.2 Birds

4.2.2.1 Bird desktop study

A list of all the birds that could possibly be found in the area is provided in Appendix B. The SABAP2 lists 351 species for grid reference 2627BB and 2627BD, however the likelihood of most of these species to be present on the site is highly unlikely due to its severely modified state. This list is compiled using historical data and recorded sightings for the entire grid which does include some natural areas. A total of 56 endemic or near endemic species was contained in the list. Most of the endemic or Red Data species listed will not be found at this site due to a high level of human activity and disturbances in the area.

4.2.2.2 Birds observed and recorded in the area

A total of eight bird species were recorded during the survey (Table 4-3). These bird species could rely on the area of interest for nesting sites and water. The artificial habitat created by the alien invasive plant species provides certain functions within the larger modified habitat that is the city of Johannesburg.

Table 4-3: Bird species recorded during the survey

English Name	Scientific Name	Endemic Status
Bishop, Southern Red	<i>Euplectes orix</i>	Not Endemic
Egret, Cattle	<i>Bubulcus ibis</i>	Not Endemic
Heron, Black-headed	<i>Ardea melanocephala</i>	Not Endemic
Ibis, African Sacred	<i>Threskiornis aethiopicus</i>	Not Endemic
Ibis, Hadedda	<i>Bostrychia hagedash</i>	Not Endemic
Masked-Weaver, Southern	<i>Ploceus velatus</i>	Not Endemic
Myna, Common	<i>Acridotheres tristis</i>	Not Endemic
Stonechat, African	<i>Saxicola torquatus</i>	Not Endemic

4.2.2.3 Red Data birds

No rare or endangered species were observed during the avifaunal survey. As the study areas are largely disturbed it is highly unlikely that any rare bird species are present. However, one cannot discount the occasional vagrant species flying over the area of interest.

4.2.3 Reptiles and Amphibians

4.2.3.1 Desktop assessment

Although no species of reptiles or amphibians were recorded during the survey, one near threatened species that could possibly be found in the area (Appendix D) *Homoroselaps dorsalis* (Striped Harlequin Snake) is listed as in Branch (2001).

The characterisation of the ecological state with regards to the fauna present was completed by assessing the presence of each of the following species, these species and their expected and encountered numbers are displayed in Table 4-4.

Table 4-4: Status of fauna

Species	Possible	Found	Status
Mammals	24	0	Poor
Birds	351	8	Poor
Reptiles	49	0	Poor
Amphibians	16	0	Poor

As can be seen from the status of the fauna present in Table 4-4, the expected species were not encountered, this is primarily due to the current habitat present on the area of concern and the surrounding land use, which has been impacted on by anthropogenic pressures for a very long time. The fact that no mammal, reptile or amphibian species were encountered in the area of concern is indicative of the prevalent habitat and the existing impacts.

4.3 Sensitivity Assessment

The sensitivity assessment investigated the ecological function and conservational importance of the study area. The site was found to have low/poor ecological function as the grassland is largely impacted upon and the river system as well. The conservational importance was found to be low due to the large impacts and disturbance the site has experienced. The disjointedness of the area impacts directly on faunal movements and the human populated areas as well.

5 Impact Assessment

5.1 Current Impacts

The pipeline route is currently largely impacted by human wastes and pollution that leads to a loss in species diversity and ecological disturbance. Examples of current impacts are represented in Figure 5-1.



Figure 5-1: The current impacts on the grasslands (a) and (b) human pollution

5.2 Impacts of the proposed pipeline

The impacts associated with the proposed pipeline, were identified to be during the construction/installation phase. The operational phase of the pipeline will have negligible impacts. Owing to the poor ecological state of the vegetation along the proposed pipeline route, the presence of plant SSC is deemed as highly unlikely. Further to this, no Faunal SSC were recorded. The impact of the construction of the pipeline is regarded to be low due to a negligible loss of habitat in poor ecological condition.

5.2.1 Mitigation and Management Measures

It is recommended that concurrent rehabilitation take place, whereby topsoil is replaced over excavated pipeline channels. Re-seeding should include indigenous grass species such as: *Eragrostis* spp. and *Cynodon dactylon* (Couch Grass); to limit the establishment of alien invasive plants within the area.

Vehicles should be restricted to existing roads where possible to reduce the overall impact on natural vegetation.

Table 5-1 lists the major impacts identified during the installation phase:

Table 5-1: Major impacts brought by pipeline upon the grassland

Impact 1	Direct loss of vegetation				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Construction Phase					
Pre-mitigation	Minor (2)	Local (3)	Immediate (1)	Likely(5)	Low (30)
Post-mitigation	Reduce impact footprint area as far as possible				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Impact 2					
Increased erosion					
Construction Phase					
Pre-mitigation	Moderate(3)	Municipal Area (4)	Immediate (1)	Unlikely(3)	Low (24)
Post-mitigation	None				

6 Discussion

The study area is situated in the Andesite Mountain Bushveld and Soweto Highveld Grasslands vegetation types. Owing to large-scale disturbance related to agriculture, development and mine dumps, vegetation in the study area has undergone considerable transformation from its original state. The vegetation associated is no longer representative of the regional vegetation types and is in a transformed state. Alien invasion was found to be prolific and plant diversity was low.

The grasslands are dominated by the *P. thunbergii* grass and pollution from human activities is scattered all along the stream system. A network of walkways is also visible in the grasslands.

Ergo Mining has proposed to install an underground treated water pipeline along existing servitude. The anticipated impact due to this is direct loss of vegetation along the pipeline route, through digging of trenches and workforce. Rehabilitation measures should be implemented during and post installation of the pipeline to ensure revegetation and avoid the risk of erosion. The overall impact however is regarded to be low since the habitat on site is in a poor ecological state.

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Appendix A: Possible Plant Species



Family	Species	Threat status
ACANTHACEAE	<i>Barleria macrostegia</i> Nees	LC
ACANTHACEAE	<i>Barleria obtusa</i> Nees	LC
ACANTHACEAE	<i>Blepharis innocua</i> C.B.Clarke	LC
ACANTHACEAE	<i>Blepharis squarrosa</i> (Nees) T.Anderson	LC
ACANTHACEAE	<i>Blepharis stainbankiae</i> C.B.Clarke	LC
ACANTHACEAE	<i>Chaetacanthus costatus</i> Nees	LC
ACANTHACEAE	<i>Hypoestes forskoolii</i> (Vahl) R.Br.	LC
ACHARIACEAE	<i>Kiggelaria africana</i> L.	LC
ALISMATACEAE	<i>Alisma plantago-aquatica</i> L.	Not Evaluated
ALLIACEAE	<i>Tulbaghia acutiloba</i> Harv.	LC
ALLIACEAE	<i>Tulbaghia leucantha</i> Baker	LC
AMARANTHACEAE	<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Not Evaluated
AMARANTHACEAE	<i>Aerva leucura</i> Moq.	LC
AMARANTHACEAE	<i>Amaranthus hybridus</i> L. subsp. <i>hybridus</i> var. <i>hybridus</i>	Not Evaluated
AMARANTHACEAE	<i>Cyathula uncinulata</i> (Schrad.) Schinz	LC
AMARANTHACEAE	<i>Gomphrena celosioides</i> Mart.	Not Evaluated
AMARANTHACEAE	<i>Guilleminea densa</i> (Willd. ex Roem. & Schult.) Moq.	Not Evaluated
AMARANTHACEAE	<i>Pupalia lappacea</i> (L.) A.Juss. var. <i>lappacea</i>	LC
AMARYLLIDACEAE	<i>Boophone disticha</i> (L.f.) Herb.	Declining
AMARYLLIDACEAE	<i>Crinum graminicola</i> I.Verd.	LC
AMARYLLIDACEAE	<i>Haemanthus humilis</i> Jacq. subsp. <i>hirsutus</i> (Baker) Snijman	LC
AMARYLLIDACEAE	<i>Nerine angustifolia</i> (Baker) Baker	LC
AMARYLLIDACEAE	<i>Scadoxus puniceus</i> (L.) Friis & Nordal	LC
ANACARDIACEAE	<i>Lannea edulis</i> (Sond.) Engl. var. <i>edulis</i>	LC
ANACARDIACEAE	<i>Ozoroa paniculosa</i> (Sond.) R.& A.Fern. var. <i>paniculosa</i>	LC
ANACARDIACEAE	<i>Schinus molle</i> L.	Not Evaluated
ANACARDIACEAE	<i>Searsia dentata</i> (Thunb.) F.A.Barkley	LC



Family	Species	Threat status
ANACARDIACEAE	<i>Searsia discolor</i> (E.Mey. ex Sond.) Moffett	LC
ANACARDIACEAE	<i>Searsia leptodictya</i> (Diels) T.S.Yi, A.J.Mill. & J.Wen forma <i>leptodictya</i>	Not Evaluated
ANACARDIACEAE	<i>Searsia magalismontana</i> (Sond.) Moffett subsp. <i>magalismontana</i>	LC
ANACARDIACEAE	<i>Searsia pyroides</i> (Burch.) Moffett var. <i>integrifolia</i> (Engl.) Moffett	LC
ANACARDIACEAE	<i>Searsia pyroides</i> (Burch.) Moffett var. <i>pyroides</i>	LC
ANACARDIACEAE	<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>dentata</i> (Engl.) Moffett	LC
ANACARDIACEAE	<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>margaretae</i> (Burt Davy ex Moffett) Moffett	LC
ANACARDIACEAE	<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>rigida</i>	LC
ANACARDIACEAE	<i>Searsia zeyheri</i> (Sond.) Moffett	LC
ANEMACEAE	<i>Mohria vestita</i> Baker	LC
ANTHERICACEAE	<i>Chlorophytum bowkeri</i> Baker	LC
ANTHERICACEAE	<i>Chlorophytum cooperi</i> (Baker) Nordal	LC
ANTHERICACEAE	<i>Chlorophytum fasciculatum</i> (Baker) Kativu	LC
ANTHERICACEAE	<i>Chlorophytum fasciculatum</i> (Baker) Kativu	LC
APIACEAE	<i>Afroscidium magalimontanum</i> (Sond.) P.J.D.Winter	LC
APIACEAE	<i>Centella asiatica</i> (L.) Urb.	LC
APIACEAE	<i>Cyclosporum leptophyllum</i> (Pers.) Sprague ex Britton & P.Wilson	Not Evaluated
APIACEAE	<i>Foeniculum vulgare</i> Mill. var. <i>vulgare</i>	Not Evaluated



Family	Species	Threat status
APIACEAE	<i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schtdl. var. <i>abyssinica</i> (Hochst. ex A.Rich.) H.Wolff	LC
APOCYNACEAE	<i>Acokanthera oppositifolia</i> (Lam.) Codd	LC
APOCYNACEAE	<i>Ancylobotrys capensis</i> (Oliv.) Pichon	LC
APOCYNACEAE	<i>Araujia sericifera</i> Brot.	Not Evaluated
APOCYNACEAE	<i>Asclepias adscendens</i> (Schltr.) Schltr.	LC
APOCYNACEAE	<i>Asclepias adscendens</i> (Schltr.) Schltr.	LC
APOCYNACEAE	<i>Asclepias albens</i> (E.Mey.) Schltr.	LC
APOCYNACEAE	<i>Asclepias aurea</i> (Schltr.) Schltr.	LC
APOCYNACEAE	<i>Asclepias brevipes</i> (Schltr.) Schltr.	LC
APOCYNACEAE	<i>Asclepias eminens</i> (Harv.) Schltr.	LC
APOCYNACEAE	<i>Asclepias eminens</i> (Harv.) Schltr.	LC
APOCYNACEAE	<i>Asclepias fallax</i> (Schltr.) Schltr.	LC
APOCYNACEAE	<i>Asclepias stellifera</i> Schltr.	LC
APOCYNACEAE	<i>Aspidoglossum biflorum</i> E.Mey.	LC
APOCYNACEAE	<i>Aspidoglossum lamellatum</i> (Schltr.) Kupicha	LC
APOCYNACEAE	<i>Aspidoglossum ovalifolium</i> (Schltr.) Kupicha	LC
APOCYNACEAE	<i>Brachystelma chloranthum</i> (Schltr.) Peckover	LC
APOCYNACEAE	<i>Brachystelma nanum</i> (Schltr.) N.E.Br.	LC
APOCYNACEAE	<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	LC
APOCYNACEAE	<i>Ceropegia rendallii</i> N.E.Br.	LC
APOCYNACEAE	<i>Cryptolepis oblongifolia</i> (Meisn.) Schltr.	LC
APOCYNACEAE	<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>decipiens</i> (N.E.Br.) Goyder & Nicholas	LC
APOCYNACEAE	<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>fruticosus</i>	LC
APOCYNACEAE	<i>Nerium oleander</i> L.	Not Evaluated



Family	Species	Threat status
APOCYNACEAE	<i>Orbea lutea</i> (N.E.Br.) Bruyns subsp. <i>lutea</i>	LC
APOCYNACEAE	<i>Pachycarpus schinzianus</i> (Schltr.) N.E.Br.	LC
APOCYNACEAE	<i>Parapodium costatum</i> E.Mey.	LC
APOCYNACEAE	<i>Raphionacme galpinii</i> Schltr.	LC
APOCYNACEAE	<i>Raphionacme hirsuta</i> (E.Mey.) R.A.Dyer	LC
APOCYNACEAE	<i>Riocreuxia polyantha</i> Schltr.	LC
APOCYNACEAE	<i>Secamone alpini</i> Schult.	LC
APOCYNACEAE	<i>Sisyranthus randii</i> S.Moore	LC
APOCYNACEAE	<i>Stapelia gigantea</i> N.E.Br.	LC
APOCYNACEAE	<i>Vinca major</i> L.	Not Evaluated
APOCYNACEAE	<i>Xysmalobium undulatum</i> (L.) Aiton f. var. <i>undulatum</i>	LC
AQUIFOLIACEAE	<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining
ARALIACEAE	<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>paniculata</i>	LC
ARALIACEAE	<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>sinuata</i> (Reyneke & Kok) De Winter	LC
ARALIACEAE	<i>Hydrocotyle verticillata</i> Thunb.	LC
ASPARAGACEAE	<i>Asparagus africanus</i> Lam.	LC
ASPARAGACEAE	<i>Asparagus angusticladus</i> (Jessop) J.-P.Lebrun & Stork	LC
ASPARAGACEAE	<i>Asparagus asparagoides</i> (L.) Druce	LC
ASPARAGACEAE	<i>Asparagus cooperi</i> Baker	LC
ASPARAGACEAE	<i>Asparagus flavicaulis</i> (Oberm.) Fellingham & N.L.Mey. subsp. <i>flavicaulis</i>	LC
ASPARAGACEAE	<i>Asparagus larycinus</i> Burch.	LC
ASPARAGACEAE	<i>Asparagus setaceus</i> (Kunth) Jessop	LC
ASPARAGACEAE	<i>Asparagus suaveolens</i> Burch.	LC
ASPARAGACEAE	<i>Asparagus virgatus</i> Baker	LC
ASPHODELACEAE	<i>Aloe arborescens</i> Mill.	LC
ASPHODELACEAE	<i>Aloe cryptopoda</i> Baker	LC
ASPHODELACEAE	<i>Aloe greatheadii</i> Schönland var. <i>davyana</i> (Schönland) Glen & D.S.Hardy	LC



Family	Species	Threat status
ASPHODELACEAE	<i>Aloe verecunda</i> Pole-Evans	LC
ASPHODELACEAE	<i>Bulbine capitata</i> Poelln.	LC
ASPHODELACEAE	<i>Bulbine favosa</i> (Thunb.) Schult. & Schult.f	LC
ASPHODELACEAE	<i>Chortolirion angolense</i> (Baker) A.Berger	LC
ASPHODELACEAE	<i>Kniphofia ensifolia</i> Baker subsp. <i>ensifolia</i>	LC
ASPHODELACEAE	<i>Kniphofia porphyrantha</i> Baker	LC
ASPHODELACEAE	<i>Trachyandra asperata</i> Kunth var. <i>swaziensis</i> Oberm.	LC
ASPHODELACEAE	<i>Trachyandra saltii</i> (Baker) Oberm. var. <i>saltii</i>	LC
ASPLENIACEAE	<i>Asplenium aethiopicum</i> (Burm.f.) Bech.	LC
ASPLENIACEAE	<i>Asplenium capense</i> (Kunze) Bir, Fraser-Jenk. & Lovis	LC
ASTERACEAE	<i>Acanthospermum australe</i> (Loefl.) Kuntze	Not Evaluated
ASTERACEAE	<i>Adenostemma caffrum</i> DC.sens.lat.	LC
ASTERACEAE	<i>Artemisia afra</i> Jacq. ex Willd. var. <i>afra</i>	LC
ASTERACEAE	<i>Aster harveyanus</i> Kuntze	LC
ASTERACEAE	<i>Aster peglerae</i> Bolus	LC
ASTERACEAE	<i>Aster squamatus</i> (Spreng.) Hieron.	Not Evaluated
ASTERACEAE	<i>Athrixia elata</i> Sond.	LC
ASTERACEAE	<i>Berkheya insignis</i> (Harv.) Thell.	LC
ASTERACEAE	<i>Berkheya radula</i> (Harv.) De Wild.	LC
ASTERACEAE	<i>Berkheya seminivea</i> Harv. & Sond.	LC
ASTERACEAE	<i>Berkheya setifera</i> DC.	LC
ASTERACEAE	<i>Berkheya speciosa</i> (DC.) O.Hoffm. subsp. <i>lanceolata</i> Roessler	LC
ASTERACEAE	<i>Berkheya zeyheri</i> Oliv. & Hiern subsp. <i>zeyheri</i>	LC
ASTERACEAE	<i>Bidens bipinnata</i> L.	Not Evaluated
ASTERACEAE	<i>Bidens pilosa</i> L.	Not Evaluated



Family	Species	Threat status
ASTERACEAE	<i>Brachylaena rotundata</i> S.Moore	LC
ASTERACEAE	<i>Callilepis leptophylla</i> Harv.	Declining
ASTERACEAE	<i>Campuloclinium macrocephalum</i> (Less.) DC.	Not Evaluated
ASTERACEAE	<i>Cichorium intybus</i> L. subsp. <i>intybus</i>	Not Evaluated
ASTERACEAE	<i>Cineraria albicans</i> N.E.Br.	LC
ASTERACEAE	<i>Cineraria austrotransvaalensis</i> Cron	NT
ASTERACEAE	<i>Cineraria lobata</i> L'Hér. subsp. <i>lobata</i>	LC
ASTERACEAE	<i>Cineraria longipes</i> S.Moore	VU
ASTERACEAE	<i>Cirsium vulgare</i> (Savi) Ten.	Not Evaluated
ASTERACEAE	<i>Conyza podocephala</i> DC.	LC
ASTERACEAE	<i>Conyza scabrida</i> DC.	LC
ASTERACEAE	<i>Cosmos bipinnatus</i> Cav.	Not Evaluated
ASTERACEAE	<i>Cotula hispida</i> (DC.) Harv.	LC
ASTERACEAE	<i>Cotula nigellifolia</i> (DC.) K.Bremer & Humphries var. <i>nigellifolia</i>	LC
ASTERACEAE	<i>Crassocephalum x picridifolium</i> (DC.) S.Moore	Not Evaluated
ASTERACEAE	<i>Dicoma anomala</i> Sond. subsp. <i>gerrardii</i> (Harv. ex F.C.Wilson) S.Ortiz & Rodr.Oubiña	LC
ASTERACEAE	<i>Dimorphotheca spectabilis</i> Schltr.	LC
ASTERACEAE	<i>Euryops laxus</i> (Harv.) Burt Davy	LC
ASTERACEAE	<i>Euryops transvaalensis</i> Klatt subsp. <i>transvaalensis</i>	LC
ASTERACEAE	<i>Felicia fruticosa</i> (L.) G.Nicholson subsp. <i>brevipedunculata</i> (Hutch.) Grau	LC
ASTERACEAE	<i>Felicia muricata</i> (Thunb.) Nees subsp. <i>muricata</i>	LC
ASTERACEAE	<i>Galinsoga parviflora</i> Cav.	Not Evaluated
ASTERACEAE	<i>Gazania krebsiana</i> Less. subsp. <i>serrulata</i> (DC.) Roessler	LC
ASTERACEAE	<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>intermedia</i> (S.Moore) Merxm.	LC



Family	Species	Threat status
ASTERACEAE	<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>zeyheri</i> (Harv.) Merxm.	LC
ASTERACEAE	<i>Gerbera ambigua</i> (Cass.) Sch.Bip.	LC
ASTERACEAE	<i>Gerbera piloselloides</i> (L.) Cass.	LC
ASTERACEAE	<i>Haplocarpha scaposa</i> Harv.	LC
ASTERACEAE	<i>Helichrysum acutatum</i> DC.	LC
ASTERACEAE	<i>Helichrysum athrixiifolium</i> (Kuntze) Moeser	LC
ASTERACEAE	<i>Helichrysum aureonitens</i> Sch.Bip.	LC
ASTERACEAE	<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>monocephalum</i> (DC.) Hilliard	LC
ASTERACEAE	<i>Helichrysum caespititium</i> (DC.) Harv.	LC
ASTERACEAE	<i>Helichrysum callicomum</i> Harv.	LC
ASTERACEAE	<i>Helichrysum cephaloideum</i> DC.	LC
ASTERACEAE	<i>Helichrysum cerastioides</i> DC. var. <i>cerastioides</i>	LC
ASTERACEAE	<i>Helichrysum chionosphaerum</i> DC.	LC
ASTERACEAE	<i>Helichrysum difficile</i> Hilliard	LC
ASTERACEAE	<i>Helichrysum lepidissimum</i> S.Moore	LC
ASTERACEAE	<i>Helichrysum mundtii</i> Harv.	LC
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>oxyphyllum</i> (DC.) Beentje	LC
ASTERACEAE	<i>Helichrysum oreophilum</i> Klatt	LC
ASTERACEAE	<i>Helichrysum paronychioides</i> DC.	LC
ASTERACEAE	<i>Helichrysum polycladum</i> Klatt	LC
ASTERACEAE	<i>Helichrysum rugulosum</i> Less.	LC
ASTERACEAE	<i>Helichrysum setosum</i> Harv.	LC
ASTERACEAE	<i>Helichrysum stenopterum</i> DC.	LC
ASTERACEAE	<i>Hilliardiella aristata</i> (DC.) H.Rob.	LC
ASTERACEAE	<i>Hilliardiella hirsuta</i> (DC.) H.Rob.	LC



Family	Species	Threat status
ASTERACEAE	<i>Hypochoeris microcephala</i> (Sch.Bip.) <i>Cabrera</i> var. <i>albiflora</i> (Kuntze) Cabrera	Not Evaluated
ASTERACEAE	<i>Hypochoeris radicata</i> L.	Not Evaluated
ASTERACEAE	<i>Lactuca inermis</i> Forssk.	LC
ASTERACEAE	<i>Laggera crispata</i> (Vahl) Hepper & J.R.I.Wood	LC
ASTERACEAE	<i>Lopholaena coriifolia</i> (Sond.) E.Phillips & C.A.Sm.	LC
ASTERACEAE	<i>Macledium zeyheri</i> (Sond.) S.Ortiz subsp. <i>zeyheri</i>	LC
ASTERACEAE	<i>Nidorella anomala</i> Steetz	LC
ASTERACEAE	<i>Nidorella hottentotica</i> DC.	LC
ASTERACEAE	<i>Nolletia rarifolia</i> (Turcz.) Steetz	LC
ASTERACEAE	<i>Osteospermum muricatum</i> E.Mey. ex DC. subsp. <i>muricatum</i>	LC
ASTERACEAE	<i>Othonna natalensis</i> Sch.Bip.	LC
ASTERACEAE	<i>Pentzia monocephala</i> S.Moore	LC
ASTERACEAE	<i>Phymaspermum athanasioides</i> (S.Moore) Källersjö	LC
ASTERACEAE	<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & B.L.Burt	
ASTERACEAE	<i>Pseudognaphalium oligandrum</i> (DC.) Hilliard & B.L.Burt	LC
ASTERACEAE	<i>Pulicaria scabra</i> (Thunb.) Druce	LC
ASTERACEAE	<i>Schistostephium crataegifolium</i> (DC.) Fenzl ex Harv.	LC
ASTERACEAE	<i>Schistostephium heptalobum</i> (DC.) Oliv. & Hiern	LC
ASTERACEAE	<i>Schkuhria pinnata</i> (Lam.) Kuntze ex Thell.	Not Evaluated
ASTERACEAE	<i>Senecio affinis</i> DC.	LC
ASTERACEAE	<i>Senecio consanguineus</i> DC.	LC
ASTERACEAE	<i>Senecio coronatus</i> (Thunb.) Harv.	LC
ASTERACEAE	<i>Senecio erubescens</i> Aiton var. <i>erubescens</i>	LC
ASTERACEAE	<i>Senecio glanduloso-pilosus</i> Volkens & Muschl.	LC
ASTERACEAE	<i>Senecio gregatus</i> Hilliard	LC
ASTERACEAE	<i>Senecio harveianus</i> MacOwan	LC



