



ECOLOGICAL ASSESSMENT REPORT

HC van Wyk Diamonds Ltd

Diamond Prospecting Site

Remaining Extent of the Farm 503 (Werda)



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Remaining Extent of the Farm 503 (Werda)

District of Hay

Northern Cape Province

**Ecological Assessment Report in application for Environmental
Authorisation related to a Prospecting Right**

November 2016

EXECUTIVE SUMMARY

HC van Wyk Diamonds Ltd is proposing the prospecting of diamonds on the Remaining Extent of the Farm 503 (Werda). The prospecting right area is located within the Hay District Municipality of the Northern Cape Province. This terrestrial ecological assessment report describes the ecological characteristics of the proposed prospecting area, identifies the source of impacts from the operation, and assesses these impacts, as well as the residual impacts after closure.

A desktop study and field investigation was performed to obtain ecological information for the proposed study area and identify the ecological characteristics and sensitivity of the site. Five plant communities were identified on site of which the watercourses and woodland and grassland communities on the plains are included in the core prospecting area. The watercourses include several ephemeral pans and an ephemeral river, which are considered to be of very high sensitivity. The grassland and woodland community on the plains are considered to be of medium sensitivity. The most profound impacts are expected to be related to the destruction of watercourses and the alteration of aquatic habitats; which in turn will cause cumulative fragmentation of important ecological corridors in the area.

Species of conservation concern that are found in these earmarked habitats will most likely also be lost locally. These include the widespread *Olea europaea* subsp. *africana*; *Gymnosporia buxifolia* and *Euphorbia duseimata* in the woodlands; and *Harpagophytum procumbens* and *Ruschia* spp. in the grassland. Similarly, the prospecting operation will result in the large-scale clearance of indigenous vegetation. Additionally, any disturbances to the Aardvark burrows on site will displace this protected species locally. Permit applications regarding protected fauna and flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation or destruction of Aardvark burrows.

The destruction of the natural habitat within the study area is inevitable, but the significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the prospecting area. Therefore, authorisation should not be granted unless the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

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1. INTRODUCTION

1.1. Background information

HC van Wyk Diamonds Ltd is proposing the prospecting of diamonds on the Remaining Extent of the Farm 503 (Werda). The prospecting right area is located within the Hay District Municipality of the Northern Cape Province and lies ± 10 km south of the town Lime Acres on a secondary gravel road that turns from the R385 near Papkuil (Figure 1). The total extent of the prospecting right area is 2 068.6718 ha.

An ecological assessment is required in order to consider the impacts that the proposed activities might have on the ecological integrity of Werda and therefore Boscia Ecological Consulting has been appointed by the applicant to conduct an assessment and provide an ecological assessment report. This assessment report describes the characteristics of habitats in the proposed prospecting area, identifies species of conservation concern, identifies invasive and encroaching species and their distribution, indicates the source of impacts from the prospecting operation and assesses these impacts as well as the residual impacts after closure. A variety of avoidance and mitigation measures associated with each identified impact are recommended to reduce the likely impact of the operation. Ecological responsibilities pertaining to relevant conservation legislation are also indicated. These should all be included in the EMPR.

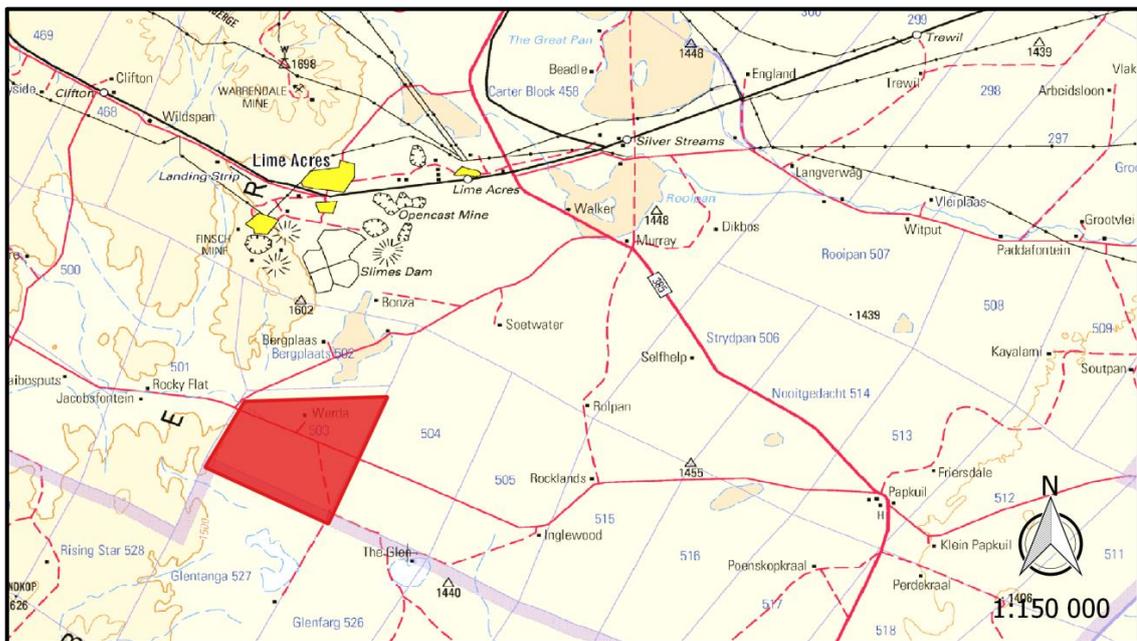


Figure 1. The location of the Werda prospecting area is indicated in red.

1.2. Scope of study

The specific terms of reference for the study include the following:

- conduct a desktop study and field investigation in order to identify and describe different ecological habitats and provide an inventory of communities/species/taxa and associated species of conservation concern within the environment that may be affected by the proposed activity;
- identify the relative ecological sensitivity of the project area;
- produce an assessment report that:
 - indicates identified habitats and fauna and flora species,
 - indicates the ecological sensitivity of habitats and conservation values of species,
 - determines the potential impacts of the project on the ecological integrity,
 - provides mitigation measures and recommendations to limit project impacts,
 - indicate ecological responsibilities pertaining to relevant conservation legislation.

1.3. Details of the specialist consultant

Company Name	Boscia Ecological Consulting cc	Registration no:	2011/048041/23
Address	PostNet Suite #194 Private Bag X2 Diamond 8305		
Contact Person	Dr Elizabeth (Betsie) Milne		
Contact Details	Cell: 082 992 1261	Email: BosciaEcology@gmail.com	
Qualifications	PhD Botany (Nelson Mandela Metropolitan University) Masters Environmental Management (University of the Free State) BTech Nature Conservation (Tshwane University of Technology)		

Declaration of independence

I, Elizabeth (Betsie) Milne declare that I:

- act as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have, and will not have any financial interest in the undertaking of the activity; other than the remuneration of work performed in terms of the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have any vested interest in the activity proceedings;
- have no, and will not engage in conflicting interest in the undertaking of the activities;
- undertake to disclose to the component authority any material information that have or may have the potential to influence the decision of the competent authority, or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- will provide the competent authority with access to all information at my disposal regarding the study.



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1.4. Description of the proposed activity

The prospecting operation is primarily based on gravel deposits that are believed to have derived from eroded diamondiferous Finsch kimberlite material. These gravels are mainly associated with quaternary deposits confined to the Daniel Alluvial Channel (Figure 2). The presence of diamondiferous gravels on Werda will be evaluated by means of a standard phased approach. Initially, non-invasive desktop studies will be conducted to delineate and define areas underlain by alluvial gravels. Thereafter, a drilling programme will be performed over anomalous target areas using predefined grids. At least 300 boreholes of ± 5 m in depth are expected to be drilled.

Drilling will concurrently be followed by opencast pitting and trenching using heavy earthmoving machinery. Vegetated soil and overburden are stripped where required and the underlying gravels are excavated and screened, before treated through a rotary pan plant. For final recovery concentrate will be fed to a Bouvestnik X-Ray Machine and the rough diamond product will then be removed from site for further beneficiation. No ore processing reagents are required or used in the treatment of the ore. An estimated total volume of 252 000 m³ will be sampled over five years.



Figure 2. The locality of the core prospecting area is indicated in white, while the border of the proposed prospecting right area is indicated in red.

Prospecting activities will primarily make use of existing roads and tracks to gain access to the prospecting right area, but additional roads will be created in order to access drilling locations, excavations and the processing site. A typical diamond processing plant, with associated infrastructure will also be erected. Planned infrastructure include a mobile office complex, workshop facilities, storage facilities, security office, accommodation facilities, diesel depot, wash bay and salvage yard.

2. METHODOLOGY

2.1. Data collection

The study comprised a combination of field and desktop surveys for data collection on fauna and flora in order to obtain the most comprehensive data set for the assessment. The fieldwork component was conducted on 10 and 11 September 2016 and most data for the desktop component was obtained from the quarter degree squares that include the study area (2823AD).

2.2. Flora

2.2.1. Field survey

For the field work component, satellite images were used to identify homogenous vegetation units within the proposed prospecting area. Representative sampling plots were allocated in these units and sampled with the aid of a GPS in order to characterise the species composition. The following quantitative data was collected:

- Species composition
- Species percentage cover
- Amount of bare soil and rock cover
- Presence of biotic and anthropogenic disturbances

Additional checklists of plant species were compiled during the surveys by traversing a linear route and recording species as they were encountered in each unit. A photographic record of some species encountered during the site visit is available on the following link: <http://www.ispotnature.org/projects/encounters-in-the-northern-cape>.

2.2.2. Desktop survey

For the desktop component, the South African National Vegetation Map (Mucina and Rutherford 2006) was used to obtain data on broad scale vegetation types and their conservation status. The South African National Biodiversity Institute's (SANBI) BGIS database was also consulted to obtain information on biodiversity information for the Tsantsabane Local Municipality (NC085), in which the study area falls. Further searches were undertaken specifically for Red List plant species within the current study area. Historical occurrences of Red List plant species were obtained from the SANBI: POSA database for the quarter degree squares that include the study area. The IUCN conservation status of plants in the species list was also extracted from the SANBI database and is based on the Threatened Species Programme (SANBI 2014).

2.3. Fauna

2.3.1. Desktop survey

A desktop survey was undertaken to obtain lists of mammals, reptiles, amphibians and birds which are likely to occur in the study area. These were derived based on distribution records from the literature, including Friedmann and Daly (2004) and Stuart and Stuart (2015) for mammals, Alexander and Marais (2007) and Bates et al. (2014) for reptiles, Du Preez and Carruthers (2009) for amphibians and Gibbon (2006) for birds.

Additional information on faunal distribution was extracted from the various databases hosted by the ADU web portal, <http://adu.org.za>. A map of important bird areas (BirdLifeSA 2015) was also consulted. The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.