Family	Species	Threat status
ASTERACEAE	<i>Senecio hieracioides</i> DC.	LC
ASTERACEAE	<i>Senecio inaequidens</i> DC.	LC
ASTERACEAE	<i>Senecio inornatus</i> DC.	LC
ASTERACEAE	<i>Senecio isatideus</i> DC.	LC
ASTERACEAE	<i>Senecio laevigatus</i> Thunb. var. <i>integrifolius</i> Harv.	LC
ASTERACEAE	<i>Senecio laevigatus</i> Thunb. var. <i>laevigatus</i>	LC
ASTERACEAE	<i>Senecio lydenburgensis</i> Hutch. & Burt Davy	LC
ASTERACEAE	<i>Senecio othonniflorus</i> DC.	LC
ASTERACEAE	<i>Senecio oxyriifolius</i> DC. subsp. <i>oxyriifolius</i>	LC
ASTERACEAE	<i>Senecio scitus</i> Hutch. & Burt Davy	LC
ASTERACEAE	<i>Senecio venosus</i> Harv.	LC
ASTERACEAE	<i>Seriphium plumosum</i> L.	Not Evaluated
ASTERACEAE	<i>Sonchus dregeanus</i> DC.	LC
ASTERACEAE	<i>Sonchus integrifolius</i> Harv. var. <i>integrifolius</i>	LC
ASTERACEAE	<i>Sonchus oleraceus</i> L.	Not Evaluated
ASTERACEAE	<i>Tagetes minuta</i> L.	Not Evaluated
ASTERACEAE	<i>Taraxacum officinale</i> Weber	Not Evaluated
ASTERACEAE	<i>Tarhonanthus camphoratus</i> L.	LC
ASTERACEAE	<i>Tarhonanthus parvicapitulatus</i> P.P.J.Herman	LC
ASTERACEAE	<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	Not Evaluated
ASTERACEAE	<i>Tolpis capensis</i> (L.) Sch.Bip.	LC
ASTERACEAE	<i>Ursinia nana</i> DC. subsp. <i>leptophylla</i> Prassler	LC
ASTERACEAE	<i>Ursinia tenuiloba</i> DC.	LC
ASTERACEAE	<i>Vernonia galpinii</i> Klatt	LC
ASTERACEAE	<i>Vernonia staehelinoidea</i> Harv.	LC
ASTERACEAE	<i>Vernonia sutherlandii</i> Harv.	LC
ASTERACEAE	<i>Xanthium strumarium</i> L.	Not Evaluated
ASTERACEAE	<i>Zinnia peruviana</i> (L.) L.	Not Evaluated
AYTONIACEAE	<i>Asterella marginata</i> (Nees) S.W.Arnell	
AYTONIACEAE	<i>Plagiochasma rupestre</i> (J.R. & G.Forst.) Steph. var. <i>rupestre</i>	

Family	Species	Threat status
BALANTIOPSISACEAE	<i>Trachyphyllum gastrodes</i> (Welw. & Duby) A.Gepp	
BARTRAMIACEAE	<i>Philonotis falcata</i> (Hook.) Mitt.	
BARTRAMIACEAE	<i>Philonotis hastata</i> (Duby) Wijk & Margad.	
BIGNONIACEAE	<i>Tecoma stans</i> (L.) Juss. ex Kunth var. <i>stans</i>	Not Evaluated
BORAGINACEAE	<i>Anchusa riparia</i> A.DC.	LC
BORAGINACEAE	<i>Cynoglossum lanceolatum</i> Forssk.	LC
BORAGINACEAE	<i>Ehretia rigida</i> (Thunb.) Druce subsp. <i>nervifolia</i> Retief & A.E.van Wyk	LC
BORAGINACEAE	<i>Heliotropium nelsonii</i> C.H.Wright	LC
BORAGINACEAE	<i>Lithospermum cinereum</i> A.DC.	LC
BRASSICACEAE	<i>Eruca sativa</i> Mill.	Not Evaluated
BRASSICACEAE	<i>Heliophila rigiduscula</i> Sond.	LC
BRASSICACEAE	<i>Lepidium africanum</i> (Burm.f.) DC. subsp. <i>africanum</i>	LC
BRASSICACEAE	<i>Lepidium bonariense</i> L.	Not Evaluated
BRASSICACEAE	<i>Lepidium mossii</i> Thell.	DDD
BRASSICACEAE	<i>Lepidium transvaalense</i> Marais	LC
BRASSICACEAE	<i>Nasturtium officinale</i> R.Br.	Not Evaluated
BRASSICACEAE	<i>Rorippa fluviatilis</i> (E.Mey. ex Sond.) Thell. var. <i>fluviatilis</i>	LC
BRASSICACEAE	<i>Rorippa nudiuscula</i> Thell.	LC
BRASSICACEAE	<i>Sisymbrium orientale</i> L.	Not Evaluated
BRYACEAE	<i>Anomobryum julaceum</i> (Schrad. ex P.Gaertn., B.Mey. & Schreb.) Schimp.	
BRYACEAE	<i>Bryum alpinum</i> Huds. ex With.	
BRYACEAE	<i>Bryum argenteum</i> Hedw.	
BRYACEAE	<i>Bryum pycnophyllum</i> (Dixon) Mohamed	
BUDDLEJACEAE	<i>Buddleja saligna</i> Willd.	LC
BUDDLEJACEAE	<i>Buddleja salviifolia</i> (L.) Lam.	LC
BUDDLEJACEAE	<i>Nuxia congesta</i> R.Br. ex Fresen.	LC
BUDDLEJACEAE	<i>Nuxia glomerulata</i> (C.A.Sm.) I. Verd.	LC
CAMPANULACEAE	<i>Wahlenbergia lycopodioides</i> Schltr. & Brehmer	LC

Family	Species	Threat status
CAMPANULACEAE	<i>Wahlenbergia magaliesbergensis</i> Lammers	LC
CAMPANULACEAE	<i>Wahlenbergia undulata</i> (L.f.) A.DC.	LC
CAMPANULACEAE	<i>Wahlenbergia virgata</i> Engl.	LC
CANNACEAE	<i>Canna indica</i> L.	Not Evaluated
CAPPARACEAE	<i>Cleome maculata</i> (Sond.) Szyszyl.	LC
CAPPARACEAE	<i>Cleome monophylla</i> L.	LC
CAPPARACEAE	<i>Maerua cafra</i> (DC.) Pax	LC
CARYOPHYLLACEAE	<i>Cerastium arabis</i> E.Mey. ex Fenzl	LC
CARYOPHYLLACEAE	<i>Dianthus mooiensis</i> F.N.Williams subsp. <i>kirkii</i> (Burt Davy) S.S.Hooper	Not Evaluated
CARYOPHYLLACEAE	<i>Dianthus mooiensis</i> F.N.Williams subsp. <i>mooiensis</i> var. <i>mooiensis</i>	Not Evaluated
CARYOPHYLLACEAE	<i>Pollichia campestris</i> Aiton	LC
CARYOPHYLLACEAE	<i>Silene burchellii</i> Otth var. <i>angustifolia</i> Sond.	Not Evaluated
CARYOPHYLLACEAE	<i>Silene gallica</i> L.	Not Evaluated
CARYOPHYLLACEAE	<i>Silene undulata</i> Aiton	LC
CELASTRACEAE	<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	LC
CELASTRACEAE	<i>Gymnosporia polyacanthus</i> (Sond.) Szyszyl. subsp. <i>vaccinifolia</i> (P.Conrath) M.Jordaan	LC
CELASTRACEAE	<i>Maytenus undata</i> (Thunb.) Blakelock	LC
CELASTRACEAE	<i>Pterocelastrus echinatus</i> N.E.Br.	LC
CELTIDACEAE	<i>Celtis africana</i> Burm.f.	LC
CHENOPODIACEAE	<i>Chenopodium album</i> L.	Not Evaluated
CHENOPODIACEAE	<i>Chenopodium mucronatum</i> Thunb.	LC
CHENOPODIACEAE	<i>Chenopodium pumilio</i> R.Br.	Not Evaluated
CHRYSOBALANACEAE	<i>Parinari capensis</i> Harv. subsp. <i>capensis</i>	LC
COLCHICACEAE	<i>Ornithoglossum vulgare</i> B.Nord.	LC
COMBRETACEAE	<i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i>	LC



Family	Species	Threat status
COMBRETACEAE	<i>Combretum erythrophyllum</i> (Burch.) Sond.	LC
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>africana</i>	LC
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B. Clarke	LC
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B. Clarke	LC
COMMELINACEAE	<i>Commelina benghalensis</i> L.	LC
COMMELINACEAE	<i>Commelina subulata</i> Roth	LC
COMMELINACEAE	<i>Cyanotis speciosa</i> (L.f.) Hassk.	LC
CONVOLVULACEAE	<i>Convolvulus farinosus</i> L.	LC
CONVOLVULACEAE	<i>Convolvulus ocellatus</i> Hook.f. var. <i>ocellatus</i>	LC
CONVOLVULACEAE	<i>Convolvulus sagittatus</i> Thunb.	LC
CONVOLVULACEAE	<i>Convolvulus thunbergii</i> Roem. & Schult.	LC
CONVOLVULACEAE	<i>Cuscuta campestris</i> Yunck.	Not Evaluated
CONVOLVULACEAE	<i>Evolvulus alsinoides</i> (L.) L.	LC
CONVOLVULACEAE	<i>Ipomoea alba</i> L.	Not Evaluated
CONVOLVULACEAE	<i>Ipomoea bathycolpos</i> Hallier f.	LC
CONVOLVULACEAE	<i>Ipomoea crassipes</i> Hook. var. <i>crassipes</i>	LC
CONVOLVULACEAE	<i>Ipomoea indica</i> (Burm.f.) Merr.	Not Evaluated
CONVOLVULACEAE	<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	LC
CONVOLVULACEAE	<i>Ipomoea omanneyi</i> Rendle	LC
CONVOLVULACEAE	<i>Ipomoea purpurea</i> (L.) Roth	Not Evaluated
CONVOLVULACEAE	<i>Ipomoea simplex</i> Thunb.	LC
CRASSULACEAE	<i>Cotyledon orbiculata</i> L. var. <i>oblonga</i> (Haw.) DC.	LC
CRASSULACEAE	<i>Crassula alba</i> Forssk. var. <i>alba</i>	LC
CRASSULACEAE	<i>Crassula expansa</i> Dryand. subsp. <i>expansa</i>	LC
CRASSULACEAE	<i>Crassula setulosa</i> Harv. var. <i>jenkinsii</i> Schönland	LC
CRASSULACEAE	<i>Crassula setulosa</i> Harv. var. <i>setulosa</i> forma <i>setulosa</i>	Not Evaluated
CRASSULACEAE	<i>Crassula vaginata</i> Eckl. & Zeyh. subsp. <i>vaginata</i>	LC
CRASSULACEAE	<i>Kalanchoe paniculata</i> Harv.	LC

Family	Species	Threat status
CRASSULACEAE	<i>Kalanchoe rotundifolia</i> (Haw.) Haw.	LC
CRASSULACEAE	<i>Kalanchoe thyrsiflora</i> Harv.	LC
CUCURBITACEAE	<i>Coccinia adoensis</i> (A.Rich.) Cogn.	LC
CUCURBITACEAE	<i>Cucumis hirsutus</i> Sond.	LC
CUCURBITACEAE	<i>Cucumis zeyheri</i> Sond.	LC
CUCURBITACEAE	<i>Peponium caledonicum</i> (Sond.) Engl.	LC
CUCURBITACEAE	<i>Trochomeria macrocarpa</i> (Sond.) <i>Hook.f. subsp. macrocarpa</i>	LC
CYPERACEAE	<i>Bulbostylis burchellii</i> (Ficalho & Hiern) C.B.Clarke	LC
CYPERACEAE	<i>Bulbostylis contexta</i> (Nees) M.Bodard	LC
CYPERACEAE	<i>Bulbostylis humilis</i> (Kunth) C.B.Clarke	LC
CYPERACEAE	<i>Bulbostylis oritrephes</i> (Ridl.) C.B.Clarke	LC
CYPERACEAE	<i>Bulbostylis schoenoides</i> (Kunth) C.B.Clarke	LC
CYPERACEAE	<i>Cyperus albostratus</i> Schrad.	LC
CYPERACEAE	<i>Cyperus congestus</i> Vahl	LC
CYPERACEAE	<i>Cyperus eragrostis</i> Lam.	Not Evaluated
CYPERACEAE	<i>Cyperus esculentus</i> L. var. <i>esculentus</i>	LC
CYPERACEAE	<i>Cyperus leptocladus</i> Kunth	LC
CYPERACEAE	<i>Cyperus longus</i> L. var. <i>tenuiflorus</i> (Rottb.) Boeck.	LC
CYPERACEAE	<i>Cyperus margaritaceus</i> Vahl var. <i>margaritaceus</i>	LC
CYPERACEAE	<i>Cyperus marginatus</i> Thunb.	LC
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl var. <i>flavissimus</i> (Schrad.) Boeck.	LC
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	LC
CYPERACEAE	<i>Cyperus rupestris</i> Kunth var. <i>rupestris</i>	LC
CYPERACEAE	<i>Cyperus semitrifidus</i> Schrad.	LC
CYPERACEAE	<i>Cyperus sexangularis</i> Nees	LC



Family	Species	Threat status
CYPERACEAE	<i>Cyperus sphaerospermus</i> Schrad.	LC
CYPERACEAE	<i>Cyperus uitenhagensis</i> (Steud.) C.Archer & Goetgh.	LC
CYPERACEAE	<i>Dracoscirpoides surculosa</i> Muasya, Reynders & Goetgh.	LC
CYPERACEAE	<i>Eleocharis dregeana</i> Steud.	LC
CYPERACEAE	<i>Ficinia stolonifera</i> Boeckeler	LC
CYPERACEAE	<i>Fimbristylis complanata</i> (Retz.) Link	LC
CYPERACEAE	<i>Fuirena pubescens</i> (Poir.) Kunth var. <i>pubescens</i>	LC
CYPERACEAE	<i>Fuirena stricta</i> Steud. var. <i>stricta</i>	LC
CYPERACEAE	<i>Isolepis costata</i> Hochst. ex A.Rich.	LC
CYPERACEAE	<i>Isolepis fluitans</i> (L.) R.Br. var. <i>fluitans</i>	LC
CYPERACEAE	<i>Kyllinga alata</i> Nees	LC
CYPERACEAE	<i>Kyllinga erecta</i> Schumach. var. <i>erecta</i>	LC
CYPERACEAE	<i>Kyllinga melanosperma</i> Nees	LC
CYPERACEAE	<i>Pycreus macranthus</i> (Boeckeler) C.B.Clarke	LC
CYPERACEAE	<i>Pycreus mundii</i> Nees	LC
CYPERACEAE	<i>Rhynchospora brownii</i> Roem. & Schult.	LC
CYPERACEAE	<i>Schoenoplectus brachyceras</i> (Hochst. ex A.Rich.) Lye	LC
CYPERACEAE	<i>Schoenoplectus corymbosus</i> (Roth ex Roem. & Schult.) J.Raynal	LC
CYPERACEAE	<i>Schoenoplectus muricinix</i> (C.B. Clarke) J.Raynal	LC
CYPERACEAE	<i>Schoenoplectus muriculatus</i> (Kük.) Browning	LC
CYPERACEAE	<i>Schoenoxiphium sparteum</i> (Wahlenb.) C.B.Clarke	LC
CYPERACEAE	<i>Scleria bulbifera</i> Hochst. ex A.Rich.	LC
DICRANACEAE	<i>Campylopus introflexus</i> (Hedw.) Brid.	



Family	Species	Threat status
DICRANACEAE	<i>Campylopus pyriformis</i> (F.W.Schultz) Brid.	
DIOSCOREACEAE	<i>Dioscorea retusa</i> Mast.	LC
DIPSACACEAE	<i>Cephalaria zeyheriana</i> Szabó	LC
DIPSACACEAE	<i>Scabiosa columbaria</i> L.	LC
DITRICHACEAE	<i>Ceratodon purpureus</i> (Hedw.) Brid. subsp. <i>stenocarpus</i> (Bruch & Schimp. ex Müll.Hal.) Dixon	
DITRICHACEAE	<i>Ditrichum brachypodium</i> (Müll.Hal.) Broth.	
DROSERACEAE	<i>Drosera collinsiae</i> N.E.Br. ex Burt Davy	LC
DRYOPTERIDACEAE	<i>Dryopteris athamantica</i> (Kunze) Kuntze	LC
EBENACEAE	<i>Diospyros lycioides</i> Desf. subsp. <i>guerkei</i> (Kuntze) De Winter	LC
EBENACEAE	<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC
EBENACEAE	<i>Diospyros whyteana</i> (Hiern) F.White	LC
EBENACEAE	<i>Euclea crispa</i> (Thunb.) Gürke subsp. <i>crispa</i>	LC
EBENACEAE	<i>Euclea undulata</i> Thunb.	LC
ELATINACEAE	<i>Bergia decumbens</i> Planch. ex Harv.	LC
ERICACEAE	<i>Erica alopecurus</i> Harv. var. <i>glabriflora</i> Bolus	LC
ERICACEAE	<i>Erica drakensbergensis</i> Guthrie & Bolus	LC
ERICACEAE	<i>Erica woodii</i> Bolus var. <i>woodii</i>	LC
ERIOSPERMACEAE	<i>Eriospermum cooperi</i> Baker var. <i>cooperi</i>	LC
ERIOSPERMACEAE	<i>Eriospermum flagelliforme</i> (Baker) J.C.Manning	LC
ERIOSPERMACEAE	<i>Eriospermum porphyrium</i> Archibald	LC
EUPHORBIACEAE	<i>Acalypha angustata</i> Sond.	LC
EUPHORBIACEAE	<i>Acalypha caperonioides</i> Baill. var. <i>caperonioides</i>	DDT
EUPHORBIACEAE	<i>Acalypha glabrata</i> Thunb. var. <i>pilosa</i> Pax	LC



Family	Species	Threat status
EUPHORBIACEAE	<i>Acalypha peduncularis</i> E.Mey. ex Meisn.	LC
EUPHORBIACEAE	<i>Acalypha villicaulis</i> Hochst.	LC
EUPHORBIACEAE	<i>Clutia natalensis</i> Bernh.	LC
EUPHORBIACEAE	<i>Clutia pulchella</i> L. var. <i>pulchella</i>	LC
EUPHORBIACEAE	<i>Dalechampia capensis</i> A.Spreng.	LC
EUPHORBIACEAE	<i>Euphorbia epicyparissias</i> E.Mey. ex Boiss.	LC
EUPHORBIACEAE	<i>Euphorbia hirta</i> L.	Not Evaluated
EUPHORBIACEAE	<i>Euphorbia inaequilatera</i> Sond. var. <i>inaequilatera</i>	LC
EUPHORBIACEAE	<i>Euphorbia pseudotuberosa</i> Pax	LC
EUPHORBIACEAE	<i>Euphorbia pubescens</i> Vahl	LC
EUPHORBIACEAE	<i>Euphorbia rhombifolia</i> Boiss.	LC
EUPHORBIACEAE	<i>Euphorbia striata</i> Thunb. var. <i>striata</i>	LC
EUPHORBIACEAE	<i>Spirostachys africana</i> Sond.	LC
EUPHORBIACEAE	<i>Tragia minor</i> Sond.	LC
EUPHORBIACEAE	<i>Tragia okanyua</i> Pax	LC
FABACEAE	<i>Acacia ataxacantha</i> DC.	LC
FABACEAE	<i>Acacia caffra</i> (Thunb.) Willd.	LC
FABACEAE	<i>Acacia cyclops</i> A.Cunn. ex G.Don	Not Evaluated
FABACEAE	<i>Acacia dealbata</i> Link	Not Evaluated
FABACEAE	<i>Acacia dealbata</i> Link	Not Evaluated
FABACEAE	<i>Acacia hereroensis</i> Engl.	LC
FABACEAE	<i>Acacia karroo</i> Hayne	LC
FABACEAE	<i>Alysicarpus rugosus</i> (Willd.) DC. subsp. <i>perennirufus</i> J.Léonard	LC
FABACEAE	<i>Argyrobium speciosum</i> Eckl. & Zeyh.	LC
FABACEAE	<i>Argyrobium tuberosum</i> Eckl. & Zeyh.	LC
FABACEAE	<i>Astragalus atropilosulus</i> (Hochst.) Bunge subsp. <i>burkeanus</i> (Harv.) J.B.Gillett var. <i>burkeanus</i>	LC
FABACEAE	<i>Chamaecrista biensis</i> (Steyaert) Lock	LC
FABACEAE	<i>Chamaecrista capensis</i> (Thunb.) E.Mey. var. <i>flavescens</i> (Thunb.) E.Mey.	LC



Family	Species	Threat status
FABACEAE	<i>Chamaecrista comosa</i> E.Mey. var. <i>capricornia</i> (Steyaert) Lock	LC
FABACEAE	<i>Chamaecrista mimosoides</i> (L.) Greene	LC
FABACEAE	<i>Crotalaria sphaerocarpa</i> Perr. ex DC. subsp. <i>sphaerocarpa</i>	LC
FABACEAE	<i>Desmodium repandum</i> (Vahl) DC.	LC
FABACEAE	<i>Dichilus lebeckioides</i> DC.	LC
FABACEAE	<i>Dichilus pilosus</i> Conrath ex Schinz	LC
FABACEAE	<i>Dichilus strictus</i> E.Mey.	LC
FABACEAE	<i>Dolichos angustifolius</i> Eckl. & Zeyh.	LC
FABACEAE	<i>Elephantorrhiza burkei</i> Benth.	LC
FABACEAE	<i>Elephantorrhiza elephantina</i> (Burch.) Skeels	LC
FABACEAE	<i>Eriosema burkei</i> Benth. ex Harv. var. <i>burkei</i>	LC
FABACEAE	<i>Eriosema cordatum</i> E.Mey.	LC
FABACEAE	<i>Eriosema nutans</i> Schinz	LC
FABACEAE	<i>Eriosema salignum</i> E.Mey.	LC
FABACEAE	<i>Eriosema transvaalense</i> C.H.Stirt.	LC
FABACEAE	<i>Erythrina lysistemon</i> Hutch.	LC
FABACEAE	<i>Indigastrum burkeanum</i> (Benth. ex Harv.) Schrire	LC
FABACEAE	<i>Indigofera comosa</i> N.E.Br.	LC
FABACEAE	<i>Indigofera confusa</i> Prain & Baker f.	LC
FABACEAE	<i>Indigofera cryptantha</i> Benth. ex Harv. var. <i>cryptantha</i>	LC
FABACEAE	<i>Indigofera dimidiata</i> Vogel ex Walp.	LC
FABACEAE	<i>Indigofera frondosa</i> N.E.Br.	LC
FABACEAE	<i>Indigofera hedyantha</i> Eckl. & Zeyh.	LC
FABACEAE	<i>Indigofera hilaris</i> Eckl. & Zeyh. var. <i>hilaris</i>	LC
FABACEAE	<i>Indigofera melanadenia</i> Benth. ex Harv.	LC



Family	Species	Threat status
FABACEAE	<i>Indigofera oxalidea</i> Welw. ex Baker	LC
FABACEAE	<i>Indigofera oxytropis</i> Benth. ex Harv.	LC
FABACEAE	<i>Indigofera zeyheri</i> Spreng. ex Eckl. & Zeyh.	LC
FABACEAE	<i>Lablab purpureus</i> (L.) Sweet subsp. <i>uncinatus</i> Verdc.	LC
FABACEAE	<i>Leobordea eriantha</i> (Benth.) B.-E. van Wyk & Boatwr.	LC
FABACEAE	<i>Lessertia mossii</i> R.G.N. Young	DDT
FABACEAE	<i>Leucaena leucocephala</i> (Lam.) de Wit subsp. <i>leucocephala</i>	Not Evaluated
FABACEAE	<i>Lotononis laxa</i> Eckl. & Zeyh.	LC
FABACEAE	<i>Lotononis macrosepala</i> Conrath	LC
FABACEAE	<i>Lotus discolor</i> E.Mey. subsp. <i>discolor</i>	LC
FABACEAE	<i>Melilotus albus</i> Medik.	Not Evaluated
FABACEAE	<i>Melilotus indicus</i> (L.) All.	Not Evaluated
FABACEAE	<i>Melolobium subspicatum</i> Conrath	VU
FABACEAE	<i>Mundulea sericea</i> (Willd.) A.Chev. subsp. <i>sericea</i>	LC
FABACEAE	<i>Pearsonia aristata</i> (Schinz) Dummer	LC
FABACEAE	<i>Pearsonia bracteata</i> (Benth.) Polhill	NT
FABACEAE	<i>Pearsonia cajanifolia</i> (Harv.) Polhill subsp. <i>cajanifolia</i>	LC
FABACEAE	<i>Pearsonia sessilifolia</i> (Harv.) Dummer subsp. <i>sessilifolia</i>	LC
FABACEAE	<i>Peltophorum africanum</i> Sond.	LC
FABACEAE	<i>Rhynchosia caribaea</i> (Jacq.) DC.	LC
FABACEAE	<i>Rhynchosia monophylla</i> Schltr.	LC
FABACEAE	<i>Rhynchosia nervosa</i> Benth. ex Harv. var. <i>nervosa</i>	LC
FABACEAE	<i>Rhynchosia sordida</i> (E.Mey.) Schinz	LC
FABACEAE	<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	LC



Family	Species	Threat status
FABACEAE	<i>Rhynchosia venulosa</i> (Hiern) K.Schum.	Not Evaluated
FABACEAE	<i>Robinia pseudoacacia</i> L.	Not Evaluated
FABACEAE	<i>Senna italica</i> Mill. subsp. <i>arachoides</i> (Burch.) Lock	LC
FABACEAE	<i>Sphenostylis angustifolia</i> Sond.	LC
FABACEAE	<i>Sutherlandia frutescens</i> (L.) R.Br.	LC
FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>capensis</i>	LC
FABACEAE	<i>Tephrosia elongata</i> E.Mey. var. <i>elongata</i>	LC
FABACEAE	<i>Tephrosia longipes</i> Meisn. subsp. <i>longipes</i> var. <i>longipes</i>	LC
FABACEAE	<i>Tephrosia multijuga</i> R.G.N.Young	LC
FABACEAE	<i>Tephrosia semiglabra</i> Sond.	LC
FABACEAE	<i>Trifolium africanum</i> Ser. var. <i>africanum</i>	LC
FABACEAE	<i>Trifolium africanum</i> Ser. var. <i>lydenburgense</i> J.B.Gillett	LC
FABACEAE	<i>Vigna vexillata</i> (L.) A.Rich. var. <i>davyi</i> (Bolus) B.J.Pienaar	LC
FABACEAE	<i>Vigna vexillata</i> (L.) A.Rich. var. <i>vexillata</i>	LC
FABACEAE	<i>Zornia linearis</i> E.Mey.	LC
FISSIDENTACEAE	<i>Fissidens bryoides</i> Hedw.	
FUMARIACEAE	<i>Fumaria muralis</i> Sond. ex W.D.J.Koch subsp. <i>muralis</i>	Not Evaluated
GENTIANACEAE	<i>Chironia palustris</i> Burch. subsp. <i>transvaalensis</i> (Gilg) I.Verd.	LC
GENTIANACEAE	<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>humilis</i> (Gilg) I.Verd.	LC
GENTIANACEAE	<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>purpurascens</i>	LC
GENTIANACEAE	<i>Sebaea exigua</i> (Oliv.) Schinz	LC
GENTIANACEAE	<i>Sebaea junodii</i> Schinz	LC
GERANIACEAE	<i>Monsonia angustifolia</i> E.Mey. ex A.Rich.	LC



Family	Species	Threat status
GERANIACEAE	<i>Monsonia attenuata</i> Harv.	LC
GERANIACEAE	<i>Pelargonium luridum</i> (Andrews) Sweet	LC
HALORAGACEAE	<i>Laurembergia repens</i> (L.) P.J.Bergius subsp. <i>brachypoda</i> (Welw. ex Hiern) Oberm.	LC
HALORAGACEAE	<i>Myriophyllum aquaticum</i> (Vell.) Verdc.	Not Evaluated
HYACINTHACEAE	<i>Albuca setosa</i> Jacq.	LC
HYACINTHACEAE	<i>Drimia calcarata</i> (Baker) Stedje	LC
HYACINTHACEAE	<i>Drimia depressa</i> (Baker) Jessop	LC
HYACINTHACEAE	<i>Drimia intricata</i> (Baker) J.C.Manning & Goldblatt	LC
HYACINTHACEAE	<i>Drimia multisetosa</i> (Baker) Jessop	LC
HYACINTHACEAE	<i>Drimiopsis burkei</i> Baker subsp. <i>burkei</i>	LC
HYACINTHACEAE	<i>Drimiopsis burkei</i> Baker subsp. <i>burkei</i>	LC
HYACINTHACEAE	<i>Eucomis autumnalis</i> (Mill.) Chitt. subsp. <i>clavata</i> (Baker) Reyneke	Not Evaluated
HYACINTHACEAE	<i>Eucomis pallidiflora</i> Baker subsp. <i>pallidiflora</i>	LC
HYACINTHACEAE	<i>Ledebouria burkei</i> (Baker) J.C.Manning & Goldblatt	
HYACINTHACEAE	<i>Ledebouria cooperi</i> (Hook.f.) Jessop	LC
HYACINTHACEAE	<i>Ledebouria luteola</i> Jessop	LC
HYACINTHACEAE	<i>Ledebouria marginata</i> (Baker) Jessop	LC
HYACINTHACEAE	<i>Ledebouria revoluta</i> (L.f.) Jessop	LC
HYACINTHACEAE	<i>Ornithogalum juncifolium</i> Jacq. var. <i>juncifolium</i>	LC
HYACINTHACEAE	<i>Ornithogalum tenuifolium</i> F.Delaroche subsp. <i>tenuifolium</i>	Not Evaluated
HYACINTHACEAE	<i>Schizocarphus nervosus</i> (Burch.) Van der Merwe	LC
HYDROCHARITACEAE	<i>Lagarosiphon muscoides</i> Harv.	LC
HYPERICACEAE	<i>Hypericum aethiopicum</i> Thunb. subsp. <i>sonderi</i> (Bredell) N.Robson	LC



Family	Species	Threat status
HYPERICACEAE	<i>Hypericumalandii</i> Choisy	LC
HYPERICACEAE	<i>Hypericum revolutum</i> Vahl subsp. <i>revolutum</i>	LC
HYPOXIDACEAE	<i>Hypoxis acuminata</i> Baker	LC
HYPOXIDACEAE	<i>Hypoxis argentea</i> Harv. ex Baker var. <i>argentea</i>	LC
HYPOXIDACEAE	<i>Hypoxis filiformis</i> Baker	LC
HYPOXIDACEAE	<i>Hypoxis galpinii</i> Baker	LC
HYPOXIDACEAE	<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining
HYPOXIDACEAE	<i>Hypoxis interjecta</i> Nel	LC
HYPOXIDACEAE	<i>Hypoxis iridifolia</i> Baker	LC
HYPOXIDACEAE	<i>Hypoxis rigidula</i> Baker var. <i>pilosissima</i> Baker	LC
HYPOXIDACEAE	<i>Hypoxis rigidula</i> Baker var. <i>rigidula</i>	LC
ICACINACEAE	<i>Apodytes dimidiata</i> E.Mey. ex Arn. subsp. <i>dimidiata</i>	LC
ICACINACEAE	<i>Cassinopsis ilicifolia</i> (Hochst.) Kuntze	LC
IRIDACEAE	<i>Babiana bainesii</i> Baker	LC
IRIDACEAE	<i>Gladiolus antholyzoides</i> Baker	LC
IRIDACEAE	<i>Gladiolus crassifolius</i> Baker	LC
IRIDACEAE	<i>Gladiolus dalenii</i> Van Geel subsp. <i>dalenii</i>	LC
IRIDACEAE	<i>Gladiolus longicollis</i> Baker subsp. <i>platypetalus</i> (Baker) Goldblatt & J.C.Manning	LC
IRIDACEAE	<i>Gladiolus papilio</i> Hook.f.	LC
IRIDACEAE	<i>Gladiolus permeabilis</i> D.Delaroche subsp. <i>edulis</i> (Burch. ex Ker Gawl.) Oberm.	LC
IRIDACEAE	<i>Gladiolus woodii</i> Baker	LC
IRIDACEAE	<i>Hesperantha candida</i> Baker	LC
IRIDACEAE	<i>Hesperantha coccinea</i> (Backh. & Harv.) Goldblatt & J.C.Manning	LC
IRIDACEAE	<i>Hesperantha leucantha</i> Baker	LC
IRIDACEAE	<i>Moraea pallida</i> (Baker) Goldblatt	LC
IRIDACEAE	<i>Moraea stricta</i> Baker	LC
IRIDACEAE	<i>Tritonia nelsonii</i> Baker	LC



Family	Species	Threat status
JUNCACEAE	<i>Juncus dregeanus</i> Kunth subsp. <i>dregeanus</i>	LC
JUNCACEAE	<i>Juncus effusus</i> L.	LC
JUNCACEAE	<i>Juncus exsertus</i> Buchenau	LC
JUNCACEAE	<i>Juncus lomatophyllus</i> Spreng.	LC
JUNCACEAE	<i>Juncus oxycarpus</i> E.Mey. ex Kunth	LC
LAMIACEAE	<i>Acrotome hispida</i> Benth.	LC
LAMIACEAE	<i>Aeollanthus buchnerianus</i> Briq.	LC
LAMIACEAE	<i>Leonotis nepetifolia</i> (L.) R.Br.	LC
LAMIACEAE	<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson	LC
LAMIACEAE	<i>Leucas martinicensis</i> (Jacq.) R.Br.	LC
LAMIACEAE	<i>Mentha aquatica</i> L.	LC
LAMIACEAE	<i>Ocimum obovatum</i> E.Mey. ex Benth. subsp. <i>obovatum</i> var. <i>obovatum</i>	LC
LAMIACEAE	<i>Plectranthus cylindraceus</i> Hochst. ex Benth.	LC
LAMIACEAE	<i>Plectranthus grallatus</i> Briq.	LC
LAMIACEAE	<i>Plectranthus hereroensis</i> Engl.	LC
LAMIACEAE	<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	LC
LAMIACEAE	<i>Rothea hirsuta</i> (Hochst.) R.Fern.	LC
LAMIACEAE	<i>Salvia radula</i> Benth.	LC
LAMIACEAE	<i>Salvia runcinata</i> L.f.	LC
LAMIACEAE	<i>Salvia tiliifolia</i> Vahl	Not Evaluated
LAMIACEAE	<i>Satureja biflora</i> (Buch.-Ham. ex D.Don) Briq.	LC
LAMIACEAE	<i>Stachys natalensis</i> Hochst. var. <i>natalensis</i>	LC
LAMIACEAE	<i>Syncolostemon pretoriae</i> (Gürke) D.F.Otieno	LC
LAMIACEAE	<i>Teucrium trifidum</i> Retz.	LC
LINACEAE	<i>Linum thunbergii</i> Eckl. & Zeyh.	LC
LOBELIACEAE	<i>Cyphia stenopetala</i> Diels	LC
LOBELIACEAE	<i>Lobelia erinus</i> L.	LC
LOBELIACEAE	<i>Lobelia flaccida</i> (C.Presl) A.DC. subsp. <i>flaccida</i>	LC



Family	Species	Threat status
LOBELIACEAE	<i>Monopsis decipiens</i> (Sond.) Thulin	LC
LORANTHACEAE	<i>Agelanthus natalitius</i> (Meisn.) Polhill & Wiens subsp. <i>zeyheri</i> (Harv.) Polhill & Wiens	LC
LORANTHACEAE	<i>Tapinanthus rubromarginatus</i> (Engl.) Danser	LC
LUNULARIACEAE	<i>Lunularia cruciata</i> (L.) Dumort. ex Lindb.	
LYTHRACEAE	<i>Nesaea sagittifolia</i> (Sond.) Koehne var. <i>sagittifolia</i>	LC
LYTHRACEAE	<i>Nesaea schinzii</i> Koehne	LC
MALPIGHIACEAE	<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>galphimifolius</i> (A.Juss.) P.D.de Villiers & D.J.Botha	LC
MALPIGHIACEAE	<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	LC
MALVACEAE	<i>Abutilon piloso-cinereum</i> A.Meeuse	LC
MALVACEAE	<i>Abutilon sonneratianum</i> (Cav.) Sweet	LC
MALVACEAE	<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	LC
MALVACEAE	<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC
MALVACEAE	<i>Hermannia cordata</i> (E.Mey. ex E.Phillips) De Winter	LC
MALVACEAE	<i>Hermannia depressa</i> N.E.Br.	LC
MALVACEAE	<i>Hermannia floribunda</i> Harv.	LC
MALVACEAE	<i>Hermannia lancifolia</i> Szyszyl.	LC
MALVACEAE	<i>Hermannia umbratica</i> I.Verd.	LC
MALVACEAE	<i>Hibiscus aethiopicus</i> L. var. <i>ovatus</i> Harv.	LC
MALVACEAE	<i>Hibiscus engleri</i> K.Schum.	LC
MALVACEAE	<i>Hibiscus lunarifolius</i> Willd.	LC
MALVACEAE	<i>Hibiscus microcarpus</i> Garcke	LC
MALVACEAE	<i>Hibiscus subreniformis</i> Burt Davy	LC
MALVACEAE	<i>Hibiscus trionum</i> L.	
MALVACEAE	<i>Lavatera arborea</i> L.	Not Evaluated



Family	Species	Threat status
MALVACEAE	<i>Pavonia burchellii</i> (DC.) R.A.Dyer	LC
MALVACEAE	<i>Pavonia columella</i> Cav.	LC
MALVACEAE	<i>Sida alba</i> L.	LC
MALVACEAE	<i>Sida chrysantha</i> Ulbr.	LC
MALVACEAE	<i>Sida dregei</i> Burtt Davy	LC
MALVACEAE	<i>Sida rhombifolia</i> L. subsp. <i>rhombifolia</i>	LC
MALVACEAE	<i>Sida ternata</i> L.f.	LC
MALVACEAE	<i>Triumfetta sonderi</i> Ficalho & Hiern	LC
MELIANTHACEAE	<i>Melianthus comosus</i> Vahl	LC
MESEMBRYANTHEMACEAE	<i>Khadia acutipetala</i> (N.E.Br.) N.E.Br.	LC
MESEMBRYANTHEMACEAE	<i>Lithops lesliei</i> (N.E.Br.) N.E.Br. subsp. <i>lesliei</i>	NT
MNIACEAE	<i>Pohlia elongata</i> Hedw.	
MOLLUGINACEAE	<i>Mollugo cerviana</i> (L.) Ser. ex DC. var. <i>cerviana</i>	LC
MOLLUGINACEAE	<i>Psammotropha myriantha</i> Sond.	LC
MORACEAE	<i>Ficus abutilifolia</i> (Miq.) Miq.	LC
MORACEAE	<i>Ficus cordata</i> Thunb. subsp. <i>cordata</i>	LC
MORACEAE	<i>Ficus ingens</i> (Miq.) Miq.	LC
MORACEAE	<i>Ficus salicifolia</i> Vahl	LC
MYRICACEAE	<i>Morella serrata</i> (Lam.) Killick	LC
NEPHROLEPIDACEAE	<i>Nephrolepis exaltata</i> (L.) Schott	Not Evaluated
NYCTAGINACEAE	<i>Mirabilis jalapa</i> L.	Not Evaluated
OLACACEAE	<i>Ximenia caffra</i> Sond. var. <i>caffra</i>	LC
OLEACEAE	<i>Menodora africana</i> Hook.	LC
OLEACEAE	<i>Olea europaea</i> L. subsp. <i>africana</i> (Mill.) P.S.Green	LC
OLINIACEAE	<i>Olinia emarginata</i> Burtt Davy	LC
ONAGRACEAE	<i>Epilobium salignum</i> Hausskn.	LC
ONAGRACEAE	<i>Oenothera jamesii</i> Torr. & A.Gray	Not Evaluated
ONAGRACEAE	<i>Oenothera rosea</i> L'Hér. ex Aiton	Not Evaluated
ONAGRACEAE	<i>Oenothera stricta</i> Ledeb. ex Link subsp. <i>stricta</i>	Not Evaluated
ORCHIDACEAE	<i>Bonatea antennifera</i> Rolfe	LC



Family	Species	Threat status
ORCHIDACEAE	<i>Brachycorythis conica</i> (Summerh.) <i>Summerh. subsp. transvaalensis</i> <i>Summerh.</i>	EN
ORCHIDACEAE	<i>Brachycorythis tenuior</i> Rchb.f.	LC
ORCHIDACEAE	<i>Disa patula</i> Sond. var. <i>transvaalensis</i> <i>Summerh.</i>	LC
ORCHIDACEAE	<i>Disperis anthoceros</i> Rchb.f. var. <i>anthoceros</i>	LC
ORCHIDACEAE	<i>Disperis micrantha</i> Lindl.	LC
ORCHIDACEAE	<i>Eulophia calanthoides</i> Schltr.	LC
ORCHIDACEAE	<i>Eulophia hians</i> Spreng. var. <i>hians</i>	LC
ORCHIDACEAE	<i>Eulophia hians</i> Spreng. var. <i>inaequalis</i> (Schltr.) S.Thomas	LC
ORCHIDACEAE	<i>Eulophia hians</i> Spreng. var. <i>inaequalis</i> (Schltr.) S.Thomas	LC
ORCHIDACEAE	<i>Eulophia leontoglossa</i> Rchb.f.	LC
ORCHIDACEAE	<i>Eulophia ovalis</i> Lindl. var. <i>bainesii</i> (Rolfe) P.J.Cribb & la Croix	LC
ORCHIDACEAE	<i>Eulophia tuberculata</i> Bolus	LC
ORCHIDACEAE	<i>Eulophia welwitschii</i> (Rchb.f.) Rolfe	LC
ORCHIDACEAE	<i>Habenaria barbertoni</i> Kraenzl. & Schltr.	NT
ORCHIDACEAE	<i>Satyrium cristatum</i> Sond. var. <i>cristatum</i>	LC
ORCHIDACEAE	<i>Satyrium hallackii</i> Bolus subsp. <i>ocellatum</i> (Bolus) A.V.Hall	LC
OROBANCHACEAE	<i>Alectra sessiliflora</i> (Vahl) Kuntze var. <i>sessiliflora</i>	LC
OROBANCHACEAE	<i>Buchnera simplex</i> (Thunb.) Druce	LC
OROBANCHACEAE	<i>Cycnium tubulosum</i> (L.f.) Engl. subsp. <i>tubulosum</i>	LC
OROBANCHACEAE	<i>Graderia subintegra</i> Mast.	LC
OROBANCHACEAE	<i>Harveya huttonii</i> Hiern	LC
OROBANCHACEAE	<i>Harveya pumila</i> Schltr.	LC
OROBANCHACEAE	<i>Melasma scabrum</i> P.J.Bergius var. <i>scabrum</i>	LC

Family	Species	Threat status
OROBANCHACEAE	<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC
OROBANCHACEAE	<i>Striga elegans</i> Benth.	LC
OROBANCHACEAE	<i>Striga gesnerioides</i> (Willd.) Vatke	LC
OSMUNDACEAE	<i>Osmunda regalis</i> L.	LC
OXALIDACEAE	<i>Oxalis corniculata</i> L.	Not Evaluated
OXALIDACEAE	<i>Oxalis latifolia</i> Kunth	Not Evaluated
PALLAVICINIACEAE	<i>Symphyogyna brasiliensis</i> Nees & Mont.	
PAPAVERACEAE	<i>Argemone mexicana</i> L. forma <i>mexicana</i>	Not Evaluated
PAPAVERACEAE	<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Not Evaluated
PHYLLANTHACEAE	<i>Phyllanthus glaucophyllus</i> Sond.	LC
PHYLLANTHACEAE	<i>Phyllanthus incurvus</i> Thunb.	LC
PHYTOLACCACEAE	<i>Phytolacca dioica</i> L.	Not Evaluated
PHYTOLACCACEAE	<i>Phytolacca octandra</i> L.	Not Evaluated
PILOTTRICHACEAE	<i>Cyclodictyon vallis-gratiae</i> (Hampe ex Müll.Hal.) Kuntze	
PINACEAE	<i>Pinus patula</i> Schlttd. & Cham. var. <i>patula</i>	Not Evaluated
PITTOSPORACEAE	<i>Pittosporum viridiflorum</i> Sims	LC
PLANTAGINACEAE	<i>Plantago lanceolata</i> L.	LC
PLANTAGINACEAE	<i>Plantago longissima</i> Decne.	LC
PLANTAGINACEAE	<i>Plantago major</i> L.	
PLUMBAGINACEAE	<i>Plumbago auriculata</i> Lam.	LC
PLUMBAGINACEAE	<i>Plumbago zeylanica</i> L.	Not Evaluated
POACEAE	<i>Agrostis eriantha</i> Hack. var. <i>eriantha</i>	LC
POACEAE	<i>Agrostis lachnantha</i> Nees var. <i>lachnantha</i>	LC
POACEAE	<i>Alloteropsis semialata</i> (R.Br.) Hitchc. subsp. <i>eckloniana</i> (Nees) Gibbs Russ.	LC
POACEAE	<i>Andropogon appendiculatus</i> Nees	LC
POACEAE	<i>Andropogon chinensis</i> (Nees) Merr.	LC
POACEAE	<i>Andropogon eucomus</i> Nees	LC
POACEAE	<i>Andropogon huillensis</i> Rendle	LC



Family	Species	Threat status
POACEAE	<i>Antheophora pubescens</i> Nees	LC
POACEAE	<i>Aristida adscensionis</i> L.	LC
POACEAE	<i>Aristida aequiglumis</i> Hack.	LC
POACEAE	<i>Aristida bipartita</i> (Nees) Trin. & Rupr.	LC
POACEAE	<i>Aristida canescens</i> Henrard subsp. <i>canescens</i>	LC
POACEAE	<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	LC
POACEAE	<i>Aristida congesta</i> Roem. & Schult. subsp. <i>congesta</i>	LC
POACEAE	<i>Aristida diffusa</i> Trin. subsp. <i>burkei</i> (Stapf) Melderis	LC
POACEAE	<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>junciformis</i>	LC
POACEAE	<i>Aristida scabrivalvis</i> Hack. subsp. <i>scabrivalvis</i>	LC
POACEAE	<i>Aristida stipitata</i> Hack. subsp. <i>graciliflora</i> (Pilg.) Melderis	LC
POACEAE	<i>Aristida transvaalensis</i> Henrard	LC
POACEAE	<i>Arundinella nepalensis</i> Trin.	LC
POACEAE	<i>Arundo donax</i> L.	Not Evaluated
POACEAE	<i>Avena fatua</i> L.	Not Evaluated
POACEAE	<i>Bewsia biflora</i> (Hack.) Gooss.	LC
POACEAE	<i>Bothriochloa bladonii</i> (Retz.) S.T.Blake	LC
POACEAE	<i>Brachiaria advena</i> Vickery	Not Evaluated
POACEAE	<i>Brachiaria brizantha</i> (A.Rich.) Stapf	LC
POACEAE	<i>Brachiaria eruciformis</i> (Sm.) Griseb.	LC
POACEAE	<i>Brachiaria serrata</i> (Thunb.) Stapf	LC
POACEAE	<i>Briza minor</i> L.	Not Evaluated
POACEAE	<i>Chloris pycnothrix</i> Trin.	LC
POACEAE	<i>Chloris virgata</i> Sw.	LC
POACEAE	<i>Cortaderia selloana</i> (Schult.) Asch. & Graebn.	Not Evaluated
POACEAE	<i>Cymbopogon dieterlenii</i> Stapf ex E.Phillips	LC



Family	Species	Threat status
POACEAE	<i>Cymbopogon nardus</i> (L.) Rendle	LC
POACEAE	<i>Cymbopogon prolixus</i> (Stapf) E.Phillips	LC
POACEAE	<i>Cynodon dactylon</i> (L.) Pers.	LC
POACEAE	<i>Cynodon hirsutus</i> Stent	LC
POACEAE	<i>Cynodon transvaalensis</i> Burt Davy	LC
POACEAE	<i>Digitaria diagonalis</i> (Nees) Stapf var. <i>diagonalis</i>	LC
POACEAE	<i>Digitaria eriantha</i> Steud.	LC
POACEAE	<i>Digitaria eylesii</i> C.E.Hubb.	LC
POACEAE	<i>Digitaria monodactyla</i> (Nees) Stapf	LC
POACEAE	<i>Digitaria ternata</i> (A.Rich.) Stapf	LC
POACEAE	<i>Digitaria tricholaenoides</i> Stapf	LC
POACEAE	<i>Digitaria velutina</i> (Forssk.) P.Beauv.	LC
POACEAE	<i>Diheteropogon amplexens</i> (Nees) Clayton var. <i>amplexens</i>	LC
POACEAE	<i>Echinochloa crus-galli</i> (L.) P.Beauv.	LC
POACEAE	<i>Echinochloa haploclada</i> (Stapf) Stapf	LC
POACEAE	<i>Ehrharta erecta</i> Lam. var. <i>erecta</i>	LC
POACEAE	<i>Eleusine coracana</i> (L.) Gaertn. subsp. <i>africana</i> (Kenn.-O'Byrne) Hilu & de Wet	LC
POACEAE	<i>Elionurus muticus</i> (Spreng.) Kunth	LC
POACEAE	<i>Enneapogon pretoriensis</i> Stent	LC
POACEAE	<i>Enneapogon scoparius</i> Stapf	LC
POACEAE	<i>Eragrostis aspera</i> (Jacq.) Nees	LC
POACEAE	<i>Eragrostis capensis</i> (Thunb.) Trin.	LC
POACEAE	<i>Eragrostis chloromelas</i> Steud.	LC
POACEAE	<i>Eragrostis cilianensis</i> (All.) Vignolo ex Janch.	LC
POACEAE	<i>Eragrostis curvula</i> (Schrad.) Nees	LC
POACEAE	<i>Eragrostis gummiflua</i> Nees	LC
POACEAE	<i>Eragrostis heteromera</i> Stapf	LC