The likelihood of Red Data species occurring on site has been determined using the distribution maps in the Red Data reference books (Friedmann and Daly 2004; Bates et al. 2014; Taylor et al. 2015; ADU 2016) and comparing their habitat preferences with the habitat described from the field survey. The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria (IUCN 2015) and/or the various red data books for the respective taxa.

2.3.2. Field survey

The faunal field survey was conducted concurrent with the vegetation survey. Habitats on site were assessed to compare with the habitat requirements of Red Data species. The presence of faunal species was determined using the following methods:

- Identification by visual observation,
- Identification of bird and mammal calls,
- Identification of signs (spoor, faeces, burrows and nests).

2.4. Assumptions and limitations

Due to the brief duration of the survey and the lack of seasonal coverage, the species list obtained during the site visit cannot be regarded as comprehensive. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant species present is captured. However, this is rarely possible due to time and cost constraints. The survey was nevertheless conducted in such a manner to ensure all representative communities are traversed and therefore is likely to have included the majority of the dominant and common species present.

The site visit for the study took place during spring, which is generally not a favourable time of the year, unless good early spring occurred. This was however not the case and therefore most grasses, annuals and other flowering plants were not in the most suitable condition for the survey. The best time to evaluate vegetation in the study area is after at least some summer rain when the vegetation has responded and is in an actively growing state. The aridity and patchy rainfall of the region however rarely provides ideal conditions for these urgent types of surveys. The results presented here can therefore only reflect the condition of the vegetation. Consequently, the timing of the site visit is considered to be a limiting factor and it is expected that some species of conservation concern were not visible during the time of sampling. Nevertheless, most of the common and significant species encountered were identifiable and therefore the condition of the veld did not have a major effect on the results.

2.5. Sensitivity mapping and assessment

An ecological sensitivity map of the site was produced by integrating the information collected on site with the available ecological and biodiversity information available in the literature and various spatial databases.

The sensitivity mapping entails delineating different habitat units identified on the satellite images and assigning likely sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern, as well as their probability of being affected by proposed activities. The sensitivity of the different units identified in the mapping procedure increased with probability and was rated according to the following scale:

Low: Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and biodiversity. Most types of activities can proceed within these areas with little ecological impact.

Medium: Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Activities within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

High: Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Activities within these areas are undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

Very High: Critical and unique habitats that serve as habitat for species of conservation concern, or perform critical ecological roles. These areas are essentially no-go areas for activities and should be avoided as much as possible.

2.6. Impact assessment and mitigation

The criteria used to assess the significance of the impacts are shown in Table 1. The different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts. The limits were defined in relation to project characteristics. Those for severity, extent, duration and probability are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The Consequence value of the impacts was calculated by using the following formula:

$$\begin{array}{c} \textit{CONSEQUENCE} \\ \text{(Severity + Spatial Scope + Duration)} \end{array} \quad \times \quad \begin{array}{c} \textit{PROBABILITY} \\ \text{(Frequency of activity + Frequency of impact)} \end{array}$$

Consequence of impacts is defined as follows:

Very Low: Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low: Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Low – Medium: Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium – High: Impact would be real and rather substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible, but not necessarily possible without difficulty.

High: Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Very High: Of the highest order possible within the bounds of impacts which could occur. There would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted.

Table 1. Criteria used to assess the significance of the impacts.

Weight	Severity	Spatial scope (Extent)	Duration
5	Disastrous	Trans boundary effects	Permanent
4	Catastrophic / major	National / Severe environmental damage	Residual
3	High/ Critical / Serious	Regional effect	Decommissioning
2	Medium / slightly harmful	Immediate surroundings / local / outside mine fence	Life of operation
1	Minimal/potentially harmful	Slight permit deviation / on-site	Short term / construction (6 months – 1 yrs)
0	Insignificant / non-harmful	Activity specific / No effect / Controlled	Immediate (0 – 6 months)

Weight number	1	2	3	4	5	
Frequency						
Probability	Frequency of impact	Highly unlikely	Rare	Low likelihood	Probable / possible	Certain
		Practically impossible	Conceivable but very unlikely	Only remotely possible	Unusual but possible	Definite
	Frequency of activity	Annually or less	6 monthly / temporarily	Infrequent	Frequently	Life of operation

CONSEQUENCE (Severity + Spatial Scope + Duration)															
PROBABILITY (Frequency of activity + Frequency of impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Colour code	Significance rating	Value	Negative impact Management strategy	Positive Impact Management strategy
	VERY HIGH	126 – 150	Improve current management	Maintain current management
	HIGH	101 – 125	Improve current management	Maintain current management
	MEDIUM – HIGH	76 – 100	Improve current management	Maintain current management
	LOW – MEDIUM	51 – 75	Improve current management	Maintain current management
	LOW	26 – 50	Improve current management	Maintain current management
	VERY LOW	1 – 25	Improve current management	Maintain current management

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1. Current and historic land use

Currently, the major land uses in the area are mining and agriculture. According to AGIS, the land capability for the majority of the study site is non-arable with low to moderate potential grazing land, while the hills in the west are classified as wilderness. The grazing capacity is between 14 and 21 ha/AU, with the agricultural region being demarcated for cattle farming. The area is categorised to have no suitability for crop production.

Werda is mainly used for grazing and apart from the current HC van Wyk prospecting application for diamonds, the farm is also subject to applications in terms of a prospecting right for limestone and a mining right for manganese and iron ore.

3.2. Geology, soils and topography

According to Hornsveld (1977) the geological features on Werda mainly comprise quaternary deposits, where surface limestone and wind-blown sand cover almost the entire area (Figure 3). The area in the vicinity of the hill in the west comprises rocks from the Griqualand West Sequence. The hill itself is associated with Kuruman banded ironstone of the Asbestos Hills Formations from the Griquatown Group; while a small section north-east of the hill consist of Lime Acres dolomitic limestone of the Ghaaplatto Formation from the Campbell Group. Diamondiferous gravels are mainly associated with the quaternary deposits, which are confined to the Daniel Alluvial Channel. It is important to note that the map of Hornsveld (1977) does not accurately reflect the geology on site and should be revisited by a geological survey. However, surface features are portrayed in the plant community descriptions.

The area is generally flat, characterised by level plains with some relief and altitudes around 1 440 m above sea level. Hills protrude in the west, with a maximum altitude of 1 536 m. The terrain of the plains is indicated by a very gentle slope of less than 1 % running east, while steeper slopes (9 %) are associated with the hills. The plains are closely associated with unit 4 of the Ae9 landtype (Figure 4). Here, well drained red sandy soils with a high base status and a depth of more than 300 mm are found. The hills represent the Ib271 landtype, where rock with limited to very shallow soils occurs. Soils of the study areas predominantly constitute Hutton and Mispah forms.

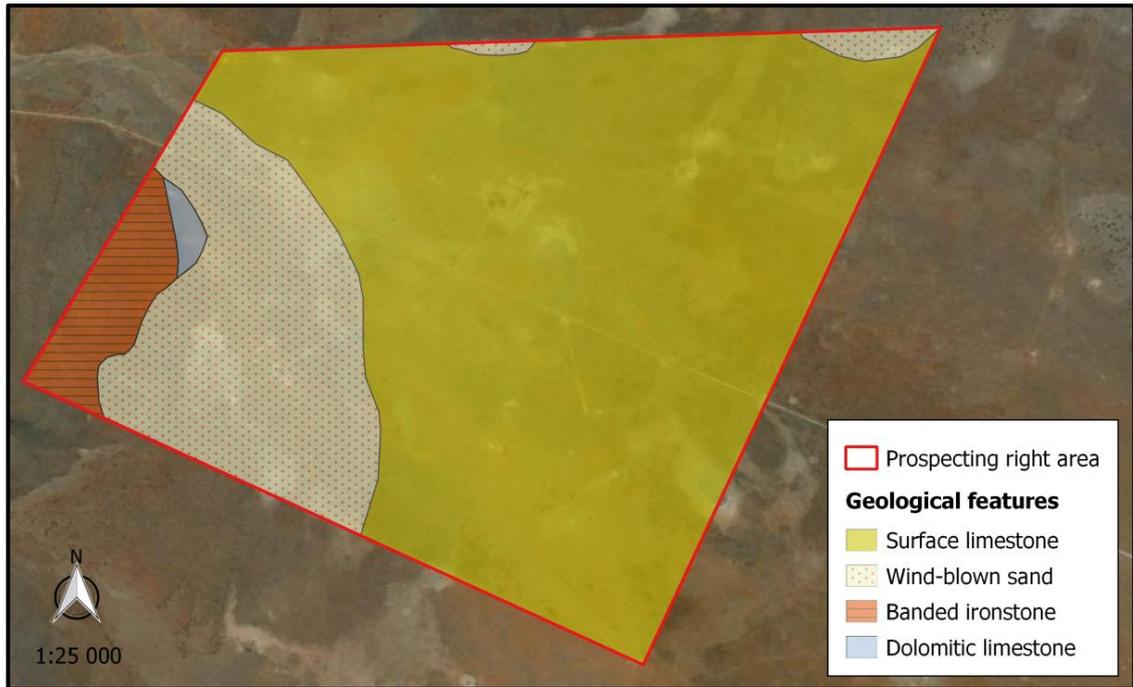


Figure 3. The distribution of geological features in the study area.

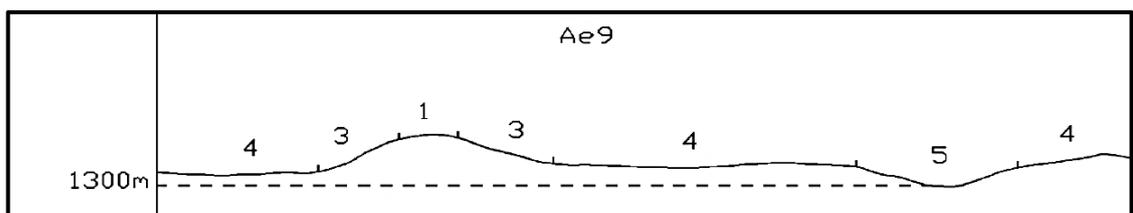


Figure 4. Land types associated with the study area (top) and a terrain form sketch for the Ae9 landtype (bottom). No terrain form sketch is available for the Ib271 landtype.

3.3. Vegetation

3.3.1. Broad-scale vegetation patterns

The study area falls within the Savanna Biome (Mucina and Rutherford 2006). According to the vegetation map of Mucina and Rutherford (2012), two broad-scale vegetation units are present on site (Figure 5), i.e. Kuruman Mountain Bushveld and Olifantshoek Plains Thornveld.