Family	Species	Threat status
POACEAE	<i>Eragrostis lehmanniana</i> Nees var. <i>lehmanniana</i>	LC
POACEAE	<i>Eragrostis mexicana</i> (Hornem.) Link subsp. <i>virescens</i> (J.Presl.) S.D.Koch & Sánchez Vega	Not Evaluated
POACEAE	<i>Eragrostis patentipilosa</i> Hack.	LC
POACEAE	<i>Eragrostis plana</i> Nees	LC
POACEAE	<i>Eragrostis planiculmis</i> Nees	LC
POACEAE	<i>Eragrostis racemosa</i> (Thunb.) Steud.	LC
POACEAE	<i>Eragrostis sclerantha</i> Nees subsp. <i>sclerantha</i>	LC
POACEAE	<i>Eragrostis superba</i> Peyr.	LC
POACEAE	<i>Eragrostis tef</i> (Zuccagni) Trotter	Not Evaluated
POACEAE	<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	LC
POACEAE	<i>Harporchloa falx</i> (L.f.) Kuntze	LC
POACEAE	<i>Helictotrichon turgidulum</i> (Stapf) Schweick.	LC
POACEAE	<i>Hemarthria altissima</i> (Poir.) Stapf & C.E.Hubb.	LC
POACEAE	<i>Heteropogon contortus</i> (L.) Roem. & Schult.	LC
POACEAE	<i>Hyparrhenia anamesa</i> Clayton	LC
POACEAE	<i>Hyparrhenia dregeana</i> (Nees) Stapf ex Stent	LC
POACEAE	<i>Hyparrhenia filipendula</i> (Hochst.) Stapf var. <i>pilosa</i> (Hochst.) Stapf	LC
POACEAE	<i>Hyparrhenia hirta</i> (L.) Stapf	LC
POACEAE	<i>Hyparrhenia tamba</i> (Steud.) Stapf	LC
POACEAE	<i>Imperata cylindrica</i> (L.) Raeusch.	LC
POACEAE	<i>Ischaemum fasciculatum</i> Brongn.	LC
POACEAE	<i>Koeleria capensis</i> (Steud.) Nees	LC
POACEAE	<i>Leersia hexandra</i> Sw.	LC
POACEAE	<i>Lolium multiflorum</i> Lam.	Not Evaluated
POACEAE	<i>Lolium perenne</i> L.	Not Evaluated
POACEAE	<i>Lophacme digitata</i> Stapf	LC



Family	Species	Threat status
POACEAE	<i>Loudetia simplex</i> (Nees) C.E.Hubb.	LC
POACEAE	<i>Melinis nerviglumis</i> (Franch.) Zizka	LC
POACEAE	<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	LC
POACEAE	<i>Microchloa caffra</i> Nees	LC
POACEAE	<i>Miscanthus junceus</i> (Stapf) Pilg.	LC
POACEAE	<i>Monocymbium ceresiiforme</i> (Nees) Stapf	LC
POACEAE	<i>Panicum coloratum</i> L. var. <i>coloratum</i>	LC
POACEAE	<i>Panicum coloratum</i> L. var. <i>coloratum</i>	LC
POACEAE	<i>Panicum maximum</i> Jacq.	LC
POACEAE	<i>Panicum natalense</i> Hochst.	LC
POACEAE	<i>Panicum schinzii</i> Hack.	LC
POACEAE	<i>Paspalum dilatatum</i> Poir.	Not Evaluated
POACEAE	<i>Paspalum scrobiculatum</i> L.	LC
POACEAE	<i>Paspalum urvillei</i> Steud.	Not Evaluated
POACEAE	<i>Paspalum vaginatum</i> Sw.	LC
POACEAE	<i>Pennisetum thunbergii</i> Kunth	LC
POACEAE	<i>Phalaris arundinacea</i> L.	Not Evaluated
POACEAE	<i>Phragmites australis</i> (Cav.) Steud.	LC
POACEAE	<i>Phragmites mauritianus</i> Kunth	LC
POACEAE	<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	LC
POACEAE	<i>Polypogon monspeliensis</i> (L.) Desf.	Not Evaluated
POACEAE	<i>Polypogon viridis</i> (Gouan) Breistr.	Not Evaluated
POACEAE	<i>Rendlia altera</i> (Rendle) Chiov.	LC
POACEAE	<i>Schizachyrium sanguineum</i> (Retz.) Alston	LC
POACEAE	<i>Setaria lindenberiana</i> (Nees) Stapf	LC
POACEAE	<i>Setaria megaphylla</i> (Steud.) T.Durand & Schinz	LC
POACEAE	<i>Setaria nigrirostris</i> (Nees) T.Durand & Schinz	LC



Family	Species	Threat status
POACEAE	<i>Setaria plicatilis</i> (Hochst.) Hack. ex Engl.	LC
POACEAE	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	LC
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sericea</i> (Stapf) Clayton	LC
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sphacelata</i>	LC
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>torta</i> (Stapf) Clayton	LC
POACEAE	<i>Setaria verticillata</i> (L.) P.Beauv.	LC
POACEAE	<i>Sorghum bicolor</i> (L.) Moench subsp. <i>drummondii</i> (Steud.) de Wet	LC
POACEAE	<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC
POACEAE	<i>Sporobolus fimbriatus</i> (Trin.) Nees	LC
POACEAE	<i>Sporobolus pectinatus</i> Hack.	LC
POACEAE	<i>Sporobolus pectinatus</i> Hack.	LC
POACEAE	<i>Sporobolus stapfianus</i> Gand.	LC
POACEAE	<i>Stipa dregeana</i> Steud. var. <i>elongata</i> (Nees) Stapf	LC
POACEAE	<i>Themeda triandra</i> Forssk.	LC
POACEAE	<i>Trachypogon spicatus</i> (L.f.) Kuntze	LC
POACEAE	<i>Tragus berteronianus</i> Schult.	LC
POACEAE	<i>Trichoneura grandiglumis</i> (Nees) Ekman	LC
POACEAE	<i>Triraphis andropogonoides</i> (Steud.) E.Phillips	LC
POACEAE	<i>Tristachya leucothrix</i> Trin. ex Nees	LC
POACEAE	<i>Tristachya rehmannii</i> Hack.	LC
POACEAE	<i>Urelytrum agropyroides</i> (Hack.) Hack.	LC
POACEAE	<i>Urelytrum agropyroides</i> (Hack.) Hack.	LC



Family	Species	Threat status
POACEAE	<i>Urochloa brachyura</i> (Hack.) Stapf	LC
POACEAE	<i>Urochloa panicoides</i> P.Beauv.	
POLYGALACEAE	<i>Muraltia empetroides</i> Chodat	LC
POLYGALACEAE	<i>Polygala gerrardii</i> Chodat	LC
POLYGALACEAE	<i>Polygala gracilentata</i> Burtt Davy	LC
POLYGALACEAE	<i>Polygala hottentotta</i> C.Presl	LC
POLYGALACEAE	<i>Polygala ohlendoriana</i> Eckl. & Zeyh.	LC
POLYGALACEAE	<i>Polygala rehmannii</i> Chodat	LC
POLYGALACEAE	<i>Polygala transvaalensis</i> Chodat subsp. <i>transvaalensis</i>	LC
POLYGONACEAE	<i>Fallopia convolvulus</i> (L.) Holub	Not Evaluated
POLYGONACEAE	<i>Persicaria attenuata</i> (R.Br.) Soják subsp. <i>africana</i> K.L.Wilson	LC
POLYGONACEAE	<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	LC
POLYGONACEAE	<i>Persicaria lapathifolia</i> (L.) Gray	Not Evaluated
POLYGONACEAE	<i>Persicaria limbata</i> (Meisn.) H.Hara	Not Evaluated
POLYGONACEAE	<i>Persicaria meisneriana</i> (Cham. & Schlttdl.) M.Gómez	LC
POLYGONACEAE	<i>Rumex acetosella</i> L. subsp. <i>angiocarpus</i> (Murb.) Murb.	
POLYGONACEAE	<i>Rumex conglomeratus</i> Murb.	LC
POLYGONACEAE	<i>Rumex crispus</i> L.	Not Evaluated
POLYGONACEAE	<i>Rumex dregeanus</i> Meisn. subsp. <i>montanus</i> B.L.Burtt	LC
POLYGONACEAE	<i>Rumex sagittatus</i> Thunb.	LC
POLYPODIACEAE	<i>Lepisorus schraderi</i> (Mett.) Ching	LC
POLYTRICHACEAE	<i>Pogonatum capense</i> (Hampe) A.Jaeger	
POLYTRICHACEAE	<i>Polytrichum commune</i> Hedw.	
POTAMOGETONACEAE	<i>Potamogeton nodosus</i> Poir.	LC
POTAMOGETONACEAE	<i>Potamogeton octandrus</i> Poir.	LC
POTAMOGETONACEAE	<i>Potamogeton pectinatus</i> L.	LC
POTTIACEAE	<i>Didymodon tophaceus</i> (Brid.) Lisa	
PRIMULACEAE	<i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	Not Evaluated



Family	Species	Threat status
PROTEACEAE	<i>Protea caffra</i> Meisn. subsp. <i>caffra</i>	LC
PROTEACEAE	<i>Protea roupelliae</i> Meisn. subsp. <i>roupelliae</i>	LC
PROTEACEAE	<i>Protea welwitschii</i> Engl.	LC
PTERIDACEAE	<i>Adiantum capillus-veneris</i> L.	LC
PTERIDACEAE	<i>Pteris cretica</i> L.	LC
RANUNCULACEAE	<i>Clematis brachiata</i> Thunb.	LC
RANUNCULACEAE	<i>Ranunculus meyeri</i> Harv.	LC
RANUNCULACEAE	<i>Ranunculus multifidus</i> Forssk.	
RHAMNACEAE	<i>Helinus integrifolius</i> (Lam.) Kuntze	LC
RHAMNACEAE	<i>Phylica paniculata</i> Willd.	LC
RHAMNACEAE	<i>Rhamnus prinoides</i> L'Hér.	LC
RHAMNACEAE	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	LC
RHAMNACEAE	<i>Ziziphus zeyheriana</i> Sond.	LC
RICCIACEAE	<i>Riccia atropurpurea</i> Sim	
ROSACEAE	<i>Agrimonia bracteata</i> E.Mey. ex C.A.Mey.	LC
ROSACEAE	<i>Agrimonia procera</i> Wallr.	LC
ROSACEAE	<i>Cliffortia linearifolia</i> Eckl. & Zeyh.	LC
ROSACEAE	<i>Cliffortia nitidula</i> (Engl.) R.E. & T.C.E.Fr. subsp. <i>pilosa</i> Weim.	Not Evaluated
ROSACEAE	<i>Cotoneaster franchetii</i> Boiss.	Not Evaluated
ROSACEAE	<i>Leucosidea sericea</i> Eckl. & Zeyh.	LC
ROSACEAE	<i>Pyracantha angustifolia</i> (Franch.) C.K.Schneid.	Not Evaluated
ROSACEAE	<i>Rubus rigidus</i> Sm.	LC
ROSACEAE	<i>Rubus x proteus</i> C.H.Stirt.	Not Evaluated
RUBIACEAE	<i>Afrocanthium gilfillanii</i> (N.E.Br.) Lantz	LC
RUBIACEAE	<i>Afrocanthium mundianum</i> (Cham. & Schldl.) Lantz	LC
RUBIACEAE	<i>Anthospermum hispidulum</i> E.Mey. ex Sond.	LC
RUBIACEAE	<i>Anthospermum rigidum</i> Eckl. & Zeyh. subsp. <i>rigidum</i>	LC
RUBIACEAE	<i>Galium spurium</i> L. subsp. <i>africanum</i> Verdc.	LC

Family	Species	Threat status
RUBIACEAE	<i>Kohautia amatymbica</i> Eckl. & Zeyh.	LC
RUBIACEAE	<i>Kohautia caespitosa</i> Schnizl. subsp. <i>brachyloba</i> (Sond.) D.Mantell	LC
RUBIACEAE	<i>Kohautia virgata</i> (Willd.) Bremek.	LC
RUBIACEAE	<i>Oldenlandia herbacea</i> (L.) Roxb. var. <i>herbacea</i>	LC
RUBIACEAE	<i>Oldenlandia rupicola</i> (Sond.) Kuntze var. <i>rupicola</i>	LC
RUBIACEAE	<i>Oldenlandia tenella</i> (Hochst.) Kuntze	LC
RUBIACEAE	<i>Pachystigma pygmaeum</i> (Schltr.) Robyns	LC
RUBIACEAE	<i>Pavetta eylesii</i> S.Moore	LC
RUBIACEAE	<i>Pavetta gardeniifolia</i> A.Rich. var. <i>subtomentosa</i> K.Schum.	LC
RUBIACEAE	<i>Pavetta zeyheri</i> Sond. subsp. <i>zeyheri</i>	LC
RUBIACEAE	<i>Pentanisia angustifolia</i> (Hochst.) Hochst.	LC
RUBIACEAE	<i>Pygmaeothamnus zeyheri</i> (Sond.) Robyns var. <i>zeyheri</i>	LC
RUBIACEAE	<i>Richardia brasiliensis</i> Gomes	Not Evaluated
RUBIACEAE	<i>Rothmannia capensis</i> Thunb.	LC
RUBIACEAE	<i>Rubia horrida</i> (Thunb.) Puff	LC
RUBIACEAE	<i>Rubia petiolaris</i> DC.	LC
RUBIACEAE	<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	LC
RUBIACEAE	<i>Vangueria parvifolia</i> Sond.	
RUTACEAE	<i>Calodendrum capense</i> (L.f.) Thunb.	LC
RUTACEAE	<i>Zanthoxylum capense</i> (Thunb.) Harv.	LC
SALICACEAE	<i>Dovyalis zeyheri</i> (Sond.) Warb.	LC
SALICACEAE	<i>Populus deltoides</i> Bartram ex Marshall subsp. <i>deltoides</i> forma <i>deltoides</i>	Not Evaluated
SALICACEAE	<i>Salix babylonica</i> L. var. <i>babylonica</i>	Not Evaluated



Family	Species	Threat status
SALICACEAE	<i>Salix mucronata</i> Thunb. subsp. <i>woodii</i> (Seemen) Immelman	LC
SALICACEAE	<i>Scolopia zeyheri</i> (Nees) Harv.	LC
SANTALACEAE	<i>Osyris lanceolata</i> Hochst. & Steud.	LC
SANTALACEAE	<i>Thesium costatum</i> A.W.Hill var. <i>costatum</i>	LC
SANTALACEAE	<i>Thesium deceptum</i> N.E.Br.	LC
SANTALACEAE	<i>Thesium racemosum</i> Bernh.	LC
SANTALACEAE	<i>Thesium rasum</i> (A.W.Hill) N.E.Br.	LC
SANTALACEAE	<i>Thesium translucens</i> A.W.Hill	LC
SANTALACEAE	<i>Thesium transvaalense</i> Schltr.	LC
SANTALACEAE	<i>Thesium utile</i> A.W.Hill	LC
SAPINDACEAE	<i>Pappea capensis</i> Eckl. & Zeyh.	LC
SAPOTACEAE	<i>Englerophytum magalimontanum</i> (Sond.) T.D.Penn.	LC
SCROPHULARIACEAE	<i>Chaenostoma leve</i> (Hiern) Kornhall	LC
SCROPHULARIACEAE	<i>Diclis rotundifolia</i> (Hiern) Hilliard & B.L.Burt	LC
SCROPHULARIACEAE	<i>Halleria lucida</i> L.	LC
SCROPHULARIACEAE	<i>Jamesbrittenia aurantiaca</i> (Burch.) Hilliard	LC
SCROPHULARIACEAE	<i>Jamesbrittenia burkeana</i> (Benth.) Hilliard	LC
SCROPHULARIACEAE	<i>Manulea paniculata</i> Benth.	LC
SCROPHULARIACEAE	<i>Manulea parviflora</i> Benth. var. <i>parviflora</i>	LC
SCROPHULARIACEAE	<i>Mimulus gracilis</i> R.Br.	LC
SCROPHULARIACEAE	<i>Nemesia fruticans</i> (Thunb.) Benth.	LC
SCROPHULARIACEAE	<i>Nemesia rupicola</i> Hilliard	LC
SCROPHULARIACEAE	<i>Selago capitellata</i> Schltr.	LC
SCROPHULARIACEAE	<i>Selago densiflora</i> Rolfe	LC
SCROPHULARIACEAE	<i>Veronica anagallis-aquatica</i> L.	LC
SCROPHULARIACEAE	<i>Zaluzianskya katharinae</i> Hiern	LC
SELAGINELLACEAE	<i>Selaginella dregei</i> (C.Presl) Hieron.	LC



Family	Species	Threat status
SINOPTERIDACEAE	<i>Cheilanthes contracta</i> (Kunze) Mett. ex Kuhn	LC
SINOPTERIDACEAE	<i>Cheilanthes dolomiticola</i> (Schelpe) Schelpe & N.C.Anthony	LC
SINOPTERIDACEAE	<i>Cheilanthes eckloniana</i> (Kunze) Mett.	LC
SINOPTERIDACEAE	<i>Cheilanthes hirta</i> Sw. var. <i>brevipilosa</i> W.& N.Jacobsen	
SINOPTERIDACEAE	<i>Cheilanthes hirta</i> Sw. var. <i>hirta</i>	LC
SINOPTERIDACEAE	<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>involuta</i>	LC
SINOPTERIDACEAE	<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>obscura</i> (N.C.Anthony) N.C.Anthony	LC
SINOPTERIDACEAE	<i>Cheilanthes multifida</i> (Sw.) Sw. subsp. <i>lacerata</i> N.C.Anthony & Schelpe	
SINOPTERIDACEAE	<i>Cheilanthes multifida</i> (Sw.) Sw. var. <i>multifida</i>	Not Evaluated
SINOPTERIDACEAE	<i>Cheilanthes quadripinnata</i> (Forssk.) Kuhn	LC
SINOPTERIDACEAE	<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>glauca</i> (Sim) Schelpe & N.C.Anthony	LC
SINOPTERIDACEAE	<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	LC
SINOPTERIDACEAE	<i>Pellaea calomelanos</i> (Sw.) Link var. <i>calomelanos</i>	LC
SOLANACEAE	<i>Cestrum aurantiacum</i> Lindl.	Not Evaluated
SOLANACEAE	<i>Datura ferox</i> L.	Not Evaluated
SOLANACEAE	<i>Datura stramonium</i> L.	Not Evaluated
SOLANACEAE	<i>Physalis angulata</i> L.	Not Evaluated
SOLANACEAE	<i>Solanum capense</i> L.	LC
SOLANACEAE	<i>Solanum chenopodioides</i> Lam.	Not Evaluated
SOLANACEAE	<i>Solanum giganteum</i> Jacq.	LC
SOLANACEAE	<i>Solanum lichtensteinii</i> Willd.	LC
SOLANACEAE	<i>Solanum mauritianum</i> Scop.	Not Evaluated
SOLANACEAE	<i>Solanum pseudocapsicum</i> L.	Not Evaluated



Family	Species	Threat status
SOLANACEAE	<i>Solanum seforthianum</i> Andrews var. <i>disjunctum</i> O.E.Schulz	Not Evaluated
SOLANACEAE	<i>Solanum sisymbriifolium</i> Lam.	Not Evaluated
SOLANACEAE	<i>Solanum supinum</i> Dunal var. <i>supinum</i>	LC
SOLANACEAE	<i>Withania somnifera</i> (L.) Dunal	LC
STRYCHNACEAE	<i>Strychnos pungens</i> Soler.	LC
THELYPTERIDACEAE	<i>Christella gueinziana</i> (Mett.) Holttum	LC
THELYPTERIDACEAE	<i>Thelypteris confluens</i> (Thunb.) C.V.Morton	LC
THYMELAEACEAE	<i>Gnidia caffra</i> (Meisn.) Gilg	LC
THYMELAEACEAE	<i>Gnidia canoargentea</i> (C.H.Wright) Gilg	LC
THYMELAEACEAE	<i>Gnidia gymnostachya</i> (C.A.Mey.) Gilg	LC
THYMELAEACEAE	<i>Gnidia kraussiana</i> Meisn. var. <i>kraussiana</i>	LC
THYMELAEACEAE	<i>Gnidia microcephala</i> Meisn.	LC
TYPHACEAE	<i>Typha capensis</i> (Rohrb.) N.E.Br.	LC
URTICACEAE	<i>Didymodoxa caffra</i> (Thunb.) Friis & Wilmot-Dear	LC
VAHLIACEAE	<i>Vahlia capensis</i> (L.f.) Thunb. subsp. <i>capensis</i>	LC
VELLOZIACEAE	<i>Xerophyta retinervis</i> Baker	LC
VERBENACEAE	<i>Lantana camara</i> L.	Not Evaluated
VERBENACEAE	<i>Lantana rugosa</i> Thunb.	LC
VERBENACEAE	<i>Lippia javanica</i> (Burm.f.) Spreng.	LC
VERBENACEAE	<i>Priva cordifolia</i> (L.f.) Druce var. <i>abyssinica</i> (Jaub. & Spach) Moldenke	LC
VERBENACEAE	<i>Verbena aristigera</i> S.Moore	Not Evaluated
VERBENACEAE	<i>Verbena bonariensis</i> L.	Not Evaluated
VERBENACEAE	<i>Verbena brasiliensis</i> Vell.	Not Evaluated
VISCACEAE	<i>Viscum rotundifolium</i> L.f.	LC
VITACEAE	<i>Cyphostemma lanigerum</i> (Harv.) Desc. ex Wild & R.B.Drumm.	LC

Family	Species	Threat status
VITACEAE	<i>Rhoicissus tridentata</i> (L.f.) Wild & <i>R.B.Drumm. subsp. tridentata</i>	Not Evaluated
ZINGIBERACEAE	<i>Hedychium gardnerianum</i> Ker Gawl.	Not Evaluated
ZYGOPHYLLACEAE	<i>Tribulus terrestris</i> L.	LC

Appendix B: Possible Avifaunal Species



Species name	Taxonomic name	Endemic Status
Apalis, Bar-throated	<i>Apalis thoracica</i>	
Avocet, Pied	<i>Recurvirostra avosetta</i>	
Babbler, Arrow-marked	<i>Turdoides jardineii</i>	
Barbet, Acacia Pied	<i>Tricholaema leucomelas</i>	Near-endemic
Barbet, Black-collared	<i>Lybius torquatus</i>	
Barbet, Crested	<i>Trachyphonus vaillantii</i>	
Batis, Chinspot	<i>Batis molitor</i>	
Bee-eater, European	<i>Merops apiaster</i>	
Bee-eater, Little	<i>Merops pusillus</i>	
Bee-eater, White-fronted	<i>Merops bullockoides</i>	
Bishop, Southern Red	<i>Euplectes orix</i>	
Bishop, Yellow	<i>Euplectes capensis</i>	
Bishop, Yellow-crowned	<i>Euplectes afer</i>	
Bittern, Little	<i>Ixobrychus minutus</i>	
Bokmakierie, Bokmakierie	<i>Telophorus zeylonus</i>	Near-endemic
Boubou, Southern	<i>Laniarius ferrugineus</i>	Endemic
Brubru, Brubru	<i>Nilaus afer</i>	
Bulbul, African Red-eyed	<i>Pycnonotus nigricans</i>	Near-endemic
Bulbul, Dark-capped	<i>Pycnonotus tricolor</i>	
Bunting, Cape	<i>Emberiza capensis</i>	Near-endemic
Bunting, Cinnamon-breasted	<i>Emberiza tahapisi</i>	
Bunting, Golden-breasted	<i>Emberiza flaviventris</i>	
Bush-Shrike, Orange-breasted	<i>Telophorus sulfureopectus</i>	
Buttonquail, Kurrichane	<i>Turnix sylvaticus</i>	
Buzzard, Jackal	<i>Buteo rufofuscus</i>	Endemic
Buzzard, Steppe	<i>Buteo vulpinus</i>	
Canary, Black-throated	<i>Crithagra atrogularis</i>	
Canary, Cape	<i>Serinus canicollis</i>	Endemic
Canary, Yellow	<i>Crithagra flaviventris</i>	Near-endemic
Canary, Yellow-fronted	<i>Crithagra mozambicus</i>	
Chat, Anteating	<i>Myrmecocichla formicivora</i>	Endemic
Chat, Familiar	<i>Cercomela familiaris</i>	
Cisticola, Cloud	<i>Cisticola textrix</i>	Near-endemic
Cisticola, Desert	<i>Cisticola aridulus</i>	
Cisticola, Lazy	<i>Cisticola aberrans</i>	
Cisticola, Levaillant's	<i>Cisticola tinniens</i>	
Cisticola, Rattling	<i>Cisticola chiniana</i>	
Cisticola, Wailing	<i>Cisticola lais</i>	
Cisticola, Wing-snapping	<i>Cisticola ayresii</i>	



Species name	Taxonomic name	Endemic Status
Cisticola, Zitting	<i>Cisticola juncidis</i>	
Cliff-Chat, Mocking	<i>Thamnodaea cinnamomeiventris</i>	
Cliff-Swallow, South African	<i>Hirundo spilodera</i>	Breeding-endemic
Coot, Red-knobbed	<i>Fulica cristata</i>	
Cormorant, Reed	<i>Phalacrocorax africanus</i>	
Cormorant, White-breasted	<i>Phalacrocorax carbo</i>	
Coucal, Burchell's	<i>Centropus burchellii</i>	Near-endemic
Coucal, White-browed	<i>Centropus superciliosus</i>	
Courser, Temminck's	<i>Cursorius temminckii</i>	
Crake, Baillon's	<i>Porzana pusilla</i>	
Crake, Black	<i>Amaurornis flavirostris</i>	
Crane, Blue	<i>Anthropoides paradiseus</i>	Endemic
Crombec, Long-billed	<i>Sylvietta rufescens</i>	
Crow, Cape	<i>Corvus capensis</i>	
Crow, Pied	<i>Corvus albus</i>	
Cuckoo, African	<i>Cuculus gularis</i>	
Cuckoo, Black	<i>Cuculus clamosus</i>	
Cuckoo, Diderick	<i>Chrysococcyx caprius</i>	
Cuckoo, Jacobin	<i>Clamator jacobinus</i>	
Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>	
Cuckoo, Red-chested	<i>Cuculus solitarius</i>	
Cuckooshrike, Black	<i>Campephaga flava</i>	
Darter, African	<i>Anhinga rufa</i>	
Dove, Laughing	<i>Streptopelia senegalensis</i>	
Dove, Namaqua	<i>Oena capensis</i>	
Dove, Red-eyed	<i>Streptopelia semitorquata</i>	
Dove, Rock	<i>Columba livia</i>	
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>	
Duck, African Black	<i>Anas sparsa</i>	
Duck, Comb	<i>Sarkidiornis melanotos</i>	
Duck, Domestic	<i>Anas platyrhynchos</i>	
Duck, Fulvous	<i>Dendrocygna bicolor</i>	
Duck, Hybrid Mallard	<i>Anas hybrid</i>	
Duck, Maccoa	<i>Oxyura maccoa</i>	
Duck, Mallard	<i>Anas platyrhynchos</i>	
Duck, Muscovy	<i>Cairina moschata</i>	
Duck, White-backed	<i>Thalassornis leuconotus</i>	
Duck, White-faced	<i>Dendrocygna viduata</i>	



Species name	Taxonomic name	Endemic Status
Duck, Yellow-billed	<i>Anas undulata</i>	
Eagle, Booted	<i>Aquila pennatus</i>	
Eagle, Martial	<i>Polemaetus bellicosus</i>	
Eagle, Verreaux's	<i>Aquila verreauxii</i>	
Eagle, Wahlberg's	<i>Aquila wahlbergi</i>	
Eagle-Owl, Spotted	<i>Bubo africanus</i>	
Eagle-Owl, Verreaux's	<i>Bubo lacteus</i>	
Egret, Cattle	<i>Bubulcus ibis</i>	
Egret, Great	<i>Egretta alba</i>	
Egret, Little	<i>Egretta garzetta</i>	
Egret, Yellow-billed	<i>Egretta intermedia</i>	
Falcon, Amur	<i>Falco amurensis</i>	
Falcon, Lanner	<i>Falco biarmicus</i>	
Falcon, Peregrine	<i>Falco peregrinus</i>	
Falcon, Red-footed	<i>Falco vespertinus</i>	
Finch, Cuckoo	<i>Anomalospiza imberbis</i>	
Finch, Red-headed	<i>Amadina erythrocephala</i>	Near-endemic
Finch, Scaly-feathered	<i>Sporopipes squamifrons</i>	Near-endemic
Finfoot, African	<i>Podica senegalensis</i>	
Firefinch, African	<i>Lagonosticta rubricata</i>	
Firefinch, Jameson's	<i>Lagonosticta rhodopareia</i>	
Firefinch, Red-billed	<i>Lagonosticta senegala</i>	
Fiscal, Common	<i>Lanius collaris</i>	
Fish-Eagle, African	<i>Haliaeetus vocifer</i>	
Flamingo, Greater	<i>Phoenicopterus ruber</i>	
Flamingo, Lesser	<i>Phoenicopterus minor</i>	
Flycatcher, Fairy	<i>Stenostira scita</i>	Endemic
Flycatcher, Fiscal	<i>Sigelus silens</i>	Endemic
Flycatcher, Marico	<i>Bradornis mariquensis</i>	Near-endemic
Flycatcher, Southern Black	<i>Melaenornis pammelaina</i>	
Flycatcher, Spotted	<i>Muscicapa striata</i>	
Francolin, Coqui	<i>Peliperdix coqui</i>	
Francolin, Orange River	<i>Scleroptila levillantoides</i>	
Francolin, Red-winged	<i>Scleroptila levillantii</i>	
Francolin, Shelley's	<i>Scleroptila shelleyi</i>	
Go-away-bird, Grey	<i>Corythaixoides concolor</i>	
Goose, Domestic	<i>Anser anser</i>	
Goose, Egyptian	<i>Alopochen aegyptiacus</i>	
Goose, Spur-winged	<i>Plectropterus gambensis</i>	
Goshawk, Gabar	<i>Melierax gabar</i>	
Grassbird, Cape	<i>Sphenoeacus afer</i>	Endemic



Species name	Taxonomic name	Endemic Status
Grass-Owl, African	<i>Tyto capensis</i>	
Grebe, Black-necked	<i>Podiceps nigricollis</i>	
Grebe, Great Crested	<i>Podiceps cristatus</i>	
Grebe, Little	<i>Tachybaptus ruficollis</i>	
Greenshank, Common	<i>Tringa nebularia</i>	
Guineafowl, Helmeted	<i>Numida meleagris</i>	
Gull, Grey-headed	<i>Larus cirrocephalus</i>	
Hamerkop, Hamerkop	<i>Scopus umbretta</i>	
Harrier, Black	<i>Circus maurus</i>	Endemic
Harrier-Hawk, African	<i>Polyboroides typus</i>	
Heron, Black	<i>Egretta ardesiaca</i>	
Heron, Black-headed	<i>Ardea melanocephala</i>	
Heron, Goliath	<i>Ardea goliath</i>	
Heron, Green-backed	<i>Butorides striata</i>	
Heron, Grey	<i>Ardea cinerea</i>	
Heron, Purple	<i>Ardea purpurea</i>	
Heron, Squacco	<i>Ardeola ralloides</i>	
Honeybird, Brown-backed	<i>Prodotiscus regulus</i>	
Honeyguide, Greater	<i>Indicator indicator</i>	
Honeyguide, Lesser	<i>Indicator minor</i>	
Hoopoe, African	<i>Upupa africana</i>	
Hornbill, African Grey	<i>Tockus nasutus</i>	
Hornbill, Yellow-billed	<i>Tockus leucomelas</i>	Near-endemic
House-Martin, Common	<i>Delichon urbicum</i>	
Ibis, African Sacred	<i>Threskiornis aethiopicus</i>	
Ibis, Glossy	<i>Plegadis falcinellus</i>	
Ibis, Hadedda	<i>Bostrychia hagedash</i>	
Indigobird, Dusky	<i>Vidua funerea</i>	
Indigobird, Village	<i>Vidua chalybeata</i>	
Jacana, African	<i>Actophilornis africanus</i>	
Kestrel, Greater	<i>Falco rupicoloides</i>	
Kestrel, Lesser	<i>Falco naumanni</i>	
Kestrel, Rock	<i>Falco rupicolus</i>	
Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>	
Kingfisher, Giant	<i>Megaceryle maximus</i>	
Kingfisher, Half-collared	<i>Alcedo semitorquata</i>	
Kingfisher, Malachite	<i>Alcedo cristata</i>	
Kingfisher, Pied	<i>Ceryle rudis</i>	
Kingfisher, Woodland	<i>Halcyon senegalensis</i>	
Kite, Black & Yellowbilled	<i>Milvus migrans</i>	
Kite, Black-shouldered	<i>Elanus caeruleus</i>	



Species name	Taxonomic name	Endemic Status
Kite, Yellow-billed	<i>Milvus aegyptius</i>	
Korhaan, Northern Black	<i>Afrotis afraoides</i>	Endemic
Korhaan, White-bellied	<i>Eupodotis senegalensis</i>	
Lapwing, African Wattled	<i>Vanellus senegallus</i>	
Lapwing, Blacksmith	<i>Vanellus armatus</i>	
Lapwing, Crowned	<i>Vanellus coronatus</i>	
Lark, Agulhas Clapper	<i>Mirafra marjoriae</i>	
Lark, Agulhas Long-billed	<i>Certhilauda brevirostris</i>	
Lark, Benguela Long-billed	<i>Certhilauda benguelensis</i>	
Lark, Cape Clapper	<i>Mirafra apiata</i>	Endemic
Lark, Cape Long-billed	<i>Certhilauda curvirostris</i>	Endemic
Lark, Eastern Clapper	<i>Mirafra fasciolata</i>	Near-endemic
Lark, Eastern Long-billed	<i>Certhilauda semitorquata</i>	Endemic
Lark, Karoo Long-billed	<i>Certhilauda subcoronata</i>	Endemic
Lark, Melodious	<i>Mirafra cheniana</i>	Endemic
Lark, Pink-billed	<i>Spizocorys conirostris</i>	Near-endemic
Lark, Red-capped	<i>Calandrella cinerea</i>	
Lark, Rufous-naped	<i>Mirafra africana</i>	
Lark, Sabota	<i>Calendulauda sabota</i>	Near-endemic
Lark, Spike-heeled	<i>Chersomanes albofasiata</i>	Near-endemic
Longclaw, Cape	<i>Macronyx capensis</i>	Endemic
Mannikin, Bronze	<i>Spermestes cucullatus</i>	
Marsh-Harrier, African	<i>Circus ranivorus</i>	
Martin, Banded	<i>Riparia cincta</i>	
Martin, Brown-throated	<i>Riparia paludicola</i>	
Martin, Rock	<i>Hirundo fuligula</i>	
Martin, Sand	<i>Riparia riparia</i>	
Masked-Weaver, Southern	<i>Ploceus velatus</i>	
Moorhen, Common	<i>Gallinula chloropus</i>	
Mousebird, Red-faced	<i>Urocolius indicus</i>	
Mousebird, Speckled	<i>Colius striatus</i>	
Mousebird, White-backed	<i>Colius colius</i>	Endemic
Myna, Common	<i>Acridotheres tristis</i>	
Neddicky, Neddicky	<i>Cisticola fulvicapilla</i>	
Night-Heron, Black-crowned	<i>Nycticorax nycticorax</i>	
Nightjar, Fiery-necked	<i>Caprimulgus pectoralis</i>	
Nightjar, Freckled	<i>Caprimulgus tristigma</i>	
Nightjar, Rufous-cheeked	<i>Caprimulgus rufigena</i>	
Olive-Pigeon, African	<i>Columba arquatrix</i>	
Oriole, Black-headed	<i>Oriolus larvatus</i>	



Species name	Taxonomic name	Endemic Status
Oriole, Eurasian Golden	<i>Oriolus oriolus</i>	
Osprey, Osprey	<i>Pandion haliaetus</i>	
Ostrich, Common	<i>Struthio camelus</i>	
Owl, Barn	<i>Tyto alba</i>	
Owl, Marsh	<i>Asio capensis</i>	
Painted-snipe, Greater	<i>Rostratula benghalensis</i>	
Palm-Swift, African	<i>Cypsiurus parvus</i>	
Paradise-Flycatcher, African	<i>Terpsiphone viridis</i>	
Paradise-Whydah, Long-tailed	<i>Vidua paradisaea</i>	
Parakeet, Rose-ringed	<i>Psittacula krameri</i>	
Penduline-Tit, Cape	<i>Anthoscopus minutus</i>	Near-endemic
Petronia, Yellow-throated	<i>Petronia superciliaris</i>	
Pigeon, Speckled	<i>Columba guinea</i>	
Pipit, African	<i>Anthus cinnamomeus</i>	
Pipit, Buffy	<i>Anthus vaalensis</i>	
Pipit, Bushveld	<i>Anthus caffer</i>	
Pipit, Long-billed	<i>Anthus similis</i>	
Pipit, Plain-backed	<i>Anthus leucophrys</i>	
Pipit, Striped	<i>Anthus lineiventris</i>	
Plover, Common Ringed	<i>Charadrius hiaticula</i>	
Plover, Three-banded	<i>Charadrius tricollaris</i>	
Pochard, Southern	<i>Netta erythrophthalma</i>	
Pratincole, Black-winged	<i>Glareola nordmanni</i>	
Prinia, Black-chested	<i>Prinia flavicans</i>	Near-endemic
Prinia, Tawny-flanked	<i>Prinia subflava</i>	
Puffback, Black-backed	<i>Dryoscopus cubla</i>	
Pytilia, Green-winged	<i>Pytilia melba</i>	
Quail, Common	<i>Coturnix coturnix</i>	
Quailfinch, African	<i>Ortygospiza atricollis</i>	
Quelea, Red-billed	<i>Quelea quelea</i>	
Rail, African	<i>Rallus caerulescens</i>	
Reed-Warbler, African	<i>Acrocephalus baeticatus</i>	
Reed-Warbler, Great	<i>Acrocephalus arundinacus</i>	
Robin-Chat, Cape	<i>Cossypha caffra</i>	
Robin, White-throated	<i>Cossypha humeralis</i>	Endemic
Rock-Thrush, Cape	<i>Monticola rupestris</i>	Endemic
Rock-Thrush, Sentinel	<i>Monticola explorator</i>	Endemic
Rock-Thrush, Short-toed	<i>Monticola brevipes</i>	Near-endemic



Species name	Taxonomic name	Endemic Status
Roller, European	<i>Coracias garrulus</i>	
Roller, Lilac-breasted	<i>Coracias caudatus</i>	
Ruff, Ruff	<i>Philomachus pugnax</i>	
Rush-Warbler, Little	<i>Bradypterus baboecala</i>	
Sandpiper, Common	<i>Actitis hypoleucos</i>	
Sandpiper, Curlew	<i>Calidris ferruginea</i>	
Sandpiper, Green	<i>Tringa ochropus</i>	
Sandpiper, Marsh	<i>Tringa stagnatilis</i>	
Sandpiper, Wood	<i>Tringa glareola</i>	
Scimitarbill, Common	<i>Rhinopomastus cyanomelas</i>	
Scrub-Robin, Kalahari	<i>Cercotrichas paena</i>	Near-endemic
Scrub-Robin, White-browed	<i>Cercotrichas leucophrys</i>	
Secretarybird, Secretarybird	<i>Sagittarius serpentarius</i>	
Seedeater, Streaky-headed	<i>Crithagra gularis</i>	
Shelduck, South African	<i>Tadorna cana</i>	Endemic
Shikra, Shikra	<i>Accipiter badius</i>	
Shoveler, Cape	<i>Anas smithii</i>	
Shrike, Crimson-breasted	<i>Laniarius atrococcineus</i>	Near-endemic
Shrike, Lesser Grey	<i>Lanius minor</i>	
Shrike, Magpie	<i>Corvinella melanoleuca</i>	
Shrike, Red-backed	<i>Lanius collurio</i>	
Snake-Eagle, Black-chested	<i>Circaetus pectoralis</i>	
Snipe, African	<i>Gallinago nigripennis</i>	
Sparrow, Cape	<i>Passer melanurus</i>	Near-endemic
Sparrow, House	<i>Passer domesticus</i>	
Sparrow, Northern Grey-headed	<i>Passer griseus</i>	
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>	
Sparrowhawk, Black	<i>Accipiter melanoleucus</i>	
Sparrowhawk, Little	<i>Accipiter minullus</i>	
Sparrowhawk, Ovambo	<i>Accipiter ovampensis</i>	
Sparrowlark, Chestnut-backed	<i>Eremopterix leucotis</i>	
Sparrow-Weaver, White-browed	<i>Plocepasser mahali</i>	
Spoonbill, African	<i>Platalea alba</i>	
Spurfowl, Natal	<i>Pternistis natalensis</i>	Near-endemic



Species name	Taxonomic name	Endemic Status
Spurfowl, Swainson's	<i>Pternistis swainsonii</i>	
Starling, Cape Glossy	<i>Lamprotornis nitens</i>	
Starling, Pied	<i>Spreo bicolor</i>	Endemic
Starling, Red-winged	<i>Onychognathus morio</i>	
Starling, Violet-backed	<i>Cinnyricinclus leucogaster</i>	
Starling, Wattled	<i>Creatophora cinerea</i>	
Stilt, Black-winged	<i>Himantopus himantopus</i>	
Stint, Little	<i>Calidris minuta</i>	
Stonechat, African	<i>Saxicola torquatus</i>	
Stork, Abdim's	<i>Ciconia abdimii</i>	
Stork, White	<i>Ciconia ciconia</i>	
Stork, Yellow-billed	<i>Mycteria ibis</i>	
Sunbird, Amethyst	<i>Chalcomitra amethystina</i>	
Sunbird, Greater Double-collared	<i>Cinnyris afer</i>	Endemic
Sunbird, Malachite	<i>Nectarinia famosa</i>	
Sunbird, White-bellied	<i>Cinnyris talatala</i>	
Swallow, Barn	<i>Hirundo rustica</i>	
Swallow, Greater Striped	<i>Hirundo cucullata</i>	
Swallow, Lesser Striped	<i>Hirundo abyssinica</i>	
Swallow, Pearl-breasted	<i>Hirundo dimidiata</i>	
Swallow, Red-breasted	<i>Hirundo semirufa</i>	
Swallow, White-throated	<i>Hirundo albigularis</i>	
Swamphen, African Purple	<i>Porphyrio madagascariensis</i>	
Swamp-Warbler, Lesser	<i>Acrocephalus gracilirostris</i>	
Swan, Mute	<i>Cygnus olor</i>	
Swift, African Black	<i>Apus barbatus</i>	
Swift, Alpine	<i>Tachymarptis melba</i>	
Swift, Common	<i>Apus apus</i>	
Swift, Horus	<i>Apus horus</i>	
Swift, Little	<i>Apus affinis</i>	
Swift, White-rumped	<i>Apus caffer</i>	
Tchagra, Black-crowned	<i>Tchagra senegalus</i>	
Tchagra, Brown-crowned	<i>Tchagra australis</i>	
Teal, Cape	<i>Anas capensis</i>	
Teal, Hottentot	<i>Anas hottentota</i>	
Teal, Red-billed	<i>Anas erythrorhyncha</i>	
Tern, Whiskered	<i>Chlidonias hybrida</i>	
Tern, White-winged	<i>Chlidonias leucopterus</i>	



Species name	Taxonomic name	Endemic Status
Thick-knee, Spotted	<i>Burhinus capensis</i>	
Thrush, Groundscraper	<i>Psophocichla litsipsirupa</i>	
Thrush, Karoo	<i>Turdus smithi</i>	Endemic
Thrush, Kurrichane	<i>Turdus libonyanus</i>	
Thrush, Olive	<i>Turdus olivaceus</i>	
Tinkerbird, Yellow-fronted	<i>Pogoniulus chrysoconus</i>	
Tit, Ashy	<i>Parus cinerascens</i>	Near-endemic
Tit, Southern Black	<i>Parus niger</i>	
Tit-Babbler, Chestnut-vented	<i>Parisoma subcaeruleum</i>	Near-endemic
Turtle-Dove, Cape	<i>Streptopelia capicola</i>	
Vulture, Cape	<i>Gyps coprotheres</i>	Near-endemic
Wagtail, African Pied	<i>Motacilla aguimp</i>	
Wagtail, Cape	<i>Motacilla capensis</i>	
Wagtail, Yellow	<i>Motacilla flava</i>	
Warbler, Garden	<i>Sylvia borin</i>	
Warbler, Icterine	<i>Hippolais icterina</i>	
Warbler, Marsh	<i>Acrocephalus palustris</i>	
Warbler, Willow	<i>Phylloscopus trochilus</i>	
Waxbill, Black-faced	<i>Estrilda erythronotos</i>	
Waxbill, Blue	<i>Uraeginthus angolensis</i>	
Waxbill, Common	<i>Estrilda astrild</i>	
Waxbill, Orange-breasted	<i>Amandava subflava</i>	
Waxbill, Sweet	<i>Coccyzygia melanotis</i>	Endemic
Weaver, Cape	<i>Ploceus capensis</i>	Endemic
Weaver, Thick-billed	<i>Amblyospiza albifrons</i>	
Weaver, Village	<i>Ploceus cucullatus</i>	
Wheatear, Capped	<i>Oenanthe pileata</i>	
Wheatear, Mountain	<i>Oenanthe monticola</i>	Near-endemic
White-eye, Cape	<i>Zosterops virens</i>	Endemic
White-eye, Orange River	<i>Zosterops pallidus</i>	Endemic
Whydah, Pin-tailed	<i>Vidua macroura</i>	
Widowbird, Long-tailed	<i>Euplectes progne</i>	
Widowbird, Red-collared	<i>Euplectes ardens</i>	
Widowbird, White-winged	<i>Euplectes albonotatus</i>	
Wood-Hoopoe, Green	<i>Phoeniculus purpureus</i>	
Woodpecker, Cardinal	<i>Dendropicos fuscescens</i>	
Wren-Warbler, Barred	<i>Calamonastes fasciolatus</i>	Near-endemic
Wryneck, Red-throated	<i>Jynx ruficollis</i>	

Appendix C: Possible Mammal Species

Family	Genus	Species	Common name	Red list category
Canidae	<i>Canis</i>	<i>mesomelas</i>	Black-backed Jackal	Least Concern
Erinaceidae	<i>Atelerix</i>	<i>frontalis</i>	Southern African Hedgehog	Near Threatened
Felidae	<i>Caracal</i>	<i>caracal</i>	Caracal	Least Concern
Felidae	<i>Leptailurus</i>	<i>serval</i>	Serval	Near Threatened
Herpestidae	<i>Atilax</i>	<i>paludinosus</i>	Marsh Mongoose	Least Concern
Herpestidae	<i>Cynictis</i>	<i>penicillata</i>	Yellow Mongoose	Least Concern
Herpestidae	<i>Galerella</i>	<i>sanguinea</i>	Slender Mongoose	Least Concern
Hystricidae	<i>Hystrix</i>	<i>africaeausustralis</i>	Cape Porcupine	Least Concern
Leporidae	<i>Lepus</i>	<i>saxatilis</i>	Scrub Hare	Least Concern
Molossidae	<i>Tadarida</i>	<i>aegyptiaca</i>	Egyptian Free-tailed Bat	Least Concern
Muridae	<i>Otomys</i>	<i>angoniensis</i>	Angoni Vlei Rat	Least Concern
Muridae	<i>Rhabdomys</i>	<i>pumilio</i>	Xeric Four-striped Grass Rat	Least Concern
Muridae	<i>Tatera</i>	<i>brantsii</i>	Highveld Gerbil	Least Concern
Mustelidae	<i>Aonyx</i>	<i>capensis</i>	African Clawless Otter	Least Concern
Mustelidae	<i>Hydrictis</i>	<i>maculicollis</i>	Spotted-necked Otter	Least Concern (IUCN 2008)
Nesomyidae	<i>Malacothrix</i>	<i>typica</i>	Large-eared African Desert Mouse	Least Concern
Nesomyidae	<i>Mystromys</i>	<i>albicaudatus</i>	African White-tailed Rat	Endangered
Rhinolophidae	<i>Rhinolophus</i>	<i>blasii</i>	Blasius's Horseshoe Bat	Vulnerable
Rhinolophidae	<i>Rhinolophus</i>	<i>clivosus</i>	Geoffroy's Horseshoe Bat	Near Threatened
Soricidae	<i>Crocidura</i>	<i>maquassiensis</i>	Makwassie Musk Shrew	Vulnerable
Soricidae	<i>Suncus</i>	<i>infinitesimus</i>	Least Dwarf Shrew	Data Deficient
Vespertilionidae	<i>Myotis</i>	<i>tricolor</i>	Temminck's Myotis	Near Threatened
Vespertilionidae	<i>Neoromicia</i>	<i>capensis</i>	Cape Serotine	Least Concern
Viveridae	<i>Genetta</i>	<i>maculata</i>	Common Large-spotted Genet (Rusty-spotted Genet)	Least Concern