Kuruman Mountain Bushveld is distributed in the Northern Cape and North-West Provinces at altitudes between 1 100 and 1 800 m. It stretches from the Asbestos Mountains southwest and northwest of Griekwastad, along the Kuruman Hills north of Danielskuil, passing west of Kuruman and re-emerging as isolated hills. The unit is typically presented as rolling hills with gentle to moderate slopes and hill pediment areas with an open shrubveld. Here, *Calobota cuspidosa* is conspicuous within a well-developed grass layer. The Hills consist of banded iron formation, with jasper, chert and riebeckite-asbestos of the Asbestos Hills Subgroup of the Griqualand West Supergroup. Soils are shallow sandy soils of the Hutton form, with the most common land type being Ib, followed by Ae, Ic and Ag. The unit is classified as being least threatened with very little being transformed and with little erosion being present. It is not currently conserved within any formal conservation areas and the succulent *Euphorbia planiceps* is the only endemic species known from this unit.

Olifantshoek Plains Thornveld is found in the Northern Cape at altitudes between 1 000 and 1 500 m. It is mostly restricted to the pediments of the Korannaberg, Langeberg and Asbestos Mountains. The plains are typically represented by an open tree and shrub layer, with a usually sparse grass layer. The unit occurs on red aeolian sand of the Kalahari Groups with silcrete and calcrete and some andesitic and basaltic lava of the Griqualand West Supergroup. Soils are deep and the most dominant landtype is Ae, but Ah also occur. Only 1 % of the unit has been transformed and erosion is very low. It is classified as being least threatened and a very small proportion is being conserved in the Witsand Nature Reserve. The shrub *Amphiglossa tecta* is the only endemic plant species known from this unit.

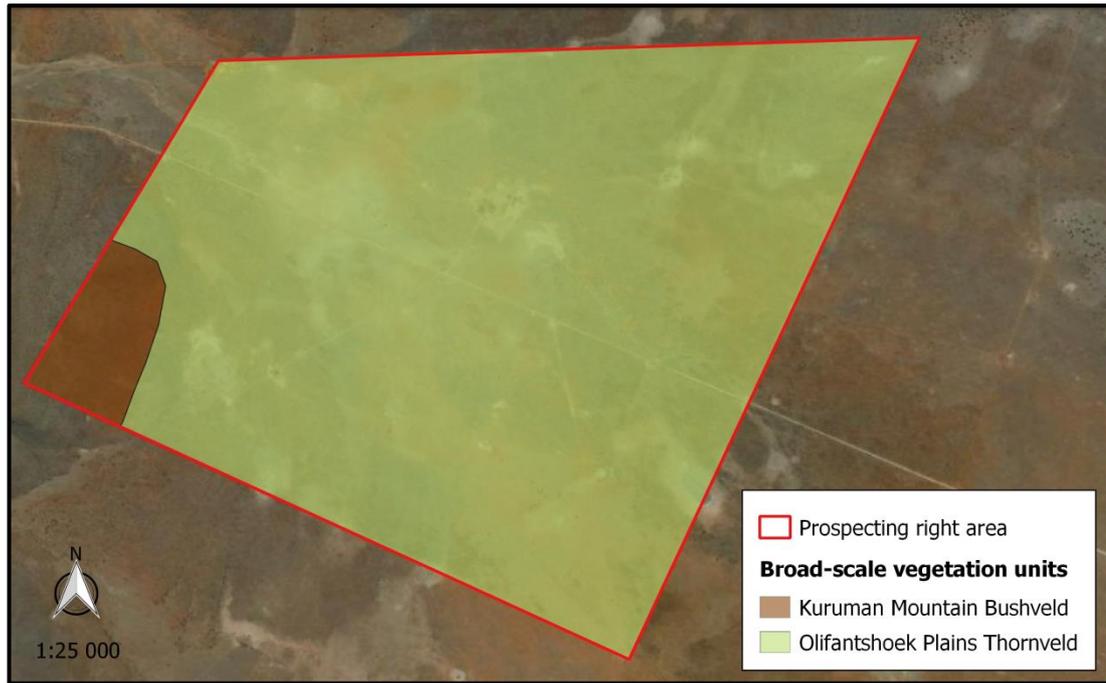


Figure 5. The broad-scale vegetation units (Mucina and Rutherford 2012) present in the study area.

3.3.2. Fine-scale vegetation patterns

The plant communities within the study area are delineated according to plant species correspondences, change in soil structure, topographical changes and disturbance regimes. The vegetation on site can be divided into five distinct units (Figure 6) and are described below. These community descriptions include unique characteristics and the dominant species found in each unit. A complete plant species list, including those species likely to occur in the area is presented in Appendix 1. Please note that watercourses were not fully assessed in this study, as they are included in the scope of a freshwater ecosystem study.

i) *Aristida congesta* – *Eriocephalus ericoides* shrubby grassland on red sandy soil

This community falls within the valley plain of the historic Daniel Alluvial channel (Figure 6) and has been filled with red sandy soil, which constitute 15 % of the ground cover. Grazing practises have created a variably patchy plant community across the plain, with the grassland being interrupted by low shrub patches (Figure 7). Trees and tall shrubs are also widely scattered across the grassland, but forms dense patches at stock watering points.

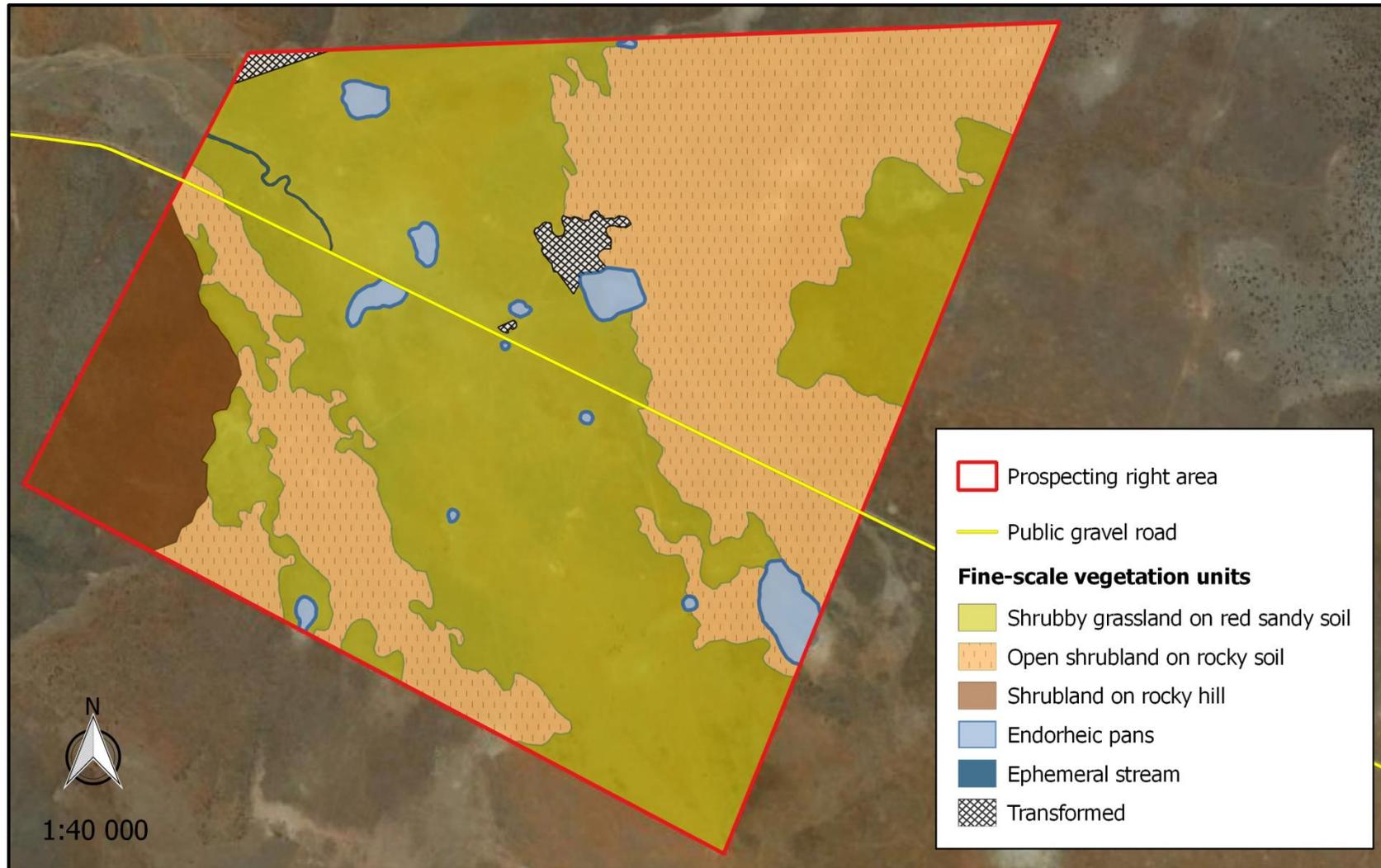


Figure 6. The distribution of fine-scale plant communities in the study area.



Figure 7. The plains are predominantly presented by a shrubby grass community, but denser low shrub patches occur at places.

Overall, the grass layer is dominated by *Aristida congesta* subsp. *congesta* and *A. congesta* subsp. *barbicollis*, but *Enneapogon desvauxii*, *Eragrostis lehmanniana* and *Stipagrostis uniplumis* are intermittently dominant. Other common grasses include *Themeda triandra* and *Brachiaria marlothii*, while *Sporobolus fimbriatus*, *Tragus racemosus*, *Anthepera pubescens*, *Eragrostis truncata*, *E. trichophora*, *Cynodon dactylon* and *Schmidtia pappophoroides* occur more sporadically.

The low shrub layer is dominated by *Eriocephalus ericoides* subsp. *griquensis*, with *Pentzia incana*, *Rosenia humilis* and *Gnidia polycephala* also being very common and dominant in some places. Other conspicuous species include *Aptosimum albomarginatum*, *A. marlothii*, *Lycium horridum*, *Osteospermum microphyllum*, *Thesium lacinulatum*, *Wahlenbergia nodosa* and *Chrysocoma ciliata*, while *Melolobium microphyllum*, *Ruschia griquensis*, *R. hamata*, *Amphiglossa triflora*, *Hertia pallens*, *Pentzia calcarea*, *Solanum namaquense*, *Berkheya* sp., *Selago* sp. are less common.

The herb layer is well developed and includes *Senna italica* subsp. *arachoides*, *Sesamum triphyllum*, *Harpagophytum procumbens*, *Helichrysum cerastioides* var. *cerastioides*, *Hermannia comosa*, and *Osteospermum scariosum* var. *scariosum*.

The scattered tall woody layer is dominated by *Olea europaea* subsp. *africana* trees, with *Searsia lancea*, *S. tridactyla*, and *Vachellia tortilis*, *V. erioloba*, *Tarchonanthus camphoratus*, *Ziziphus mucronata*, *Lycium hirsutum*, *Diospyros austro-africana* var. *microphylla* and *Asparagus exuvialis* also found here.

Species of conservation concern include the nationally (NFA) protected tree *Vachellia erioloba*, while *Ruschia griquensis*, *R. hamata* and *Olea europaea* subsp. *africana* are protected according to NCNCA. Exotics include *Prosopis glandulosa*, *Opuntia ficus-indica*, *Cymbopogon pospischilii* and *Bidens* sp.

ii) *Tarchonanthus camphoratus* – *Stipagrostis uniplumis* open shrubland on rocky soil

This community is mainly found on red sandy soil mixed with jaspelite on the plains, but a section with shallow red sandy soil on dolomitic limestone outcrops and crystalline chert also occurs on the north-eastern ridge (Figure 6). The vegetation is presented as an open shrubland, where *Tarchonanthus camphoratus* shrubs are scattered in a shrubby grassland matrix (Figure 8).

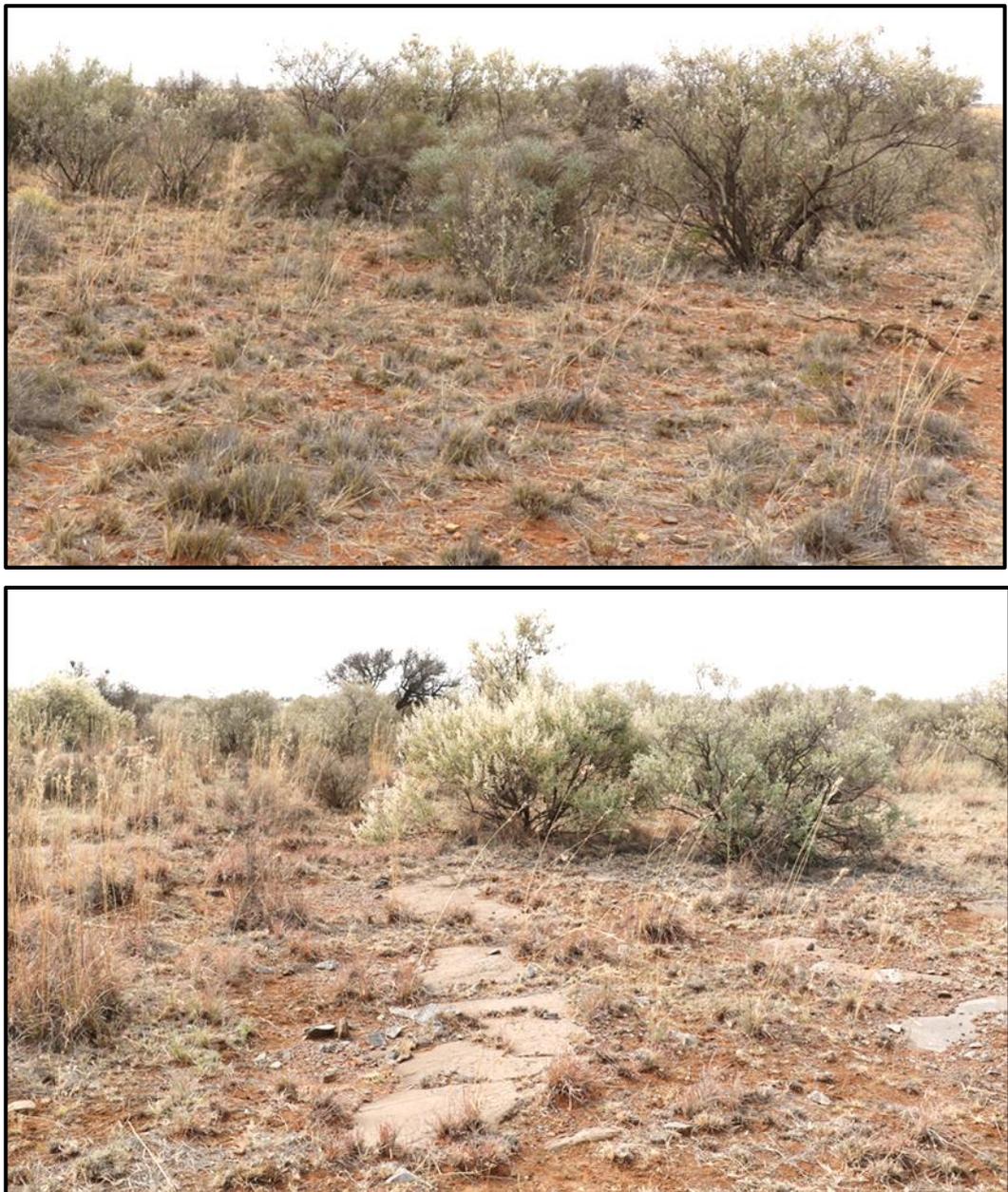


Figure 8. The open shrubland community occurs on red sandy soil mixed with jaspelite on the plains (top), as well as on shallow red sandy soil on dolomitic limestone outcrops and crystalline chert on the north-eastern ridge (bottom).

Tarchonanthus camphoratus is the most conspicuous shrub in this community, but *Calobota cuspidosa*, *Grewia flava*, *Olea europaea* subsp. *africana*, *Searsia tridactyla* and *S. lancea* are also abundant. Other tall shrubs include *Diospyros austro-africana* var. *microphylla*, *Ehretia alba*, *Gymnosporia buxifolia*, *Vachellia tortilis*, *V. hebeclada* subsp. *hebeclada*, *Ziziphus mucronata* and *Asparagus exuvialis*.

The low shrub stratum is dominated by *Eriocephalus ericoides* subsp. *griquensis*, with *Gnidia polycephala*, *Amphiglossa triflora*, *Rosenia humilis*, *Wahlenbergia nodosa*, *Chrysocoma ciliata* and *Pentzia incana* also being very common. Other low shrubs that occur at lower densities include *Felicia filifolia* subsp. *filifolia*, *Melolobium microphyllum*, *Aptosimum albomarginatum*, *A. marlothii*, *Lycium horridum*, *Leonotis pentadentata*, *Euryops dregeanus*, *Thesium lacinulatum*, *Peliostomum leucorrhizum*, *Euphorbia duseimata*, *Deverra burchellii*, *Asparagus* sp. and *Berkheya* sp.

The grass layer is well developed and is dominated by *Stipagrostis uniplumis* and *Enneapogon scoparius*, with *Aristida congesta* subsp. *congesta* and *Eragrostis lehmanniana* also being very common. Other abundant species include *Aristida vestita*, *Fingerhuthia africana* and *Heteropogon contortus*. *Digitaria eriantha*, *Enneapogon cenchroides*, *Sporobolus fimbriatus*, *Aristida congesta* subsp. *barbicollis*, *A. stipitata*, *Eragrostis trichophora*, *Schmidtia pappophoroides* and *Tragus racemosus* are found sporadically.

No nationally protected trees were encountered in this community, but species protected under the NCNCA include *Olea europaea* subsp. *africana*, *Gymnosporia buxifolia*, *Deverra burchellii* and *Euphorbia duseimata*. *Prosopis glandulosa* and *Cymbopogon pospischilii* were the only exotic found in the open shrubland.

iii) *Searsia tridactyla* - *Sporobolus fimbriatus* shrubland on rocky hill

This community is located on the slopes of the hill in the south-western corner of the study site (Figure 6) and grows among banded ironstone rocks. The community composition between the foot slopes and upper slopes are similar, but the dominant grass species shifts from *Stipagrostis uniplumis* at the bottom, to *Sporobolus fimbriatus* at the top. *Senegalia mellifera* and *Tarchonanthus* also forms denser stands on the footslopes, whereas the woody layer becomes more diversely dispersed toward the upper slopes (Figure 9). Rocks and red sandy soil constitute between 10 % and 30 % of the ground cover.

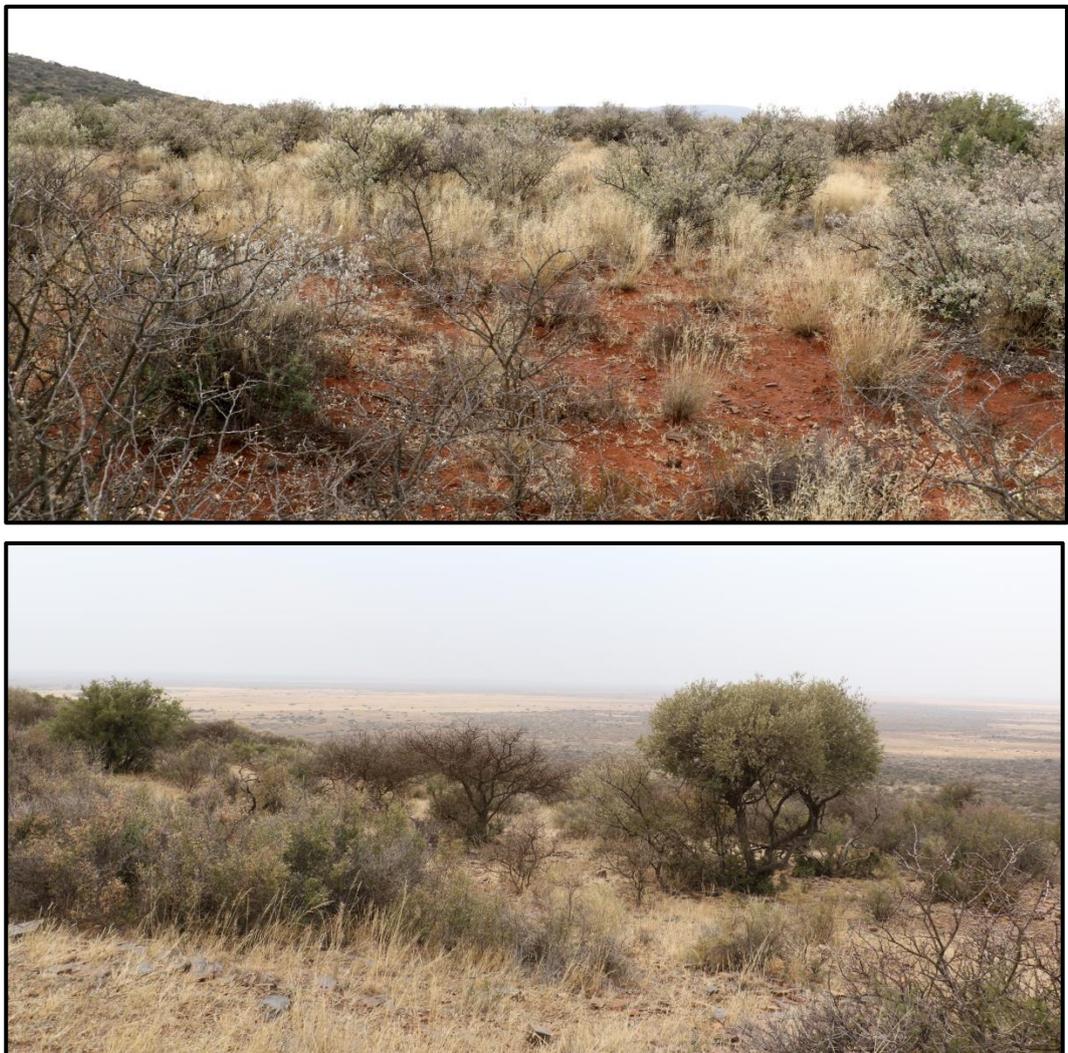


Figure 9. The vegetation on the hill transitions from the footslopes (top) to the upper slopes (bottom) by the dominant grass species as well as by the woody layer becoming more diversely dispersed towards the upper slopes.