Appendix D: Possible Herpetofaunal Species

Family	Genus	Species	Subspecies	Common name	Red list category
Reptiles					
Agamidae	<i>Agama</i>	<i>aculeata</i>	<i>distanti</i>	Distant's Ground Agama	Least Concern (SARCA 2014)
Agamidae	<i>Agama</i>	<i>atra</i>		Southern Rock Agama	Least Concern (SARCA 2014)
Atractaspididae	<i>Aparallactus</i>	<i>capensis</i>		Black-headed Centipede-eater	Least Concern (SARCA 2014)
Atractaspididae	<i>Atractaspis</i>	<i>bibronii</i>		Bibron's Stiletto Snake	Least Concern (SARCA 2014)
Atractaspididae	<i>Homoroselaps</i>	<i>dorsalis</i>		Striped Harlequin Snake	Near Threatened (SARCA 2014)
Atractaspididae	<i>Homoroselaps</i>	<i>lacteus</i>		Spotted Harlequin Snake	Least Concern (SARCA 2014)
Chamaeleonidae	<i>Chamaeleo</i>	<i>dilepis</i>	<i>dilepis</i>	Common Flap-neck Chameleon	Least Concern (SARCA 2014)
Colubridae	<i>Boaedon</i>	<i>capensis</i>		Brown House Snake	Least Concern (SARCA 2014)
Colubridae	<i>Crotaphopeltis</i>	<i>hotamboeia</i>		Red-lipped Snake	Least Concern (SARCA 2014)
Colubridae	<i>Dasypeltis</i>	<i>scabra</i>		Rhombic Egg-eater	Least Concern (SARCA 2014)
Colubridae	<i>Lamprophis</i>	<i>aurora</i>		Aurora House Snake	Least Concern (SARCA 2014)
Colubridae	<i>Lycodonomorphus</i>	<i>inornatus</i>		Olive House Snake	Least Concern (SARCA 2014)
Colubridae	<i>Lycodonomorphus</i>	<i>rufulus</i>		Brown Water Snake	Least Concern (SARCA 2014)
Colubridae	<i>Lycophidion</i>	<i>capense</i>	<i>capense</i>	Cape Wolf Snake	Least Concern (SARCA 2014)
Colubridae	<i>Prosymna</i>	<i>sundevallii</i>		Sundevall's Shovel-snout	Least Concern (SARCA 2014)
Colubridae	<i>Psammophis</i>	<i>brevirostris</i>		Short-snouted Grass Snake	Least Concern (SARCA 2014)
Colubridae	<i>Psammophis</i>	<i>crucifer</i>		Cross-marked Grass Snake	Least Concern (SARCA 2014)
Colubridae	<i>Psammophis</i>	<i>trinasalis</i>		Fork-marked Sand Snake	Least Concern (SARCA 2014)
Colubridae	<i>Psammophylax</i>	<i>rhombeatus</i>	<i>rhombeatus</i>	Spotted Grass Snake	Least Concern (SARCA 2014)
Colubridae	<i>Pseudaspis</i>	<i>cana</i>		Mole Snake	Least Concern (SARCA 2014)
Colubridae	<i>Telescopus</i>	<i>semiannulatus</i>	<i>semiannulatus</i>	Eastern Tiger Snake	Least Concern (SARCA 2014)
Cordylidae	<i>Chamaesaura</i>	<i>aenea</i>		Coppery Grass Lizard	Near Threatened (SARCA 2014)
Cordylidae	<i>Cordylus</i>	<i>vittifer</i>		Common Girdled Lizard	Least Concern (SARCA 2014)

Elapidae	<i>Elapsoidea</i>	<i>sundevallii</i>	<i>media</i>	Highveld Garter Snake	Not listed
Elapidae	<i>Hemachatus</i>	<i>haemachatus</i>		Rinkhals	Least Concern (SARCA 2014)
Elapidae	<i>Naja</i>	<i>mossambica</i>		Mozambique Spitting Cobra	Least Concern (SARCA 2014)
Gekkonidae	<i>Lygodactylus</i>	<i>capensis</i>	<i>capensis</i>	Common Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Lygodactylus</i>	<i>ocellatus</i>		Spotted Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus</i>	<i>affinis</i>		Transvaal Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus</i>	<i>capensis</i>		Cape Gecko	Least Concern (SARCA 2014)
Gerrhosauridae	<i>Gerrhosaurus</i>	<i>flavigularis</i>		Yellow-throated Plated Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Nucras</i>	<i>holubi</i>		Holub's Sandveld Lizard	Least Concern (SARCA 2014)
Leptotyphlopidae	<i>Leptotyphlops</i>	<i>distanti</i>		Distant's Thread Snake	Least Concern (SARCA 2014)
Leptotyphlopidae	<i>Leptotyphlops</i>	<i>scutifrons</i>	<i>conjunctus</i>	Eastern Thread Snake	Not listed
Leptotyphlopidae	<i>Leptotyphlops</i>	<i>scutifrons</i>	<i>scutifrons</i>	Peters' Thread Snake	Not listed
Pelomedusidae	<i>Pelomedusa</i>	<i>subrufa</i>		Central Marsh Terrapin	Least Concern (SARCA 2014)
Scincidae	<i>Afroablepharus</i>	<i>wahlbergii</i>		Wahlberg's Snake-eyed Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis</i>	<i>capensis</i>		Cape Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis</i>	<i>punctatissima</i>		Speckled Rock Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis</i>	<i>varia</i>		Variable Skink	Least Concern (SARCA 2014)
Testudinidae	<i>Kinixys</i>	<i>lobatsiana</i>		Lobatse Hinged Tortoise	Least Concern (SARCA 2014)
Testudinidae	<i>Stigmochelys</i>	<i>pardalis</i>		Leopard Tortoise	Least Concern (SARCA 2014)
Typhlopidae	<i>Rhinotyphlops</i>	<i>lalandei</i>		Delalande's Beaked Blind Snake	Least Concern (SARCA 2014)
Viperidae	<i>Bitis</i>	<i>arietans</i>	<i>arietans</i>	Puff Adder	Least Concern (SARCA 2014)
Viperidae	<i>Causus</i>	<i>rhombeatus</i>		Rhombic Night Adder	Least Concern (SARCA 2014)
Family	Genus	Species	Subspecies	Common name	Red list category
Amphibians					
Bufo	<i>Amietophrynus</i>	<i>gutturalis</i>		Guttural Toad	Least Concern

Bufo	Amietophrynus	rangeri		Raucous Toad	Least Concern
Bufo	Schismaderma	carens		Red Toad	Least Concern
Hyperoliidae	Kassina	senegalensis		Bubbling Kassina	Least Concern
Hyperoliidae	Semnodactylus	wealii		Rattling Frog	Least Concern
Phrynobatrachidae	Phrynobatrachus	natalensis		Snoring Puddle Frog	Least Concern
Pipidae	Xenopus	laevis		Common Platanna	Least Concern
Ptychadenidae	Ptychadena	anchietae		Plain Grass Frog	Least Concern
Pyxicephalidae	Amietia				Not listed
Pyxicephalidae	Amietia	fuscigula		Cape River Frog	Least Concern
Pyxicephalidae	Amietia	queckettii		Drakensberg River Frog	Least Concern
Pyxicephalidae	Cacosternum	boettgeri		Common Caco	Least Concern
Pyxicephalidae	Pyxicephalus	adspersus		Giant Bull Frog	Near Threatened
Pyxicephalidae	Strongylopus	fasciatus		Striped Stream Frog	Least Concern
Pyxicephalidae	Tomopterna	cryptotis		Tremelo Sand Frog	Least Concern
Pyxicephalidae	Tomopterna	natalensis		Natal Sand Frog	Least Concern



DIGBY WELLS
ENVIRONMENTAL



Goudkoppies Pipeline Basic Assessment

Notification of Intent to Develop

Project Number:

ERG3057

Prepared for:

Ergo Mining (Pty) Ltd

December 2014

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This document has been prepared by Digby Wells Environmental.

Report Type:	Notification of Intent to Develop
Project Name:	Goudkoppies Pipeline Basic Assessment
Project Code:	ERG3057

Name	Responsibility	Signature	Date
Natasha Higgitt <i>Assistant Heritage Consultant: Archaeology Specialist</i> ASAPA No.: 335	Methodology, Cultural Heritage Baseline Description, Sources of Risk, Conclusion and recommendations		December 2014
Justin du Piesanie <i>Heritage Consultant: Archaeology Specialist</i> ASAPA No.: 270	1 st Review		December 2014

This report is provided solely for the purposes set out in it and may not, in whole or in part, be used for any other purpose without Digby Wells Environmental prior written consent.

NOTIFICATION OF INTENT TO DEVELOP

This Notification of Intent to Develop (NID) is submitted in accordance with subsections (2) and (8) of section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

Introduction

Digby Wells Environmental (Digby Wells) has been appointed by Ergo Mining (Pty) Ltd (hereafter Ergo) to complete an application for the Environmental Authorisation (EA) in terms National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, and the Environmental Impact Assessment Regulations, 2010. The EA will require a Basic Assessment pertaining to the *“Proposed construction of a Treated Water Pipeline from the Goudkoppies Waste Water Treatment Works (WWTW) to the Crown Complex near Diepkloof, Soweto”*.

Project Activities

The specifications of the proposed pipeline are as follows:

- 6 km in length buried at a depth of no more than 3 m;
- Welded with High Density Polyethylene (HDPE);
- Internal diameter of 500 mm; and
- Capacity of 231 litres per second.

The activities for the proposed project area summarised below.

Identified Project Activity	Description	Development as defined in NHRA	Sources of risk to heritage resources	Project Phase
GN 544, 9 (i)	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water with an internal diameter of 0,36 metres or more. The envisaged 0.5 m diameter pipeline be constructed over a distance of approximately 6000 m.	This activity constitutes development as defined in terms of NHRA Section (s) 2(viii) (a) construction, alteration, demolition, removal or change of use of a place or a structure at a place.	No heritage resources are evident in the area; therefore there are no sources of risk to heritage.	n/a
GN 544, 11 (xi)	The construction of infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse. The pipeline will cross one or more	This activity constitutes development as defined in terms of NHRA Section (s) 2(viii) (a) construction, alteration, demolition, removal or change of use of a place or a structure at a place.	No heritage resources are evident in the area; therefore there are no sources of risk to heritage.	n/a

Identified Project Activity	Description	Development as defined in NHRA	Sources of risk to heritage resources	Project Phase
	watercourses by way of a bridging structure to carry the pipeline.			
GN 544, 18 (i)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse. Certain portions of the pipeline may be buried underneath a water course.	This activity constitutes development as defined in terms of NHRA s. 2 (viii) (e) and (f) any change to the natural or existing condition or topography of land; and any removal or destruction of trees, or removal of vegetation or topsoil.	No heritage resources are evident in the area; therefore there are no sources of risk to heritage.	n/a

NHRA Section 38 Triggers

The following activities require a Heritage Impact Assessment (HIA) in terms of Section 38 of the NHRA.

NHRA Section 38 (1) Activities / Triggers			Summary description (E.g. 500 m conveyor belt, open cast pit, etc.)
<input checked="" type="checkbox"/>	a	Any linear development or barrier >300 m	Water Pipeline (6 km)
<input type="checkbox"/>	b	Any bridge or similar structure >50 m	
<input type="checkbox"/>	c	Any development or activity that will change the character of a site:	
<input type="checkbox"/>	i	≥5 000m ² in extent	
<input type="checkbox"/>	ii	Involving ≥3 existing erven/subdivisions	
<input type="checkbox"/>	iii	Involving ≥3 or more erven/divisions consolidated within past 5 years.	
<input type="checkbox"/>	d	Rezoning of a site ≥10 000m ² in extent.	
<input checked="" type="checkbox"/>	8	Other triggers, e.g.: in terms of other legislation, (i.e.: National Environment Management Act, etc.)	NEMA

Additional Impact Assessment Process

The following impact assessment processes were undertaken for the proposed project.

Legislation, i.e. NEMA, MPRDA, etc.	NEMA
Consenting Authority that has/will receive information	Gauteng Department of Agriculture and Rural Development (GDARD)
Reference Number:	GAUT: 002/14-15/0190
Present phase of process at Authority, e.g. Draft Scoping Report	Basic Assessment

Identified/known heritage resources and potential impacts

The following categories of heritage resources as defined in Section 3 of the NHRA are known to occur within the proposed project area.

<input type="checkbox"/>	3(2)(a)	Places, buildings, structures and equipment of cultural significance <i>Description of resource:</i> None <i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(b)	Places to which oral traditions are attached or which are associated with living heritage <i>Description of resource:</i> None <i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(c)	Historical settlements and townscapes <i>Description of resource:</i> None <i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(d)	Landscapes and natural features of cultural significance <i>Description of resource:</i> None <i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(e)	Geological resources of scientific or cultural importance <i>Description of resource:</i> None <i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(f)	Archaeology and/or palaeontology (Including archaeological sites and material, fossils, rock art, battlefields & wrecks) <i>Description of resource:</i> None <i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(g)	Graves and burial grounds (e.g.: ancestral graves, graves of victims of conflict, historical graves & cemeteries) <i>Description of resource:</i> None <i>Potential impact:</i> None

<input type="checkbox"/>	3(2)(a)	Other human remains
		<i>Description of resource:</i> None
		<i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(h)	Sites of significance relating to the history of slavery in South Africa
		<i>Description of resource:</i> None
		<i>Potential impact:</i> None
<input type="checkbox"/>	3(2)(i)	Movable objects
		<i>Description of resource:</i> None
		<i>Potential impact:</i> None

Recommendations

Is a Heritage Impact Assessment required?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>If NO, provide motivation:</p> <p>The pipeline will have limited impacts on the landscape. It will be constructed in an existing Eskom servitude and no heritage resources were identified within the proposed pipeline route.</p> <p>Based on the findings from this study, it is unlikely that any <i>in situ</i> heritage resources are to occur in the proposed pipeline route. If and where these may occur, it is suspected that they will not be <i>in situ</i> and no information potential will remain.</p> <p>It is recommended that the proposed pipeline be exempt from any additional heritage studies with the following conditions:</p> <ul style="list-style-type: none"> ■ The proposed pipeline must maintain a minimum of 50 m buffer from identified heritage resources such as the Orlando Power Station and Klipspruit Sewage Farm. ■ The Environmental Management Plan (EMP) must include Chance Finds Procedures (CFP's) that in turn should include a register of applicable permits and Heritage authorisations that may be required in the event that any heritage resources protected in terms of sections 27, 28, 29, 34, 35, 36 and 37 of the NHRA are impacted on. 		

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1 Introduction

1.1 Project Background

Digby Wells Environmental (Digby Wells) was appointed by Ergo Mining (Pty) Ltd (Ergo) to complete an application for the Environmental Authorisation (EA) in terms National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, and the Environmental Impact Assessment Regulations, 2010. The EA will require a Basic Assessment pertaining to the *“Proposed construction of a Treated Water Pipeline from the Goudkoppies Waste Water Treatment Works (WWTW) to the Crown Complex near Diepkloof, Soweto”*.

1.2 Terms of Reference

Ergo requires Digby Wells to conduct the Heritage Resource Management (HRM) Process for the Goudkoppies Project to ensure compliance with NEMA and the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

1.3 Scope of Work

The required HRM process was inclusive of a Notification of Intent to Develop (NID) that was informed by baseline information. The Scope of Work (SoW) included:

- Gather baseline information to provide heritage and historical context for the project area, limited to website articles, books and previously completed heritage reports conducted in the surrounding areas;
- Completing historical layering for the project area limited to a single years historical imagery (in this case 1952); and
- Collating information into a NID report including recommendations for any additional heritage studies, if deemed necessary.

1.4 Project Description

Ergo is a mid-tier gold producer. Ergo is a world leader in terms of reclaiming historic gold Tailings Storage Facilities throughout the Witwatersrand Mining area. Once the reclamation process has concluded, Ergo, as part of their environmental policy, endeavours to rehabilitate the reclaimed facilities in line with best practice guidelines.

One such facility undergoing rehabilitation is their Crown Tailings complex situated near Diepkloof, Soweto. This facility is irrigated on a daily basis to promote and sustain vegetation growth on the slopes of the facility to reduce erosion, dust generation and maintain slope stability. Currently, potable water from Rand Water is utilised for dust suppression and Ergo envisages utilising treated effluent from the Goudkoppies WWTW for dust suppression of the Crown Tailings complex instead. Please see <http://www.drd.co.za/our-business/ergo/pipeline> for more information.

The treated water from the Goudkoppies WWTW will pass through an additional filtration process to ensure further removal of suspended solids. This water will then be pumped to the Crown Tailings complex, from where it will be utilised for dust suppression measures.

Approval has been granted by the Department of Water and Sanitation (DWS) for the proposed use of treated water for mining related water requirements. The Gauteng Department of Agriculture and Rural Development (GDARD) recently approved the Rondebult pipeline from Elsburg Tailings Complex to Rondebult WWTW for this same requirement.

The pipeline will extend from the Goudkoppies WWTW north-eastwards up until the Crown Tailings complex. The pipeline will be buried, no more than 3 m, predominantly within an Eskom servitude. Ergo is in the process of having a wayleave agreement drafted so as to utilise their servitude. Eskom has agreed in principal.

Table 1-1: Location of the Goudkoppies Project

Province	Gauteng Province
Magisterial District / Local Authority	Soweto Magisterial District
District Municipality	City of Johannesburg
Local Municipality	City of Johannesburg Metropolitan Municipality
Nearest Town	Soweto
Property Name and Number	Diepkloof 319 IQ Mooifontein 225 IQ Goudkoppies 317 IQ
1: 50 000 Map Sheet	2627BB 2627BD

Plans depicting the study area can be found in Appendix A.

1.5 Project Activities

The proposed project will entail the installation of a water pipeline between the Goudkoppies WWTW and Crown Tailings complex. The specifications of the pipeline are as follows:

- 6 km in length buried at a depth of no more than 3 m;
- Welded with High Density Polyethylene (HDPE);
- Internal diameter of 500 mm; and
- Capacity of 231 litres per second.

The activities for the proposed project area summarised in Table 1-2 below.

Table 1-2: Project Activities for the Goudkoppies Project

Activity	NHRA Triggers	Description
GN 544, 9 (i)	Section 38 (1) a	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water with an internal diameter of 0.36 metres or more. <i>The envisaged 0.5 m diameter pipeline be constructed over a distance of approximately 6 000 m.</i>
GN 544, 11 (xi)	Section 38 (1) a	The construction of infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse. <i>The pipeline will cross one or more watercourses by way of a bridging structure to carry the pipeline.</i>
GN 544, 18 (i)	n/a	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse. <i>Certain portions of the pipeline may my buried underneath a water course.</i>

1.6 Client, Consultant and Landowner Contact Details

Contact details for the Goudkoppies Project and Digby Wells' project managers, and relevant landowners are provided in Table 1-3 to Table 1-5 below.

Table 1-3: Goudkoppies project manager contact details

Company	Ergo Mining (Pty) Ltd
Contact person	Mr Greg Ovens
Tel no	(011) 470 2600
E-mail address	greg.ovens@drdgold.com
Postal address	P.O. Box 390, Maraisburg, 1700

Table 1-4: Digby Wells Project Manager contact details

Company	Digby Wells Environmental
Contact person	Mr Mellerson Pillay
Tel no	(011) 789 9495
Fax no	(011) 789 9498

E-mail address	mel.pillay@digbywells.com
Postal address	Private Bag X10046, Randburg, 2125

Table 1-5: Landowner contact details

Farm Name	Portion	SG Code	Description	Landowner	Contact Person	Contact Details
Diepkloof 319 IQ	146	T0IQ00000000 031900146	Crown Complex	Ergo Mining(Pty) Ltd	Mr Greg Ovens	Tel: (011) 470 2600 Address: P O Box 390 Maraisburg,1700 E-mail Address: greg.ovens@drdgold.com
Mooifontein 225 IQ	115	T0IQ00000000 022500115	Crown Complex	Ergo Mining(Pty) Ltd		Tel:(011) 470 2600 Address: P O Box 390 Maraisburg,1700 E-mail Address: greg.ovens@drdgold.com
Goudkoppie 317 IQ	R/E	T0IQ00000000 031700000	Waste Water Treatment Plant (Proclamation Area S.G. No. 3806/1989)	City of Johannesburg Metropolitan Municipality	Ms Lebo Molefe Acting Unit Head for EIA	Tel:(011) 587 4212 Address:118 Jorrissen Street, 6th Floor, Traduna House, Johannesburg 2001 E-mail Address: lebomol@joburg.org.za
Registered Eskom Servitude		Registered servitude for existing power lines	Not Applicable	Eskom Holdings	Mr Wikus Snyman Land Development Manager	Tel: (011) 711 3116, Address: 204 Smit Street Braamfontein 2017 E-mail Address: wayleavejhb@eskom.co.za
Road Crossings						
Road	Description	Landowner		Contact Person		Contact Details
M70	Soweto Highway	City of Johannesburg Metropolitan Municipality		Ms Lebo Molefe Acting Unit Head for EIA		Tel:(011) 587 4212 Address:118 Jorrissen Street, 6th Floor, Traduna House, Johannesburg 2001 E-mail Address: lebomol@joburg.org.za
M68	Chris Hani Road	City of Johannesburg Metropolitan Municipality		Ms Lebo Molefe Acting Unit Head for EIA		Tel:(011) 587 4212 Address:118 Jorrissen Street, 6th Floor, Traduna House, Johannesburg 2001 E-mail Address: lebomol@joburg.org.za
M79	Masopha Street	City of Johannesburg Metropolitan Municipality		Ms Lebo Molefe Acting Unit Head for EIA		Tel:(011) 587 4212 Address:118 Jorrissen Street, 6th Floor, Traduna House, Johannesburg 2001 E-mail Address: lebomol@joburg.org.za

1.7 Expertise of Specialist

The following specialists provided input for the NID for the Goudkoppies Project:

Natasha Higgitt has obtained her BA Honours degree in Archaeology in 2010 from the University of Pretoria. She currently holds the position of Assistant Heritage Consultant: Archaeology Specialist at Digby Wells. She has more than three years' experience in

archaeological surveys and gained further generalist heritage experience since her appointment at Digby Wells in South Africa and Liberia. Natasha is a professional member of the Association of Southern African Archaeologists (ASAPA) (Member No: 335).

Justin du Piesanie obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. He currently holds the position of Heritage Management Consultant: Archaeologist at Digby Wells. He has over 5 years combined experience in HRM in South Africa, gaining further generalist experience since his appointment at Digby Wells in Burkina Faso, the Democratic Republic of Congo, Liberia and Mali.

Justin is a professional member of the ASAPA (*Member No. 270*) and the International Council on Monuments and Sites (ICOMOS) South Africa (*Member No. 14274*).

The curriculum vita of the specialists is attached as Appendix B.

2 Policy and Legal Framework

The NHRA is the overarching legislation that protects heritage resources and regulates their management. The HRM process completed for the Goudkoppies Project was done in accordance with s. 38(8), where impacts on heritage are assessed in terms of other legislation – the NEMA in this instance.

These specific legislative requirements are discussed separately below.

2.1 NEMA Regulations

According to section 22 of the NEMA Regulations 543, a Basic Assessment report must contain a description of the cultural and heritage aspects within the environment that may be affected by the proposed activity.

2.2 NHRA

The HRM approach developed and implemented by Digby Wells is founded on section 38(1) and 38(2) of the NHRA. These sections of the Act require that Heritage Resources Authorities (HRA's), in this case the South African Heritage Resources Agency (SAHRA) and the Provincial Heritage Resources Authority - Gauteng (PHRA-G) be notified as early as possible of any developments that may exceed certain minimum thresholds. The heritage specialist is required to provide SAHRA and PHRA-G with sufficient information regarding the proposed development in order to determine whether a comprehensive Heritage Impact Assessment (HIA) is required. SAHRA and PHRA-G should respond within 14 days whether or not a HIA is required, and if required should state which specialist studies should be included.

3 NID methodology

3.1 Definitions

Sources of risk to heritage resources can, essentially, be divided into three broad categories, as follows:

- **Direct or primary effects** on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work.
- **Indirect, induced or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access.
- **Cumulative effects** on heritage resources result from in-combination effects on heritage resources acting with a host of processes that are insignificant when seen in isolation, but which collectively have a significant effect.

(Winter & Bauman 2005: 36)

3.2 Definition of the Study Area

Given that no individual identified heritage resource can exist in isolation to the wider natural, social, cultural and heritage landscape, two concentric study areas were defined for the purposes of this study. Defining these 'zones of influence' had a two-fold purpose:

- First, it provided the context within which identified heritage resources need to be interpreted and understood to determine cultural significance; and
- Second, assessing the significance of impacts on heritage resources corresponding to the three impact categories listed above (An Impact Assessment was not part of the SoW of this study).

The local study area was defined as the affected local municipality. The local study area was specifically examined to provide a historical backdrop within which the proposed development will occur. The local study area is depicted in Figure 3-1.

The site-specific study area was defined as the bounded project area i.e. the farm portions, within which the development will physically intrude through the construction of project infrastructure and project-related activities. The site-specific study area is depicted in Figure 3-2.