The tall woody layer is presented as trees and tall shrubs. Here, *Searsia tridactyla* dominates, but *S. burchellii*, *Senegalia mellifera*, *Tarchonanthus camphoratus*, *Boscia albitrunca* and *Calobota cuspidosa* are also common. *Ziziphus mucronata*, *Gymnosporia buxifolia*, *Ehretia alba*, *Vachellia tortilis*, *Asparagus exuvialis*, *Grewia flava* and *Olea europaea* subsp. *africana* occur at lower densities.

The lower shrub layer is dominated by *Chrysocoma ciliata*, *Eriocephalus ericoides* subsp. *griquensis*, *Pentzia incana*, *Felicia filifolia* subsp. *filifolia* and *Asparagus* sp., but *Lycium horridum*, *Aptosimum marlothii*, *Rosenia humilis*, *Monechma divaricatum*, *Leonotis pentadentata* and *Selago* sp. are also common.

The grass layer is well developed and diverse. Apart from the dominant grasses mentioned above, other common species include *Tragus racemosus*, *Aristida congesta* subsp. *congesta*, *A. vestita*, *Enneapogon scoparius*, *Schmidtia pappophoroides*, *Eragrostis homomalla* and *Fingerhuthia africana*. Other species include *Enneapogon cenchroides*, *Heteropogon contortus*, *Digitaria eriantha*, *Brachiaria serrata* and *Eragrostis nindensis*.

Herbs include *Hermannia comosa*, *Sesamum triphyllum* and *Phyllanthus parvulus*.

Regarding species of conservation concern; *Boscia albitrunca* is nationally (NFA) and provincially (NCNCA) protected, while *Gymnosporia buxifolia* and *Olea europaea* subsp. *africana* are also protected according to NCNCA. *Cymbopogon pospischilii* was the only exotic species found here.

iv) *Leptochloa fusca* dominated endorheic pans

Numerous pans occur on Werda (Figure 6). All of them are ephemeral and endorheic (Figure 10). Their surfaces are densely dominated by *Leptochloa fusca*. This species has a high tolerance for saline and waterlogged soils and has proven to be a significant source of fodder. This explains the considerable utilisation by cattle and harvester termites that were evident during the site visit (Figure 11).

Other grasses that occur mostly towards the periphery of the pans include *Aristida congesta* subsp. *barbicollis*, *A. congesta* subsp. *congesta*, *Eragrostis bicolor*, *E. truncata*, *E. trichophora*, *Themeda triandra* and *Enneapogon desvauxii*.

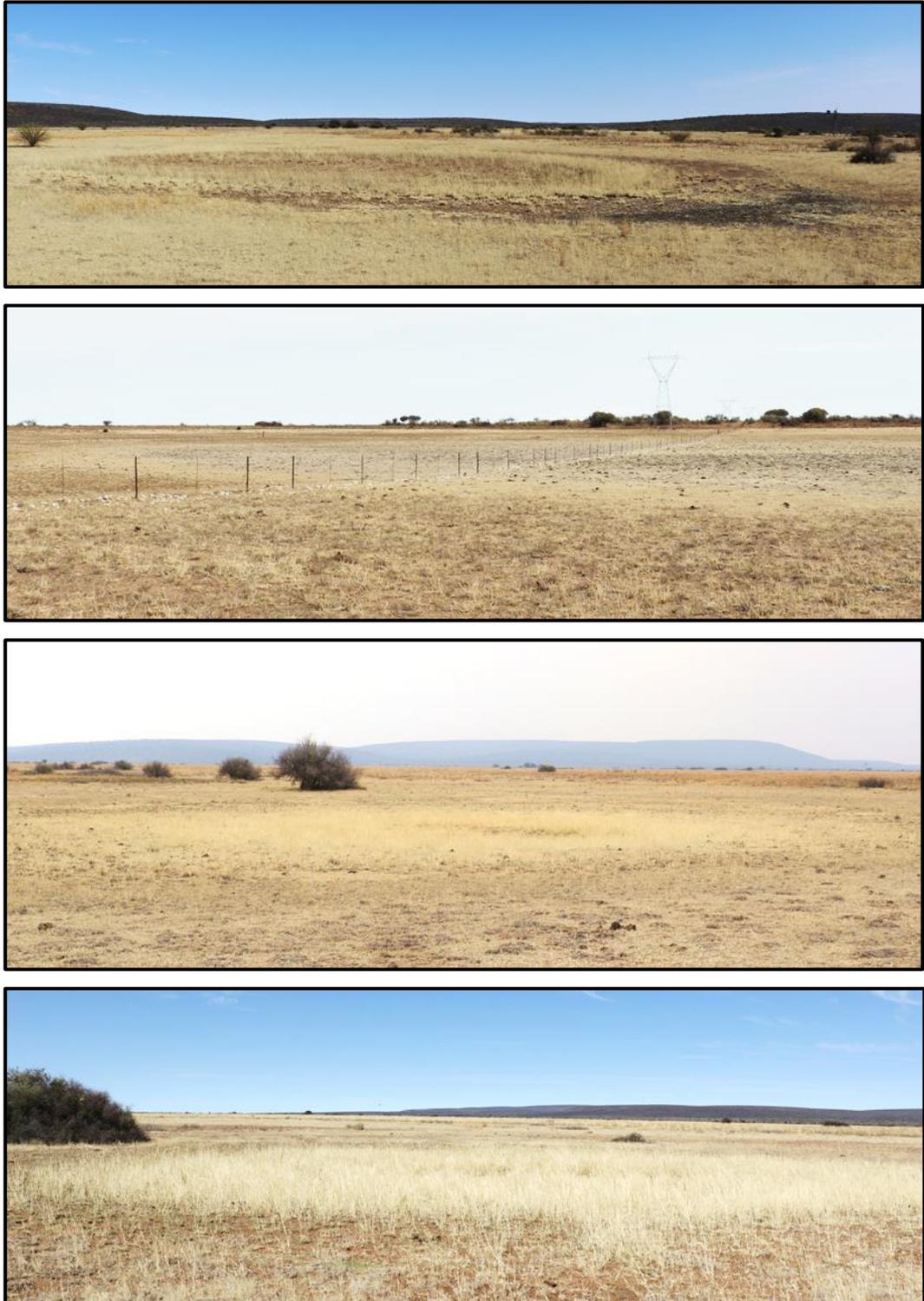


Figure 10. An example of endorheic pans found on Werda.



Figure 11. The high density of dung (top) and large amounts of frass (bottom) respectively indicate cattle and harvester termite utilisation.

Platycarphella parvifolia and *Cullen tomentosum* are common herbs on the pans, while *Ziziphus mucronatus*, *Osteospermum microphyllum*, *Galenia sarcophylla* and *Gnaphalium* spp. are associated with some. No exotics or species of conservation concern were encountered on the pans.

v) Ephemeral stream

The ephemeral stream enters the property in the north-western corner (Figure 6) and meanders in a south-easterly direction, but is modified by the public gravel road that traverses the property, where it dissolves into the plains. It has a defined channel low in species richness and dominated by a monotonous, short grass layer (Figure 12).

Here, *Eragrostis bicolor* occupies most of the channel, but *Chloris virgata* is also very common. *Themeda triandra* and *Tragus racemosus* occurs sporadically.

Other species observed here include *Cullen tomentosum*, *Platycarphella parvifolia*, *Salvia verbenaca* and the weed *Schkuhria pinnata*. No species of conservation concern were encountered here.



Figure 12. The channel of the ephemeral stream is well defined and characterised by a monotonous short grass layer.

A specialist consultant was appointed to perform a wetland delineation and classification assessment on the pans and ephemeral stream found on Werda. Please refer to their report for more information on these watercourses.

3.3.3. Population of sensitive, threatened and protected plant species

The SANBI Red List provides information on the national conservation status of South Africa's indigenous plants, while the National Forests Act (No. 84 of 1998) (NFA) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA) restricts activities regarding sensitive plant species. Section 15 of the NFA prevents any person to cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. Section 49 (1) and 50 (1) of the NCNCA states that no person may, without a permit pick, transport, possess, or trade in a specimen of a specially protected (Schedule 1) or protected (Schedule 2) plants. Furthermore, Section 51(2) states that no person may, without a permit, pick an indigenous plant (Schedule 3) in such manner that it constitutes large-scale harvesting.

All species recorded in the area are classified as least concern; a category which includes widespread and abundant taxa (Table 2).

Species from the study area that are protected in terms of the National Forests (NFA) Act No 84 of 1998 (Table 2) includes *Vachellia haematoxylon*, *V.erioloba* and *Boscia albitrunca*. The latter species is also protected according the NCNCA. It is restricted to the hill and occurs widespread at a low density of two individuals per hectare, as stunted individuals and medium-sized trees (Figure 13). Only one young *V. erioloba* tree was encountered on site and it occurred in the south-eastern corner of the grassland, near the gate of a neighbouring game farm (Figure 14). No *Vachellia haematoxylon* individuals were seen during the survey. It is not foreseen that any individuals of these protected tree species will be affected by the Werda prospecting operation. Nevertheless, in order to damage or remove any protected trees (seedlings to adults) an application must be submitted to the Northern Cape Department of Agriculture, Forestry and Fisheries (DAFF) and a licence obtained from DAFF at least three months prior to such activities.

Specially protected species in terms of Schedule 1 of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009 (Table 2) that are known from the study area include *Lessertia affinis*, *Pelargonium multicaule* subsp. *multicaule* and *Harpagophytum procumbens*. Of these, only *Harpagophytum procumbens* were found on site, and are associated with the grassland on the plains. It only occurs sporadically at densities less than one individual per hectare.



Figure 13. The protected tree *Boscia albitrunca* is restricted to the hill and occurs widespread at a low density of two individuals per hectare, as stunted individuals (left) and medium-sized trees (right).



Figure 14. The only *Vachellia erioloba* tree encountered on site occurs as a young individual in the south-eastern corner of the grassland, near the entrance gate to a neighbouring game farm.

Table 2. Plant species found in the study region that are of conservation concern. Those encountered during the survey is indicated with *.

FAMILY	Scientific name	Status	NFA	NCNCA
APIACEAE	<i>Deverra burchellii</i> *	LC		S2
APOCYNACEAE	<i>Pachypodium succulentum</i>	LC		S2
APOCYNACEAE	<i>Pentarrhinum insipidum</i>	LC		S2
CAPPARACEAE	<i>Boscia albitrunca</i> *	LC	X	S2
CELASTRACEAE	<i>Gymnosporia buxifolia</i> *	LC		S2
EUPHORBIACEAE	<i>Euphorbia duseimata</i> *	LC		S2
EUPHORBIACEAE	<i>Euphorbia mauritanica</i> var. <i>mauritanica</i>	LC		S2
FABACEAE	<i>Lessertia affinis</i>	LC		S1
FABACEAE	<i>Vachellia erioloba</i> *	LC	X	
FABACEAE	<i>Vachellia haematoxylon</i>	LC	X	
GERANIACEAE	<i>Pelargonium multicaule</i> subsp. <i>multicaule</i>	LC		S1
MESEMBRYANTHEMACEAE	<i>Ruschia griquensis</i> *	LC		S2
MESEMBRYANTHEMACEAE	<i>Ruschia hamata</i> *	LC		S2
OLEACEAE	<i>Olea europaea</i> subsp. <i>africana</i> *	LC		S2
OXALIDACEAE	<i>Oxalis depressa</i>	LC		S2
OXALIDACEAE	<i>Oxalis lawsonii</i>	LC		S2
PEDALIACEAE	<i>Harpagophytum procumbens</i> *	LC		S1
SCROPHULARIACEAE	<i>Jamesbrittenia atropurpurea</i> subsp. <i>atropurpurea</i>	LC		S2
SCROPHULARIACEAE	<i>Jamesbrittenia aurantiaca</i>	LC		S2
SCROPHULARIACEAE	<i>Jamesbrittenia tysonii</i>	LC		S2
SCROPHULARIACEAE	<i>Nemesia lilacina</i>	LC		S2

Protected species in terms of Schedule 2 of the NCNCA are listed in Table 2. Apart from the already mentioned *Boscia albitrunca*, others that were found on site include *Deverra burchellii*, *Gymnosporia buxifolia*, *Euphorbia duseimata*, *Ruschia griquensis*, *Ruschia hamata* and *Olea europaea* subsp. *africana*. These all occur at very low densities of less than one individual per hectare. *Olea europaea* subsp. *africana* is however the most abundant and occurs on the hill, in the open shrubland and the grassland. Its presence is most profound in the latter two communities, where it is widespread in the form of tall trees and shrubs (Figure 15). *Deverra burchellii* is restricted to the open shrubland patches that occur in the vicinity of the ephemeral stream, while *Gymnosporia buxifolia* occurs widespread on the hill and in the open shrubland. *Euphorbia duseimata* is restricted to the latter community, while *Ruschia griquensis* and *Ruschia hamata* is restricted to the grassland on red sandy soil.

A projection for species of conservation concern is presented in Table 3 and a photographic guide to those species encountered during the survey is attached as Appendix 3.



Figure 15. The protected *Olea europaea* subsp. *africana* is widespread in the grassland and open shrubland and occur as tall trees (top) and shrubs (bottom).

In addition to those protected species listed above; according to Section 51(2) of NCNCA, a permit is required from the Northern Cape, Department of Environment and Nature Conservation (DENC) for any large-scale clearance of all indigenous (Schedule 3) vegetation, before such activities commence.

Table 3. A projection of community sizes and species of conservation concern found in the study area.

Communities	Total size	Predicted extent to be affected	Associated species of conservation concern	Population density (ind/ha)	Estimated population to be affected
 <i>Aristida congesta</i> – <i>Eriocephalus ericoides</i> shrubby grassland on red sandy soil	± 1 000 ha	± 1 000 ha	<i>Vachellia erioloba</i> <i>Olea europaea</i> subsp. <i>africana</i> <i>Ruschia griquensis</i> <i>Ruschia hamata</i> <i>Harpagophytum procumbens</i>	< 1 < 1 < 1 < 1 < 1	None predicted ± 100 ± 50 ± 50 ± 50
 <i>Tarchonanthus camphoratus</i> – <i>Stipagrostis uniplumis</i> open shrubland on rocky soil	± 730 ha	± 730 ha	<i>Olea europaea</i> subsp. <i>africana</i> <i>Gymnosporia buxifolia</i> <i>Euphorbia duseimata</i> <i>Deverra burchellii</i>	< 1 < 1 < 1 < 1	± 70 ± 30 ± 20 ± 10
 <i>Searsia tridactyla</i> - <i>Sporobolus fimbriatus</i> shrubland on rocky hill	± 140 ha	0 ha	<i>Boscia albitrunca</i> <i>Gymnosporia buxifolia</i> <i>Olea europaea</i> subsp. <i>africana</i>	± 2 < 1 < 1	None predicted None predicted None predicted
 <i>Leptochloa fusca</i> dominated endorheic pans	± 40 ha	0 ha	None encountered	-	N/A
 Ephemeral stream	± 1.5 ha	0 ha	None encountered	-	N/A

3.3.4. Weeds and invader plant species

Weeds and invasive species are controlled in terms of the National Environmental Management: Biodiversity (NEMBA) Act 10 of 2004, the Conservation of Agricultural Resources (CARA) Act 43 of 1993, as well as the NCNCA (Schedule 6). These are species that do not naturally occur in a given area and exhibit tendencies to invade that area, and others; at the cost of locally indigenous species. To govern the control of such species, NEMBA and CARA have divided weeds and invader species into categories (see **Error! Not a valid bookmark self-reference.**). All declared weeds and invasive species recorded in and around the study area are listed in Table 5, along with their categories according to CARA, NEMBA and NCNCA.

Table 4. The categorisation of weeds and invader plant species, according to NEMBA and CARA.

NEMBA		CARA	
1a	Listed invasive species that must be combatted or eradicated.	1	Plant species that must be removed and destroyed immediately. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals and the environment.
1b	Listed invasive species that must be controlled.	2	Plant species that may be grown under controlled conditions. These plants have certain useful qualities and are allowed in demarcated areas. In other areas they must be eradicated and controlled.
2	Listed invasive species that require a permit to carry out a restricted activity within an area.	3	Plant species that may no longer be planted. These are alien plants that have escaped from, or are growing in gardens and are proven to be invaders. No further planting is allowed. Existing plants may remain (except those within the flood line, 30 m from a watercourse, or in a wetland) and must be prevented from spreading.
3	Listed invasive species that are subject to exemptions and prohibitions		

Table 5. A list of declared weeds and invasive species recorded in the study area.

Scientific name	Common name	CARA	NEMBA	NCNCA
<i>Cirsium vulgare</i>	Scotch thistle	1	-	S6
<i>Datura inoxia</i>	Large thorn apple	1	-	S6
<i>Opuntia ficus-indica</i>	Sweet prickly pear	1	1b	S6

<i>Prosopis glandulosa</i> var. <i>glandulosa</i>	Honey mesquite	2	3	S6
<i>Eucalyptus camaldulensis</i>	Red river gum	2	1b	S6

3.3.5. Indicators of bush encroachment

Bush encroacher species are controlled in terms of Regulation 16 of CARA; where land users of an area in which natural vegetation occurs and that contains communities of encroacher indicator plants are required to follow sound practices to prevent the deterioration of natural resources and to combat bush encroachment where it occurs. Declared indicators of bush encroachment in the Northern Cape, which were recorded in and around the study area, are listed in Table 6.

Table 6. A list of declared indicators of bush encroachment in the Northern Cape recorded in the study area.

Scientific name	Common name
<i>Senegalia mellifera</i>	Black thorn
<i>Vachellia tortilis</i> subsp. <i>heteracantha</i>	Umbrella thorn
<i>Grewia flava</i>	Wild raisin
<i>Tarchonanthus camphoratus</i>	Camphor bush

3.4. Faunal communities

According to Section 3(a) and 4(a) of the Northern Cape Nature Conservation (NCNCA) Act No. 9 of 2009, no person may, without a permit by any means hunt, kill, poison, capture, disturb, or injure any protected or specially protected animals. Furthermore, Section 12 (1) of NCNCA states that no person may, on a land of which he or she is not the owner, hunt a wild animal without the written permission from the landowner.

The landscape features, i.e. plains, hills and ephemeral pans provide the potential for a variety of habitats to faunal communities. The micro-habitats provided by pristine terrestrial vegetation are likely to host a variety of small mammals, while the ephemeral pans are likely to accommodate a number of aquatic species and important bird species when inundated.

3.4.1. Mammals

As many as 50 terrestrial mammals and nine bat species have been recorded in the region (see Appendix 2), of which the Greater Kudu, South African Ground Squirrel, Suricate, Springbok, Blesbok and signs of recent Aardvark, Cape Porcupine and Springhare activity were encountered during the site visit.

Virtually all mammals of the study area are protected; either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). Eighteen mammal species of conservation concern potentially occur in the area (Table 7), of which 12 are listed either in the IUCN or South African Red Data Book. Those that are specially protected are also indicated in Table 7.

Table 7. Mammal species of conservation concern that are likely to occur in the region Conservation values are indicated in terms of the international (IUCN) Red List, the South African Red Data Book (SA RDB) and Schedule 1 of the Northern Cape Nature Conservation Act (NCNCA).