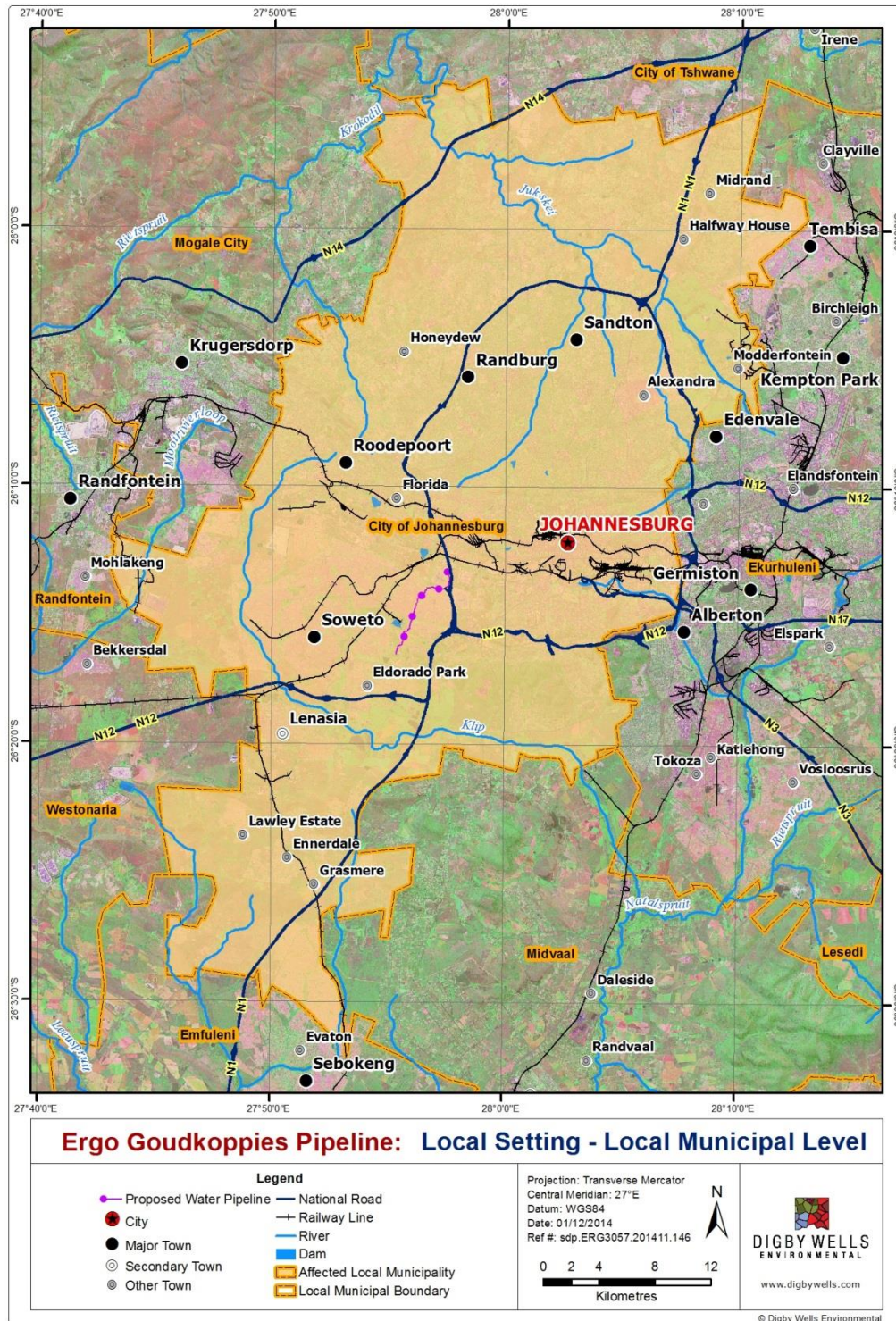


Figure 3-1: Local Study Area of the Goudkoppies Project

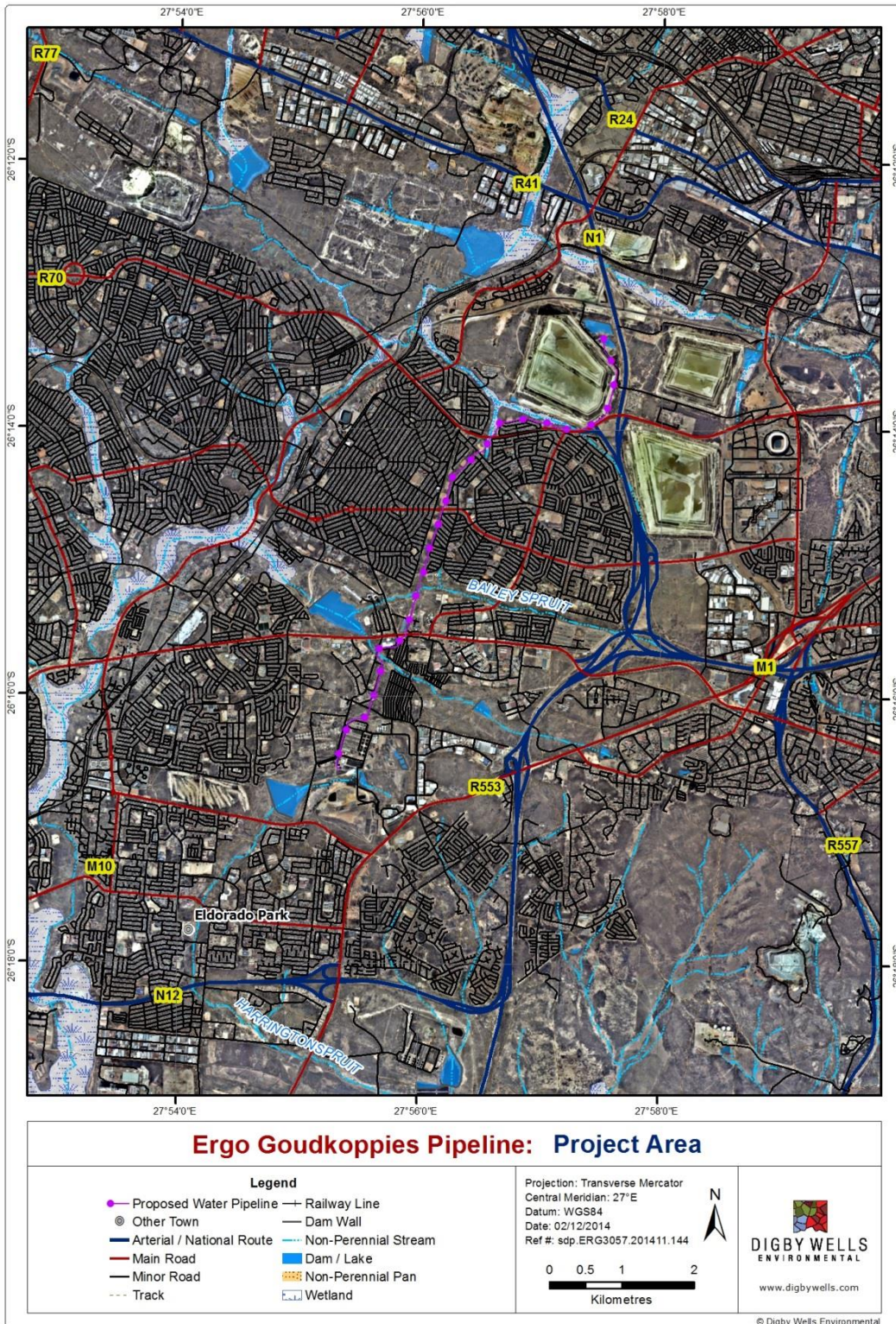


Figure 3-2: Site Specific Study Area of the Goudkoppies Project

3.3 Data Collection

3.3.1 Desktop and Text-Based Data Collection

Data collection was aimed at information gathering relating to known heritage resources within and surrounding the proposed area for development. Information was obtained through a high-level literature review of credible information sources such as previous impact assessments, books, databases and website articles. This will give context to the project area and any identified heritage resources to evaluate potential impacts to the resources. It will also allow for appropriate recommendations for exemption for further assessments.

Sources that were used to inform the findings are fully referenced under section 7 of this report, and are briefly listed in below.

Table 3-1: Relevant reviewed published sources

Author	Source type	Project/area
Huffman & Calabrese, 1997	Archaeological Survey	Diepkloof, Rivasdale and Pimville
Van Schalkwyk, 2003	Heritage Survey	Aerton
Fourie, 2007	Heritage Scoping Report	Misgund 322IQ
Brodie, 2008	Book	Johannesburg
Pato, 2008	Book	Johannesburg
Ndvhoho & Magoma, 2010	Phase HIA	Power Park, Rivasdale and Pimville
Birkholtz, 2011	HIA	Boksburg
Kusel, 2013	Phase 1 HIA	Naturena

3.4 Historical Layering

Historical layering is a process whereby diverse cartographic sources from various time periods are reviewed to identify built structures that may possibly be older than 60 years old with a project area. The rationale behind historical layering is as follows:

- Provides relative dates based on the presence/absence of visible features; and
- Identifies potential locations where heritage resources may exist within an area.

Cartographic sources referred to in this report include are listed in Table 3-2.

Table 3-2: Cartographic sources relevant to the Goudkoppies project

Aerial photographs						
Job no.	Flight plan	Photo no.	Map ref.	Area	Date	Reference
314	006	43620	2627	Johannesburg/Vereeniging	1952	1952/006
	007	44544	2628			1952/007

3.5 Site Naming

Sites that were identified in previous assessment reports are named or numbered according to the systems used in the respective reports but are prefixed with the relevant report or case number and site number, for example **1997-SAHRA-0008/Site 1**.

Where report or case numbers do not exist, the site number is prefixed with report author and site number, for example **Huffman-1997/Site 1**.

Sites identified during baseline research are prefixed by the SAHRIS case number assigned to the Goudkoppies Project followed by the map sheet number; relevant heritage resources type (i.e. Iron Age) and site number. For example: **6854/2627BD/IA/001**

This number may be shortened on any plans or maps to the relevant heritage resources type suffixed with the site number used in that report. For example: **IA/001**

3.6 Constraints and Limitations

The following restrictions and limitations were encountered:

- No site visit was undertaken by the Heritage Specialist. Photographs in the report were supplied by the Aquatic and Biophysical specialists;
- Information contained in the report is limited to desktop studies only;
- No palaeontological assessment was conducted as the project is an area of low palaeontological sensitivity and no deep excavations will occur during the construction phase.

4 Cultural Heritage Baseline Discussion

4.1 Introduction

The results from the information sources reviewed indicated that the majority of the heritage resources located within the local study area are from the historical period (Figure 3-1).

While briefly considering the palaeontological sensitivity of the local study area, the cultural heritage baseline primarily focuses on the historical period.

4.1.1 Palaeontological Baseline

The underlying geology of the Goudkoppies proposed pipeline lies over formations associated with the *Central Rand Group (Turffontein Subgroup)* and the *Ventersdorp Supergroup (Klipriviersberg Group)* (See Figure 4-1). Formations associated with the *Klipriviersberg Group* and the *Turffontein Subgroup* are considered to have low sensitivity and are not considered within this report (SAHRIS, 2014).

According to the Palaeo-Sensitivity Map (PSM) hosted on SAHRIS, the project area is considered to have a low palaeontological sensitivity as shown in Figure 4-2 below. A low palaeontological sensitivity indicates that the underlying geology is not conducive to the presence of palaeontological resources such as fossils.

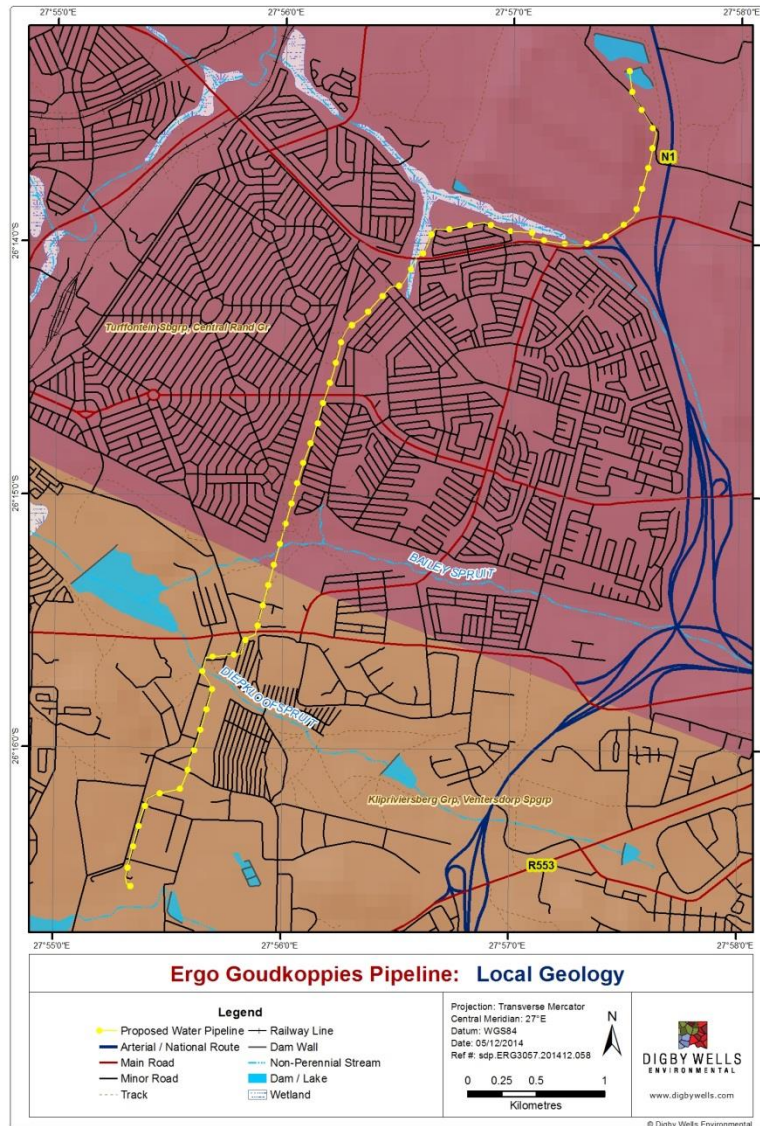


Figure 4-1: Geology of the Goudkoppies Project



Figure 4-2: PalaeoSensitivity of the Goudkoppies Project area

4.1.2 Historical and Recent Period

The project area is situated between the suburbs of Klipspruit, Orlando, Pimville and Diepkloof and the history of these areas are briefly highlighted below.

In 1886 gold was discovered by George Harrison on the farm Langlaagte. Following this discovery, prospecting rights on the portion of Langlaagte where gold was found were granted and the rapid growth of the Witwatersrand began (von Ketelhodt, 2007). Migrant labour from all over the world and the country flocked to Johannesburg in hope of work on the mines. By the mid 1890's, over 100 000 people were living in the city. Black mine workers were forced to live in large compounds where between 20 and 50 men would sleep in a room, huddled in rows. This led to the spread of many infectious diseases (Brodie, 2008).

Following an alleged outbreak of the bubonic plague in the inner city in 1904, black inhabitants were removed from Brickfields to an area next to a sewage dumping site (today known as the suburb Klipspruit) and housed in emergency housing known as *e'Tenki*. The Town Council awarded a sanitation concession that would see the construction of the Klipspruit Sewage Farm in 1908. By 1934, a section of Klipspruit was renamed Pimville after Councillor J H Pim (Pato, 2008).

To the east of Klipspruit, lies the suburb of Orlando (named after the first Chairman of the Native Affairs Commission Councillor E Orlando Leake) which was established in 1930 by the City Council. Orlando has been the site of a number of iconic moments and individuals in South Africa's history, such as the Soweto Uprising on 16 June 1976 (a peaceful turned violent protest against the Bantu Education system) and was the home of the late Nelson Rolihlahla Mandela (Pato, 2008). With the expansion of Johannesburg, came in increasing need for electricity. The Orlando Power Station was built between 1939 and 1955 (Krige, 2010) to address the cities ever growing demand for power. The spray pond of the power

station made use of the effluent from the Klipspruit Sewage Plant for the cooling process (EWISA, n.d). The power station that was built by 1955, was decommissioned in 1998 and has been in a state of neglect ever since. However the cooling towers have become a tourist attraction and media billboard, making it a landmark in the area (South African Tourism, 2014).

To the east of Orlando is the suburb of Diepkloof which was established in 1956 and was inhabited by individuals who were relocated from Johannesburg's Western Suburbs. The historical aerial imagery below (Figure 4-3) shows Diepkloof in 1952 as agricultural plots before the suburb was established. The already well established Orlando is situated to the west of the agricultural fields.

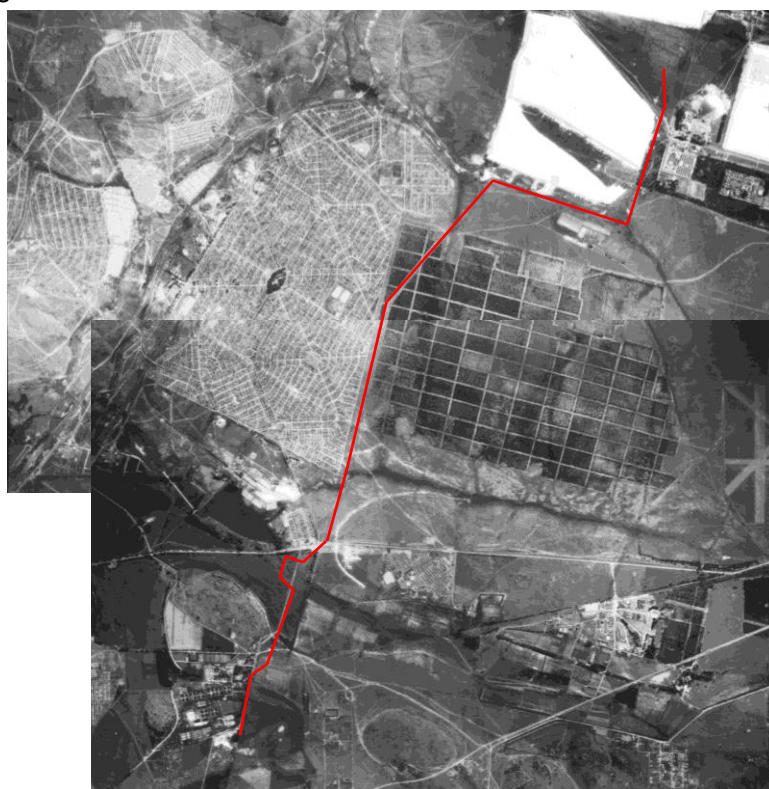


Figure 4-3: Historical aerial imagery of the Goudkoppies Project area in 1952

A total of five heritage reports conducted in the surrounding area were reviewed for the Goudkoppies project. Four of the heritage studies reported no identified heritage sites in their respective project areas (Fourie, 2007; Kusel, 2013; Ndvhoho & Magoma, 2010; Van Schalkwyk, 2003). Two open air churches were identified by Huffman and Calabrese (1997). See Figure 4-4 below for identified sites and Appendix C for the site list.

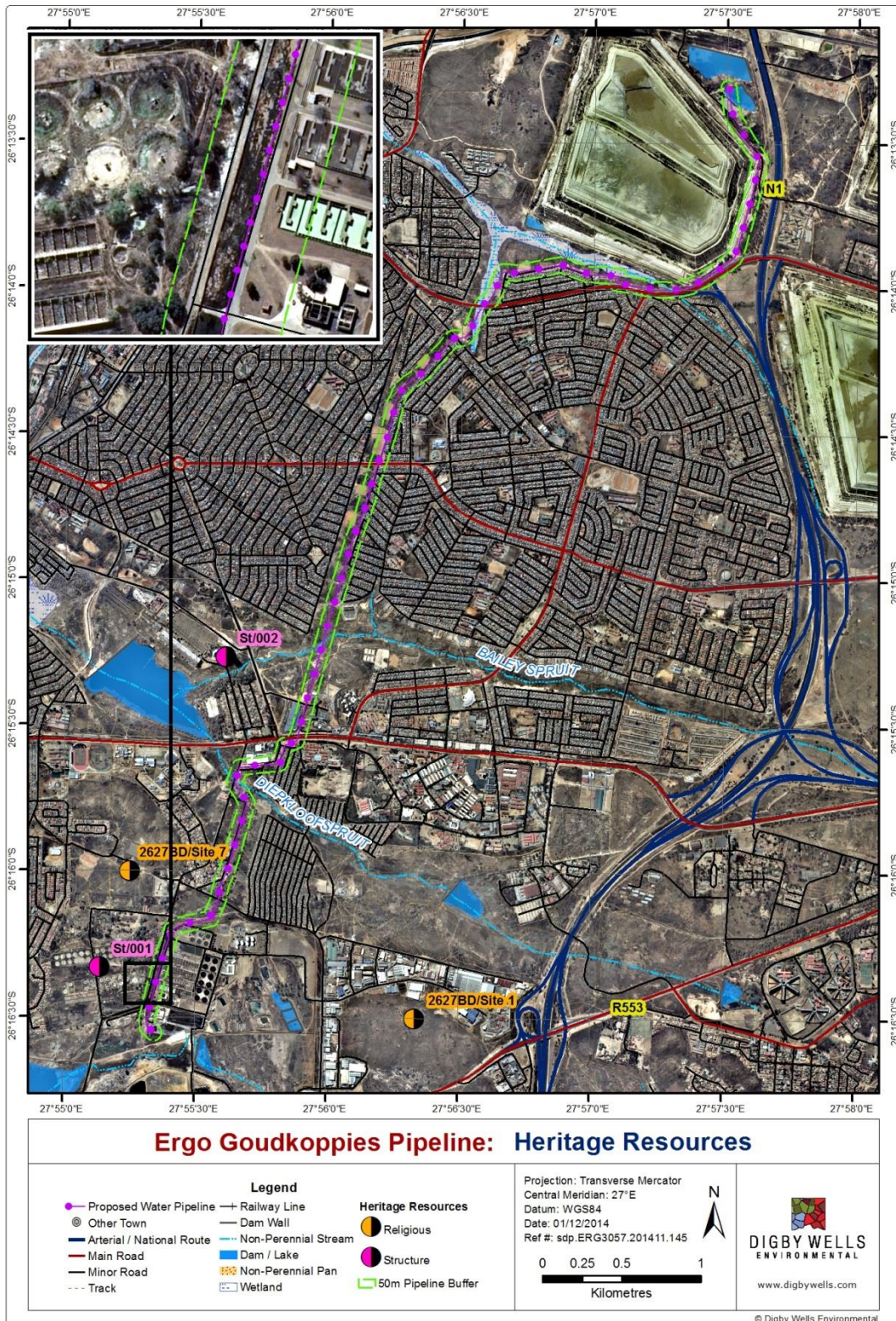


Figure 4-4: Identified Heritage Resources

4.2 Current Conditions of the Project Area

A site visit was conducted by the Aquatics and Biophysical specialists, who surveyed the proposed pipeline route and water crossing points. The pipeline route will be buried within an existing Eskom servitude for the majority of the route and has been heavily disturbed by roads, power lines and dumping (See Figure 4-5 to Figure 4-8).



Figure 4-5: View of the proposed pipeline route between the existing Eskom and road servitude, and the Crown Tailings Facility



Figure 4-6: View of existing pipelines running under a road through a culvert. The proposed pipeline will also run along existing pipeline routes



Figure 4-7: View of Eskom servitude which the proposed pipeline route will follow



Figure 4-8: View of Eskom servitude in which the proposed pipeline will run next to the Orlando Towers

4.3 Discussion Summary

No heritage resources were identified within the proposed pipeline route during the desktop study. As stated in the limitations in section 3.6, no heritage survey was conducted; however the Aquatics and Biophysical specialists who went out to site did not note any heritage resources such as historical structures, graves or open air churches within the proposed pipeline route. Additionally, no built structures are located within the pipeline route as it is a registered Eskom servitude. The Eskom servitude is 100 m in width and already acts as buffer for any built structure on either side of the servitude. The local study area can be characterised as a Struggle era landscape and has been developed over the years to a degree that the positive identification of *in situ* heritage is decreased significantly.

Heritage resources are located in the areas surrounding the proposed pipeline route; however they will not be impacted on by the proposed development.

The geology of the project area is not conducive to the presence of fossils and the pipeline will only be buried at a depth of no more than 3 m and will not affect the bedrock.

The Klipspruit Sewage farm is older than 60 years and is under general protection in terms of section 34 of the NHRA and any changes to these structures will require a permit under section 34. The proposed pipeline will run adjacent to the Klipspruit Sewage farm from the current Goudkoppies WWTW at a distance of 65 m. An arbitrary 50 m buffer was placed on either side of the pipeline, as depicted in the zoom insert in Figure 4-4. The pipeline will be constructed beneath the existing Eskom servitude and between two roads that already serve as buffer, therefore the Klipspruit Sewage farm will not be directly impacted on by the proposed pipeline.

The Crown Tailings Facility in the far north of the historical photograph (Figure 4-3) are well over 60 years old as they are already very well established in 1952. They are protected under section 34 of the NHRA and any changes to these structures will require a permit under section 34. However, the pipeline and 50 m buffer will run on the outside of the tailings facility and will not directly impact them as shown in Figure 4-4.

The Orlando Power Station and cooling towers are protected under section 34 of the NHRA, and any changes to the structures will require a permit in terms of section 34 of the NHRA. However the proposed pipeline route and 50 m buffer will not directly impact the towers as depicted in Figure 4-4.

The two open air churches identified by a previous HIA are defined as places associated with oral traditions or living heritage (section 2 (b) of the NHRA) and must be protected. However, they are located over 300 m from the proposed pipeline and will not be directly impacted on as shown in Figure 4-4.

5 Sources of Risk

Sources of risk were determined considering the project activities that may impact on identified heritage resources (See Table 5-1).

Table 5-1: Identified sources of risk

Identified Project Activity	Description	Development as defined in NHRA	Sources of risk to heritage resources	Project Phase
GN 544, 9 (i)	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water with an internal diameter of 0,36 metres or more. The envisaged 0.5 m diameter pipeline be constructed over a distance of approximately 6000 m.	This activity constitutes development as defined in terms of NHRA Section (s) 2(viii) (a) construction, alteration, demolition, removal or change of use of a place or a structure at a place.	There are no sources of risk to identified heritage resources as they are not located within the proposed pipeline route.	n/a
GN 544, 11 (xi)	The construction of infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse. The pipeline will cross one or more watercourses by way of a bridging structure to carry the pipeline.	This activity constitutes development as defined in terms of NHRA Section (s) 2(viii) (a) construction, alteration, demolition, removal or change of use of a place or a structure at a place.	There are no sources of risk to identified heritage resources as they are not located within the proposed pipeline route.	n/a
GN 544, 18 (i)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse. Certain portions of the pipeline may be buried underneath a water course.	This activity constitutes development as defined in terms of NHRA s. 2 (viii) (e) and (f) any change to the natural or existing condition or topography of land; and any removal or destruction of trees, or removal of vegetation or topsoil.	There are no sources of risk to identified heritage resources as they are not located within the proposed pipeline route.	n/a

5.1 Direct Impacts

Activities undertaken during the construction phase of the project have the greatest likelihood of resulting in direct impacts on heritage resources. Project activities associated with GN 544 9(i), 11(xi) and 18(i) (as described in Table 5-1) will result in site clearing and earthworks that could potentially alter, i.e. damage or destroy sub-surface or unidentified heritage resources.

Heritage resources identified during this study however are not located within the proposed pipeline routing and should not be directly impacted upon by the project related activities. While the Klipspruit Sewage farm is in close proximity, approximately 65 m from the pipeline, the pipeline will be buried below the Eskom servitude and between two roads which act as a buffer, and should therefore not be directly impacted on during site clearance.

5.2 Induced Impacts

Induced and/or secondary impacts on heritage resources are commonly associated with the operational phase of the project. Subsequent to the construction of the pipeline, the potential for secondary impacts from leaks or ruptures increases. This impact could potentially affect heritage resources that are located outside of the current impact footprint.

5.3 Cumulative Impacts

The installation of the proposed pipeline will add to the industrial landscape. This region is intrinsically linked to the history of Johannesburg and the political struggle of South Africa. The increase of an industrial landscape will erode at the sense of place of the area. This could potentially result in the gradual diminishing of the cultural significance of the region.

6 Conclusion and Recommendations

The surrounding area in which the proposed pipeline is situated is associated with the history of the early development of Johannesburg and the Apartheid Struggle. However the specific route that the proposed pipeline will follow will not directly impact any places or structures associated with these phases of history. Additionally, the sense of place of the surrounding areas will not be impacted as the proposed pipeline will be situated within already established servitudes.

The project activities will be restricted to the pipeline route within the existing Eskom servitude, and will not impact any of the identified heritage resources located outside of the proposed pipeline route. No heritage resources were identified within the proposed pipeline route or within 50 m on either side of the route. Based on the results and findings as discussed above, the likelihood of any heritage and/or palaeontological resources occurring in and near the proposed Goudkoppies Project is low.

Consequently, no sources of risk or impacts were identified for known heritage resources as they are located outside from the proposed pipeline route and 50 m buffer. However, potential sources of risks were identified such as accidental damage and/or destruction to sub-surface and/or unidentified heritage resources within the pipeline route.

Digby Wells thus requests a Letter of Exemption from any further heritage assessments with regard to the Goudkoppies Project be issued to Ergo. The project area is highly disturbed, therefore there is a low potential for the discovery of in situ archaeological or heritage remains. The pipeline will be buried no more than 3 m below the surface, therefore there will be a low potential for the bedrock to be impacted on, considering the geology of the area is of low palaeontological sensitivity.

Exemption should be considered for archaeological, palaeontological and built environment studies, as well as burial grounds and graves with the following conditions:

- The proposed pipeline route must maintain a minimum of 50 m buffer from any identified heritage such as the Orlando Power Station and Klipspruit Sewage farm; and
- Chance Finds Procedures (CFP's) must be compiled and implemented as part of the Environmental Management Plan (EMP) that in turn should include a register of applicable permits and Heritage authorisations that may be required in the event that any heritage resources protected in terms of ss. 27, 28, 29, 34, 35, 36 and 37 of the NHRA are impacted on

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Appendix A: Plans

Plan 1: Regional Setting of the Goudkoppies Project 1: 250 000

Plan 2: Local Setting of the Goudkoppies Project 1: 50 000

Plan 3: Site Specific Setting of the Goudkoppies Project 1: 10 000

Appendix B: CV of Specialist

Appendix C: Site list



DIGBY WELLS
ENVIRONMENTAL



Proposed Construction of a Treated Water Pipeline from the Goudkoppies Waste Water Treatment Works to the Crown Complex near Diepkloof, Soweto

Environmental Management Programme

Project Number:

ERG3057

Prepared for:

Ergo Mining (Pty) Ltd

January 2015


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This document has been prepared by Digby Wells Environmental.

Report Type:	Environmental Management Programme
Project Name:	Proposed construction of a Treated Water Pipeline from the Goudkoppies Waste Water Treatment Works to the Crown Complex near Diepkloof, Soweto
Project Code:	ERG3057

Name	Responsibility	Signature	Date
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1 Introduction

Ergo Mining (Pty) Ltd (Ergo) is a mid-tier gold producer and a world leader in terms of reclaiming historic gold Tailings Storage Facilities throughout the Witwatersrand Mining area.

Once the reclamation process has concluded, Ergo, as part of their environmental policy, endeavours to rehabilitate the reclaimed facilities in line with best practice guidelines.

One such facility undergoing rehabilitation is their Crown Tailings complex situated near Diepkloof, Soweto. This facility is irrigated on a daily basis to promote and sustain vegetation growth on the slopes of the facility to reduce erosion, dust generation and maintain slope stability. Currently, potable water from Rand Water is utilised for irrigation and Ergo envisages to instead utilise treated effluent from the Goudkoppies Waste Water Treatment Works (WWTW) for the irrigation of the Crown Tailings complex.

The treated water from the Goudkoppies WWTW will pass through an additional filtration process to ensure further removal of suspended solids. This water will then be pumped to the Crown tailings complex, from where it will be utilised for irrigation. The details of the proposed pipeline include:

- Approximately 6 km in length and welded with a High Density Polyethylene (HDPE) liner (lack of flanges and couplings will ensure no possible areas of leakage);
- The volume of treated water to be pumped will total 231 litres per second (20 mega litres a day); and
- The internal diameter of the pipeline will be 500 mm (0.5 m).

Approval has been granted by the Department of Water and Sanitation (DWS) for the proposed use of treated water for mining related water requirements. The Gauteng Department of Agriculture and Rural Development (GDARD) recently approved the Rondebult pipeline from Elsburg Tailings Complex to Rondebult Waste Water Treatment Works for this same requirement.

The pipeline will extend from the Goudkoppies WWTW north-eastwards up until the Crown Tailings complex. The pipeline will be buried predominantly within an Eskom servitude. Ergo is in the process of having a wayleave agreement drafted so as to utilise their servitude, however Eskom has agreed in principal.

1.1 Environmental Principles

The following principles should be considered at all times during the construction and operational phase activities:

- The environment is considered to be composed of both biophysical and social components;

- Construction is a disruptive activity and all due consideration must be given to the environment, including the social environment, during the execution of this project to minimise the impact on affected parties;
- Minimisation of areas disturbed by construction activities (i.e. the footprint of the construction area) should reduce many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs;
- The environment is held in public trust for the benefit of people, due care must therefore be exercised to ensure that the rights of others with respect to its use are respected. This requires that a risk averse and cautious approach to the management of activities associated with the project be adopted at all times.

This Environmental Management Programme (EMPr) should be made binding and enforceable on all the parties involved in the development of the proposed Goudkoppies Water Pipeline project, including the project applicant and contractors at the different operational management levels.

1.2 Purpose for this Report

An EMP is an environmental management tool that is implemented with the objective of mitigating the undue or reasonably avoidable adverse impacts associated with the development of a project and to enhance any potential positive impacts that could be realised due to the development of a project.

This draft EMP was based on the outcomes of the Basic Assessment (BA) process that was undertaken for the proposed development of the Goudkoppies water pipeline transporting treated wastewater to the Crown Tailings Facility. Based on the nature and extent of the proposed Goudkoppies Water Pipeline project and the understanding of the significance of anticipated impacts that will be experienced, the Applicant will minimise the social and environmental impacts by implementing a number of management measures. Ergo intends on reusing treated waste water instead of using potable water. The water used on site will also be re-captured and re-used as much as possible during the irrigation activity. A number of potentially problematic issues have been avoided by the choice of the placement of the pipeline which has minimised a number of the environmental impacts. The management and mitigation measures that were recommended to mitigate impacts to the environmental, socio-economic and heritage environment to an acceptable level are thus systematically addressed in the EMPr.

The specific objectives of this report are to:

- Define environmental management objectives to achieve an acceptable environmental standard and long-term sustainability of the proposed Goudkoppies Water Pipeline project;

- Outline mitigation measures and environmental specifications that will be required to be implemented during the construction, operational and decommissioning phases of the proposed Goudkoppies Water Pipeline project;
- Formulate plans to manage specific environmental features that are known to be significantly affected during project implementation as a precautionary measure; and
- Propose mechanisms to monitor the implementation of the mitigation measures.

2 Description of Environmental Objectives and Specific Goals

The environmental objectives of the Ergo Operations are as follows:

- Not to endanger public health and safety nor animal health and safety;
- To ensure pollution is mitigated and managed;
- Areas are rehabilitated to a state that it is suitable for the predetermined and agreed land use;
- To ensure that the operations are not an economic, social or environmental liability to the local community or the state now or in the future;
- To ensure that the operations (Goudkoppies Water Pipeline) are not abandoned but closed in accordance with the relevant requirements when applicable;
- Optimal utilisation and maintenance of the structure/pipeline in a well-planned manner;
- The sustainable and responsible utilisation (re-use) of all water resources and the prevention of pollution thereof wherever possible;
- To ensure that the interests of all interested and affected parties are considered.

2.1 Responsibility of Implementing the EMP

2.1.1 Roles and responsibilities

The key personnel to ensure compliance to this EMP report will be the operational staff, Group Environmental Manager, Environmental Co-ordinator and Site Environmental Co-ordinators, Environmental support staff as well as a Human Resources Manager.

As a minimum, these roles as they relate to the implementation of monitoring programmes and management activities will include:

- Operational staff
 - Execute the management / mitigatory measures identified in the EMP; and
 - Ensure adequate resources to execute the EMP.
- Group environmental manager

- Oversee the role of the site-specific environmental co-ordinator.
- Environmental Co-ordinator (will report as a minimum to the Group Environmental Manager and Mine Manager)
 - Ensure that the monitoring programmes are scoped and included in the annual mine budget;
 - Conduct appropriate environmental awareness training to contractors and monitoring staff;
 - Identify and appoint appropriately qualified specialists/engineers to undertake the programmes; and
 - Appoint specialists in a timeously manner to ensure work can be carried out to acceptable standards.
- Environmental Support Staff
 - Provide specialist guidance on environmental issues;
 - Manage consultants; and
 - Audit and report on compliance.
- Human Resources Manager
 - Establish and maintain good working relations with surrounding communities and landowners.

3 Environmental Training and Awareness Plan

The purpose of an Environmental Training and Awareness Plan is to outline the methodology that will be used to inform employees or contractors of any environmental impacts which may result from their work, any sensitivities they needs to be made aware of and any environmental issues that exist and the manner in which the impacts must be dealt with in order to avoid pollution to, or the degradation of, the environment.

3.1 Responsibilities

Contractors will be employed and used during the construction of the pipeline. The Environmental Co-ordinator must ensure that all contractors involved in the construction of the project receive adequate training on environmental issues and are adequately aware of the contents of the EMP. During the operational phase, the Environmental Co-ordinator will ensure the pipeline is monitored to detect any defects or leakages.

3.2 Timeframe and Training Requirements

All construction workers and their supervisors will undergo environmental awareness training prior to working at the proposed Goudkoppies Water Pipeline project site. A site induction will be held for the local labour pool and for any new employees who join the project. The induction aims to highlight all sensitive areas which need to be avoided by the construction workers. The employees must be made aware of the wetlands surrounding the area, the communities and residential areas in close proximity to the construction site and the chance find procedures in case any artefacts, ornaments or related structures are encountered on site during construction.

The induction will include training on the following components:

- The social and environmental context within which the wastewater transporting pipeline will be constructed;
- The risks associated with the activities which workers and supervisors will be responsible for and the associated mitigation measures;
- The management measures which apply;
- The relevant procedures and protocols to be followed; and
- The roles and responsibilities for implementing mitigation measures.

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the client and / or a translator should be called to the site to further explain aspects of environmental or social behavior that are unclear.

3.3 Performance Management

The effectiveness of the environmental management training and awareness building interventions will be evaluated by:

- The performance as recorded by the site inspections (conducted by the Environmental Co-ordinator) aimed at evaluating the environmental awareness of the contractors, and
- Analysing the root causes of environmental incidents, including non-conformance to legal requirements, to determine which incidents were caused by a lack of environmental awareness and training.

4 Environmental Management Programme

The purpose of this section is to define the environmental objectives, management measures and action plans for each of the identified impact. Impact assessment was conducted utilising the following methodology for the pipeline project:

In order to assess impact for the proposed pipeline, several site visits were undertaken by various specialists and members of the public participation team. Following this, the area was researched and information collected from the client, governmental departments, reference books and internet sources.

The significance of an impact follows the established impact assessment process:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Where: Consequence = Severity + Spatial Scale + Duration

Probability = Likelihood of an impact occurring

Considering the above elements, each identified impact has been assessed qualitatively and categorised into either: low, medium or high significance. The rating is applied both prior to and after mitigation. Those impacts that are not reduced post mitigation will require particular attention to ensure they are adequately managed. Impacts that result in a positive outcome will be noted as such.

Table 1: Impact Assessment methodology

Significance	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
High	Significant impact on highly valued species, habitat or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	<u>Provincial</u> Will / could have impacts that affect issues on a provincial level.	<u>Permanent</u> Likely to be permanent however mitigation measures of natural process will reduce the impact.	Almost certain / Highly probable It is most likely that the impact will occur.

Significance	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
Medium	Moderate, short-term effects but not affecting ecosystem functions. Rehabilitation requires intervention and can be undertaken within a year.	Ongoing social issues. Damage to items of cultural significance.	<u>Local</u> Municipal Local impacts extending as far as the development site area but may spread locally into the municipal area.	<u>Medium term</u> Impact may last beyond the construction phase.	Probable – <u>Likely</u> Has occurred here or elsewhere and could therefore occur.
Low	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with / without help of external consultants.	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Limited to the site and its immediate surroundings.	Short term Duration of construction phase.	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.

Table 2: Construction phase EMP

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Visual	Reduce the visual impact to surrounding land owners and users.	<ul style="list-style-type: none"> Due to the nature of the area, there is natural screening available from the natural vegetation, undulating topography and buildings. There will be minimal equipment and machinery used and workers will not be staying on site. No open fires will be allowed on site. Each section must be excavated, pipeline buried and site rehabilitated prior to moving onto the adjacent site. 	Weekly inspections of the completed pipeline sections.	N/A	Environmental Officer	Low
Air Quality	To minimise the risk of air pollution from fugitive dust caused by vehicle and machinery movement and the handling of materials.	<ul style="list-style-type: none"> Where dirt roads are used as access points, dust should be controlled by watering the roads and reducing the movement of trucks. Speed is to be limited to 40km/hr. During particularly windy and dry conditions, the general site must be watered to reduce dust levels. 	Daily during windy conditions.	N/A	Environmental Officer	Low
Noise	To keep noise levels to acceptable limits and reduce noise in built up areas	<ul style="list-style-type: none"> Construction activities to only take place during daylight hours. Construction related machinery and vehicles must be serviced regularly to reduce noise. Equipment to be switched off when not in use. 	Ongoing	N/A	Environmental Officer	Low

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Fauna and Flora	<p>To prevent unnecessary destruction of the natural vegetation.</p> <p>Not to adversely affect, other than by pipeline construction, the wildlife in the area or to harm any animal life found on the property and to prevent unnecessary destruction of natural habitat for animal life.</p>	<ul style="list-style-type: none"> ▪ Construction activities and clearing of vegetation to be limited to within the servitude of the pipeline and to a maximum of the following week's area of construction. ▪ Contaminated soils from oil spillages and any other oil waste must be collected in a designated container and removed to the Holfontein waste disposal facility once construction is complete. ▪ Rehabilitation of areas disturbed during construction must occur concurrently to pipeline construction activity i.e. once a section of pipe has been buried; it needs to be rehabilitated with vegetation similar to the surrounding vegetation. ▪ Monitoring of sites post construction to be implemented to ensure rehabilitation is successful with a focus on controlling alien invasive species. 	<p>Weekly inspections of the completed pipeline sections.</p> <p>Monthly monitoring post construction for first 3 months.</p>	<p>Incorporate the pipeline route into the existing Ergo bio-monitoring network.</p> <p>Rehabilitate where required.</p>	Environmental Officer	Low

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Wetlands	To not further degrade the existing wetlands in the area.	<ul style="list-style-type: none"> ▪ Access of people and vehicles to the wetlands along the pipeline construction servitude must be restricted as far as possible. ▪ Steel sleeves must be fitted over the pipeline at the wetland crossing. ▪ All construction personnel must be educated with regards to the sensitivity of the area. ▪ Highly sensitive areas to be surveyed and indicated by markers prior to site construction. ▪ When constructing the pipeline through the wetland, work must be continuous and completed without delay so that water is not allowed to pond. 	<p>Daily monitoring while construction is underway in the wetland.</p> <p>Weekly inspections of the completed pipeline sections.</p>	<p>Incorporate the pipeline route into the existing Ergo bio-monitoring network.</p> <p>Rehabilitate where required.</p>	Environmental Officer	Low

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Aquatics	To not further impact on the already extensively modified aquatic ecosystem.	<ul style="list-style-type: none"> ▪ Eroded sediments must be captured; this can be completed through the use of screening nets and paddocks in drainage channels where construction is occurring or along roadways. ▪ The pipelines should be constructed over existing water crossings (where feasible). ▪ The use of heavy machinery adjacent the water crossings must be avoided where possible. ▪ The portion of the pipeline crossing the wetland areas must be a continuous length of pipeline, i.e. contain no flanges. ▪ All hydrocarbons must be stored away from riparian systems, the changing of oil and lubricants as well as the filling of fuels should be completed at a designated workshop with adequate surface water collection facilities. ▪ Building materials must be stored away from riparian/wetland areas so as to reduce potential runoff entering the aquatic systems. ▪ On site hydrocarbon spill kits must be present on site should a spillage occur. 	<p>Daily monitoring while construction is underway in the wetland.</p> <p>Weekly inspections of the completed pipeline sections.</p>	<p>Incorporate the pipeline route into the existing Ergo bio-monitoring network.</p> <p>Rehabilitate where required.</p>	Environmental Officer	Low

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Soils	To prevent loss of soil quality through contamination, erosion and compaction.	<ul style="list-style-type: none"> ▪ The area being cleared of vegetation for the construction activities must be limited to the servitude for the pipeline. ▪ Construction activities should preferably take place during the dry months. ▪ All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed. Rehabilitation to be monitored post construction. ▪ The refueling of vehicles must take place off site. ▪ Soils tripping should be done in two (2) steps to improve the natural rehabilitation chances. The topsoil (30 cm) must be stripped and stockpiled on one edge whilst the rest of the excavated soil is to be placed on the opposite edge of the trench. When the trenches are to be backfilled the subsoil is to be place in first with the topsoil placed on top. ▪ Stockpiling of the pipes to be installed must be limited and only be stored in designated areas. 	Weekly inspections	Rehabilitate where required	Environmental Officer	Low

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Heritage	To prevent any impacts to heritage resources and preserve any artefacts unearthed.	<ul style="list-style-type: none"> ▪ Should graves, fossils or any archaeological artefacts be identified during construction, work on the area where the artefacts were found must cease immediately and it should immediately be reported to a heritage practitioner who will conduct a chance find procedure ▪ A brief environmental awareness programme will be discussed with local workforce to ensure they are aware of the probability and procedure in place should any artefacts be unearthed. 	Ongoing	Should anything to unearthed – apply the chance find procedure	Environmental Officer and Heritage Specialist	Low
Social	To minimise the nuisance factor to local residents.	<ul style="list-style-type: none"> ▪ Land owners, road and land users to be timeously informed of any inconvenience brought about through the construction of the pipeline. Where required, notices to inform of any delays, road closures or construction activities are to be place at the site at least a week before construction to take place. ▪ If traffic is to be affected, construction is not to take place in peak hour traffic times and should only take place between 09:00am to 15:30pm in high density traffic areas. ▪ A grievance mechanism must be put in place to adequately record and address issues and concerns raised by stakeholders. 	Ongoing	Community liaison if and when required	Community Liaison Officer	Low

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
General	Minimise waste and pollution.	<ul style="list-style-type: none"> ▪ Adequate forms of chemical sanitation must be provided and placed within 100 m of worker activity and serviced on a regular basis. ▪ Sealable waste bins must be provided by the contractor and serviced regularly. ▪ Waste to be segregated on site into appropriately labelled storage bins must be regularly removed from site. ▪ General housekeeping will be enforced and monitored. ▪ Post construction of each pipeline section, the site will be inspected for litter and general waste, as well as success of rehabilitation. 	Ongoing Weekly removal of waste from site	N/A	Environmental Officer	Low

Table 3: Operational phase EMP

Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Recommended Action Plans	Responsible Person	Significance after Mitigation
Soils	Reduce risk of erosion during severe weather and poor rehabilitation	<ul style="list-style-type: none"> ▪ Monitoring of the entire pipeline route to take place post construction and routinely during operations to ensure the pipeline has been adequately rehabilitated ▪ Should the monitoring indicate potential problem areas, the relevant consultants will be brought in to remedy the impact 	Until the end of the first wet season and then annually thereafter.	Rehabilitate where required	Environmental Officer	Low
Water	Ensuring the re-use of waste water than using potable water for industrial processes	<ul style="list-style-type: none"> ▪ Where waste water can be further re-used, these measures should be implemented on site ▪ No contamination of surface or groundwater is anticipated for the pipeline and should there be leaks, the water quality is of a standard which will not result in negative impacts to water resources or fauna and flora. 	N/A	N/A	Environmental Officer	Medium (positive)

5 Action Plans

5.1 Monitoring

Currently Ergo are undertaking monitoring throughout their operations in Gauteng.

5.2 Rehabilitation

In areas where soils have been eroded or vegetation re-growth has been poor, Ergo need to undertake rehabilitation to stabilise soils, re-plant indigenous vegetation and undertake monitoring as set out in this EMPr. The effectiveness of such measures must be confirmed periodically.

5.3 Chance Find Procedure

The purpose of a chance find procedure (CFP) is to provide Ergo and their contractors with the appropriate response guidelines that should be implemented in the event of chance discovery of heritage resources.

5.3.1 Initial Identification

Heritage resources or Burial grounds and graves (BGG) may be identified during construction or accidentally exposed. The initial procedure when such sites are found aim to avoid any further damage. The following steps and reporting structure must be observed in both instances:

- The person or group (identifier) who identified or exposed the burial ground must cease all activity in the immediate vicinity of the site;
- The identifier must immediately inform his/her supervisor of the discovery;
- The supervisor must ensure that the site is secured and control access; and
- The supervisor must then inform the relevant Ergo Environmental Officer.

5.3.2 Chance Find Procedures: Heritage Resources

In the event that previously unidentified heritage resources are identified and/or exposed during construction or operation of the Project, the following steps must be implemented subsequent to those outlined in the section above.

- The Digby Wells Environmental (Digby Wells) project manager and/or Heritage Resources Management (HRM) Unit must be notified of the discovery;
- Digby Wells will assign a qualified specialist to consider the heritage resource, either via communicating with the Environmental Officer via telephone or email, or based on a site visit;
- Appropriate measures will then be presented to Ergo;

- Should the specialist conclude that the find is a heritage resource protected in terms of the NHRA (1999) Sections 34, 35, 37 and NHRA (1999) Regulations (Regulation 38, 39, 40), Digby Wells will notify the South African Heritage Resources Agency (SAHRA) and/or the Gauteng Provincial Heritage Resources Agency on behalf of Ergo; and
- Based on the comments received, Digby Wells will provide Ergo with a Terms of References Report and relevant associated costs if necessary.

5.3.3 Chance Find Procedures: Palaeontology and major finds

Should any finds related to bone clusters, Paleontology, major finds or fossils be unearthed, Digby Wells should be contacted and a site visit undertaken where after a recommended procedure will be drawn up.

6 Conclusion

This draft EMPr was based on the outcomes of the Draft Basic Assessment process that was undertaken for the proposed Goudkoppies Water Pipeline project.

The EMPr is a dynamic document, which must be updated when required. The EMPr must be made available to contractors to ensure the mitigating measures are understood and implemented on site. Follow up after each completed pipeline section should include an assessment of the adequacy of the mitigation measures and where necessary, these can be amended.