Scientific name	Common name	IUCN	SA RDB	NCNCA
<i>Eidolon helvum</i>	African Straw-coloured Fruit-bat	NT		
<i>Rhinolophus denti</i>	Dent's Horseshoe Bat		NT	
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat		NT	
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat		NT	
<i>Orycteropus afer</i>	Aardvark			X
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil		DD	
<i>Manis temminckii</i>	Ground Pangolin	VU	VU	X
<i>Suncus varilla</i>	Lesser Dwarf Shrew		DD	
<i>Atelerix frontalis</i>	South African Hedgehog		NT	
<i>Proteles cristata</i>	Aardwolf			X
<i>Felis silvestris</i>	African Wild Cat			X
<i>Felis nigripes</i>	Black-footed Cat	VU		X
<i>Vulpes chama</i>	Cape Fox			X
<i>Hyaena brunnea</i>	Brown Hyena	NT		X
<i>Otocyon megalotis</i>	Bat-eared Fox			X
<i>Poecilogale albinucha</i>	African Striped Weasel		DD	X
<i>Ictonyx striatus</i>	Striped Polecat			X
<i>Mellivora capensis</i>	Honey Badger		NT	X

Of these, Aardvark activities were evident on site, especially in the shrubby grassland near the ephemeral stream, where many active aardvark holes occur (Figure 16). Termitaria are also scattered across the plains and are prominent features on the study area (Figure 17) and are strongly linked to aardvark activities. The protected bat species, Bushveld Gerbil, Aardwolf, Cape Fox, Bat-eared Fox, African Striped Weasel, African Wild Cat, Honey Badger and Striped Polecat all have a high chance of occurring across the site, given their wide habitat tolerances and preference for the habitat found on site. The Lesser Dwarf Shrew also has a high possibility to occur on site based on its termite mound affinity.



Figure 16. One of the Aardvark burrows that were encountered on site.



Figure 17. Termitaria are prominent features on the plains of the study area.

Ground Pangolin, South African Hedgehog and Black-footed cat may potentially occur on site on account of their preferences for arid areas. They are however rather skittish and therefore they will most likely occur very seldomly. The Brown Hyaena might be present, but has a low potential to be found on site mainly based on the fact that farm fences are restricting their occurrences across their natural distribution range.

The core prospecting activities are associated with the alluvial channel, which include the shrubby grassland and the open shrubland. Listed mammals that are most likely to be impacted in the form of species- and/or habitat loss resulting from the prospecting activities include those that are associated with these habitats.

3.4.2. Reptiles

The Werda prospecting area lies within the distribution range of at least 36 reptile species (see Appendix 2). No listed species are known to occur in the area, but most reptiles of the study area are protected either according to Schedule 1 or 2 of NCNCA (see Appendix 2). Specially protected species include *Karusasaurus polyzonus* (Southern Karusa Lizard) and *Chamaeleo dilepis dilepis* (Namaqua Chamaeleon).

The habitat diversity for reptiles in the study area is fairly high, with the rocky hills considered to be the most important habitat for reptiles at the site. It is however not foreseen that the prospecting activities will take place here and therefore the prospecting operation is not considered to cause significant habitat loss for the local reptile population.

3.4.3. Amphibians

Eleven amphibian species are known from the region (Appendix 2), indicating that the site does not potentially have a diverse frog community. This is however normal for an arid area. No natural permanent water was observed in site that would represent suitable breeding habitats for most of these species, but the ephemeral pans will be important during periods of inundation. As a result, only those species which are relatively independent of water are likely to occur regularly in the area.

The Giant Bull Frog (*Pyxicephalus adspersus*) is listed as Near Threatened and is protected according to Schedule 1 of the NCNCA. They prefer seasonal shallow grassy pans, vleis and other rain-filled depressions in open flat areas of grassland or savanna, but mainly remain buried up to 1 m underground until conditions become favourable. The site lies within the known distribution of this species and the numerous ephemeral pans on site could potentially provide the ideal habitat for this species. All other amphibians of the study area are protected according to Schedule 2 of NCNCA (see Appendix 2).

Impacts on amphibians are however likely to be low and restricted largely to habitat loss from prospecting, but if any of the ephemeral pans are destroyed the impacts will be more profound, because these pans are not well known and could potentially host unique species assemblages that are currently dormant due to their adaptations to ephemerality.

3.4.4. Avifauna

The study site does not fall within or near; i.e. within 100 km, of any of the Important Bird Areas (IBA) defined by Birdlife South Africa. A total number of 261 bird species have been recorded from the region and all of these species are protected either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). This suggests that the area has been reasonably well sampled and that the species list is likely to be fairly comprehensive.

As many as 25 listed bird species are known from the region, all of which are classified as Vulnerable, Near Threatened or Endangered (Table 8). All birds are protected either according to Schedule 1, 2 or 3 of NCNCA (see Appendix 2). Those that are specially protected (Schedule 1) are also listed in Table 8. A number of these are expected to occur on site either as residents or by occasionally passing over the area.

In general, bird species of the study area are likely to experience habitat loss as a result of the Werda prospecting activities. The most significant impacts are expected to be on the plains as well as in the pan habitats, which will also lead to the subsequent loss of ecological connectivity. This will especially impact the wetland birds that rely on these habitats for breeding, nesting and foraging during wet periods.

Direct disturbances will be very local and confined to the core sites and will be in the form of noise and movement. Birds are however highly mobile and are expected to move to similar adjacent habitats, if necessary.

Table 8. Bird of conservation concern that are likely to occur on site. Species are indicated in terms of the SA Bird Atlas and Schedule 1 of the Northern Cape Nature Conservation Act (NCNCA).

Scientific name	Common name	SA Bird Atlas	NCNCA
<i>Accipiter badius</i>	Shikra		X
<i>Anthropoides paradisea</i>	Blue Crane	NT	
<i>Aquila rapax</i>	Tawny Eagle	EN	X
<i>Aquila verreauxii</i>	Verreaux's Eagle	VU	X
<i>Ardeotis kori</i>	Kori Bustard	NT	
<i>Bubo africanus</i>	Spotted Eagle-Owl		X
<i>Bubo lacteus</i>	Verreaux's Eagle-Owl		X
<i>Buteo rufofuscus</i>	Jackal Buzzard		X
<i>Buteo vulpinus</i>	Steppe Buzzard		X
<i>Caprimulgus europaeus</i>	European Nightjar		X
<i>Caprimulgus rufigena</i>	Rufous-cheeked Nightjar		X
<i>Caprimulgus tristigma</i>	Freckled Nightjar		X
<i>Charadrius pallidus</i>	Chestnut-banded Plover	NT	X
<i>Ciconia abdimii</i>	Abdim's Stork	NT	
<i>Ciconia nigra</i>	Black Stork	VU	X
<i>Circaetus pectoralis</i>	Black-chested Snake-Eagle		X
<i>Circus maurus</i>	Black Harrier	EN	X
<i>Circus pygargus</i>	Montagu's Harrier		X
<i>Circus ranivorus</i>	African Marsh-Harrier	EN	X
<i>Coracias garrulus</i>	European Roller	NT	
<i>Cursorius rufus</i>	Burchell's Courser	VU	
<i>Elanus caeruleus</i>	Black-shouldered Kite		X
<i>Falco biarmicus</i>	Lanner Falcon	VU	X
<i>Falco naumanni</i>	Lesser Kestrel		X
<i>Falco peregrinus</i>	Peregrine Falcon		X
<i>Falco rupicolis</i>	Rock Kestrel		X
<i>Falco rupicoloides</i>	Greater Kestrel		X
<i>Glareola nordmanni</i>	Black-winged Pratincole	NT	X
<i>Glaucidium perlatum</i>	Pearl-spotted Owlet		X
<i>Gyps africanus</i>	White-backed Vulture	CR	X
<i>Gyps coprotheres</i>	Cape Vulture	EN	X
<i>Haliaeetus vocifer</i>	African Fish-Eagle		X
<i>Hieraaetus pennatus</i>	Booted Eagle		X
<i>Leptoptilos crumeniferus</i>	Marabou Stork	NT	X
<i>Melierax gabar</i>	Gabar Goshawk		X
<i>Milvus migrans</i>	Black Kite		X
<i>Neotis ludwigii</i>	Ludwig's Bustard	EN	X
<i>Oxyura maccoa</i>	Maccoa Duck	NT	
<i>Phoenicopterus minor</i>	Lesser Flamingo	NT	X
<i>Phoenicopterus ruber</i>	Greater Flamingo	NT	X
<i>Polemaetus bellicosus</i>	Martial Eagle	EN	X
<i>Polihierax semitorquatus</i>	Pygmy Falcon		X
<i>Polyboroides typus</i>	African Harrier-Hawk		X
<i>Ptilopus granti</i>	Southern White-faced Scops-Owl		X
<i>Rostratula benghalensis</i>	Greater Painted-snipe	NT	X
<i>Sagittarius serpentarius</i>	Secretarybird	VU	X
<i>Torgos tracheliotus</i>	Lappet-faced Vulture	EN	X
<i>Tyto alba</i>	Barn Owl		X

Apart from general disturbances and habitat loss, other potential impacts would come from electrocution and collisions with power lines and the accidental or intentional killing of birds. Not all species are vulnerable to powerlines, but flamingos, bustards and storks are highly vulnerable to collisions, while many of the raptors, including vultures, are susceptible to electrocution and collision. Furthermore, owls and vultures are often killed due to cultural beliefs and practises. Monitoring during the prospecting operation would be vital in order to ensure no or low impact.

3.5. Critical biodiversity areas and broad-scale processes

The proposed prospecting site does not fall within a Critical Biodiversity Area, any formally protected area, or within a National Protected Areas Expansion Strategy Focus Area. Furthermore, the broad-scale vegetation units of the study area (Kuruman Mountain Bushveld and Olifanthsoek Plains Thornveld) are classified as least threatened and therefore no formal fine-scale conservation planning has been conducted. These vegetation units have however been identified as a medium conservation priority area within the Siyanda Environmental Management Framework, but the study area does not fall within a proposed conservation area for the District Municipality.

Nevertheless, Werda has been included within the Siyanda Environmental Control Zone 1; i.e. a zone with potential sensitive groundwater resources. The karst aquifers that occur in the dolomite and lime stone rocks in the area represent a major strategic water resource. It is sensitive both in respect to the abstraction and potential pollution of groundwater. Therefore, a suggested management parameter is to prohibit the bulk storage of hazardous substances as well as unrehabilitated spoil heaps and mine dumps.

The ephemeral pans of the study area have been classified by the Wetland Freshwater Priority Areas project as wetlands with a Present Ecological State (PES) of “AB”, which means that the pans are in a Natural or Good condition. Furthermore, none of the pans have been identified as significant wetlands in terms of Ramsar sites, IUCN Frog localities, threatened water bird localities or Crane breeding grounds.

Furthermore, the study area falls within the Griqualand West Centre (GWC) of Endemism (Van Wyk and Smith 2001). A centre of plant endemism is an area with high concentrations of plant species with very restricted distributions, known as endemics. They are extremely vulnerable; relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range restricted species. The GWC (Figure 18) is considered a priority in the Northern Cape, because the number of threats to the area is increasing rapidly. This is a cause of concern, because the GWC is still greatly misunderstood and under researched.

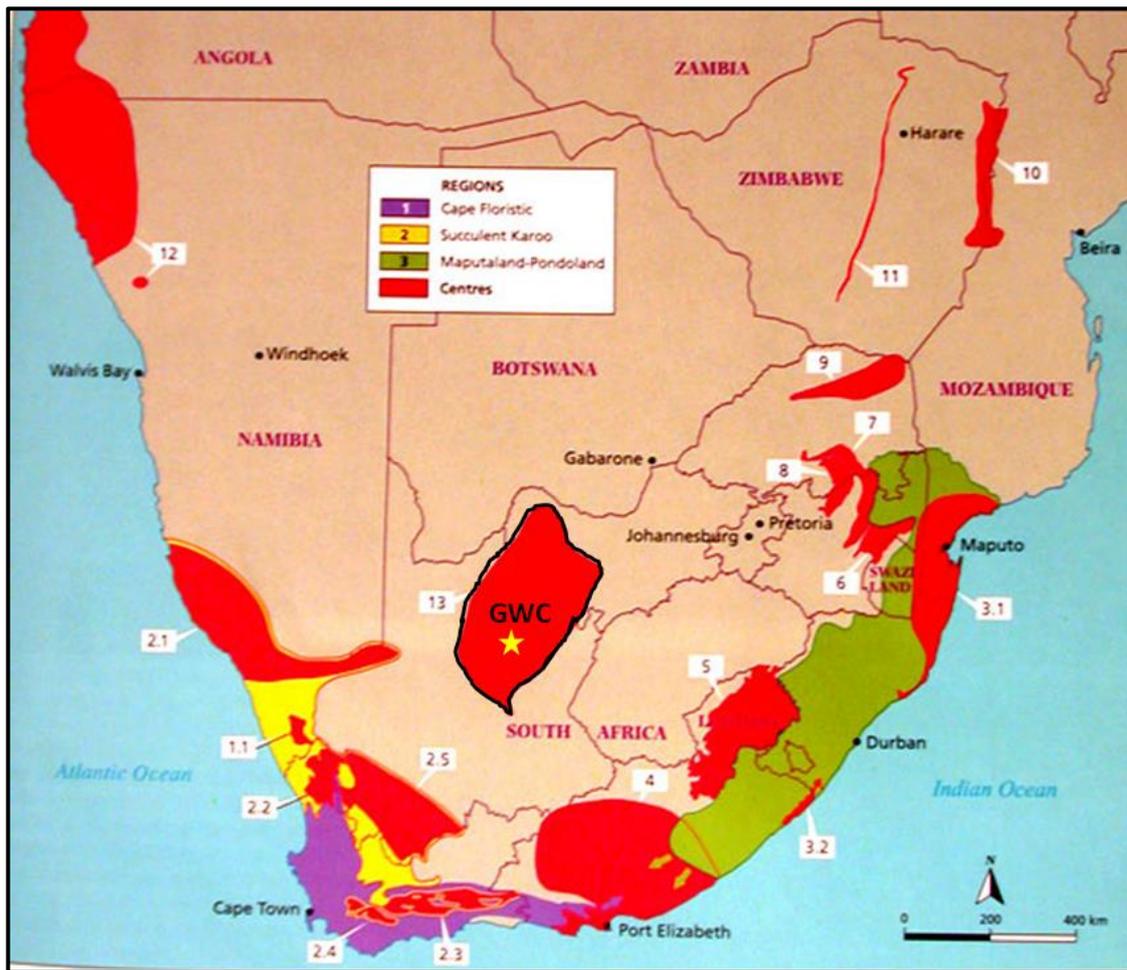


Figure 18. A map indicating the regions of floristic endemism in southern Africa, according to (Van Wyk and Smith 2001). The location of the study area is presented by the yellow star.

3.6. Site sensitivity

The sensitivity map for the Werda prospecting operation is illustrated in Figure 19. The endorheic pans and ephemeral stream are considered to be of very high sensitivity due to their vital ecological and hydrological functionality and significance. All watercourses in the study area are also unique habitats protected in terms of the National Water Act (Act No 36 of 1998). These units are essentially no-go areas.

The hill is considered to be of high sensitivity, on account of the high number and frequency of species of conservation concern found here and the various niches available to fauna. No prospecting activities are however expected to take place here.

The majority of the site encompasses the grassland and open shrubland of the plains, which are considered to be of medium sensitivity. These areas host a few species of conservation concern and are expected to be affected by the prospecting operation, but impacts are likely to be largely local and the risk of secondary impact such as erosion low. Activities within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

The transformed areas include the farmsteads and a quarry, and are considered to be of low sensitivity on account of the transformation of natural habitats that was caused here.

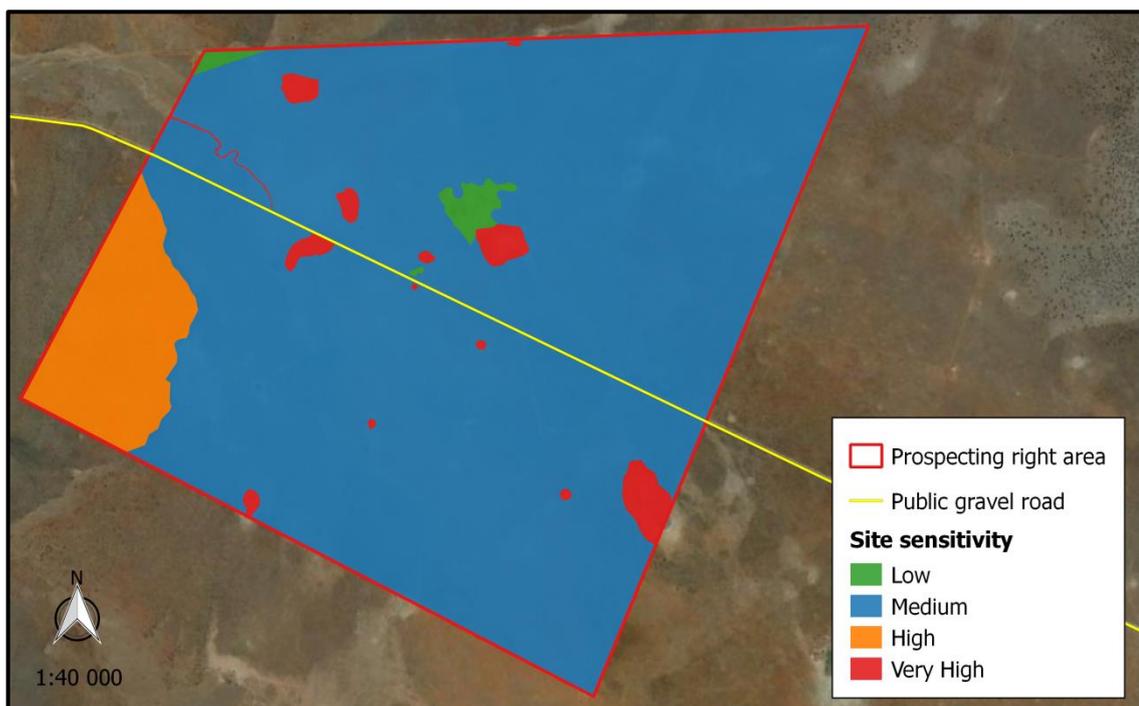


Figure 19. A sensitivity map for the Werda prospecting area.

4. IDENTIFICATION AND NATURE OF IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the Werda prospecting operation are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the prospecting activities are listed.

4.1. Vegetation and floristics

4.1.1. Loss of natural and unique habitats

The vegetation in the path of prospecting activities and within the infrastructure areas will be completely removed. Vegetation clearing will lead to the loss of currently intact habitat within the prospecting area and habitat disturbances. This disturbance destroys primary vegetation and allows secondary pioneers species or invasive plants to enter and re-colonise disturbed area. As primary vegetation is more functional in an ecosystem, this could irreversibly transform the vegetation characteristics in the area.

4.1.2. Loss of Red data and/or protected floral species

There are a number of listed and protected species present at the site, such as *Boscia albitrunca*, *Ruschia* spp., *Gymnosporia buxifolia*, *Deverra burchellii*, *Euphorbia duseimata*, *Vachellia erioloba*, *Olea europaea* subsp. *africana* and *Harpagophytum procumbens*. It is highly likely that most of these species, especially *Olea europaea* subsp. *africana* would be removed during the operation. Furthermore, any illegal fire wood collection or illegal harvesting of the plants for trade or medicinal use by staff, contractors or secondary land users could potentially have a negative impact on the population of these species.

4.1.3. Introduction or spread of alien species

Disturbances created during the prospecting operation are highly likely to encourage the proliferation and spread of alien species on site and to neighbouring farms. The current extent of alien invasive species is not a major cause of concern, but such species will rapidly increase in abundance and expand into the adjacent areas if given the opportunity. This impact is deemed likely to occur.

4.1.4. Encouraging bush encroachment

The disturbance created during the prospecting operation could potentially encourage bush encroachment. This is especially likely during the clearing of diverse habitats where opportunity is provided for highly competitive encroaching species like *Senegalia mellifera*, *Tarchonanthus camphoratus* and *Vachellia tortilis* subsp. *heteracantha* to establish.

It is however also possible that the prospecting operation can control the spread of the latter species, by removing them for prospecting purposes.

4.2. Fauna

4.2.1. Habitat fragmentation

Aquatic and riparian habitats, rock crevices, burrows, nests and vegetation on which small mammals, insects, amphibians, reptiles and birds are heavily reliant will be destroyed during the clearing activities associated with prospecting, causing the permanent displacement of these animals.

During the operational phases re-established vegetation will be cleared and will create unnatural open spaces within the landscape. Some species that habitually seek out protective cover for movement across the landscape may be prevented from moving across this cleared space due to the fear of predation. It restricts the movement of smaller species and limits their access to foraging sites. This causes reduced population density of prey species, which in turn reduces the food availability for predators. It ultimately affects the nutrient cycle and ecological functioning.

4.2.2. Intentional/accidental killing of fauna

Smaller fauna will inevitably be killed along with their habitat during the clearing of land. Some species, particularly snakes and lizards, are often intentionally killed as they are thought to be dangerous, while vultures and owls are killed for cultural beliefs and practises. Large exposed excavations could result in some faunal species falling in and being killed or being unable to escape from the excavation, ultimately leading to death. Furthermore, vehicular traffic is often a significant cause of accidental road kill. Overhead powerlines pose electrocution and/or collision threats to certain bird species.

4.2.3. Anthropogenic disturbances

Disturbance, like prospecting activities, result in disturbances to the naturally occurring faunal species. These disturbances include increased levels of noise, pollution, vibrations, waste generations, illumination and human presence. Disturbances that alter the natural environment have two effects. Firstly, it may cause the loss of certain species due to the destruction of habitat.

Sensitive and shy fauna would move away from the area during the operation as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the activities and might be killed. Secondly, it may cause the influx of species previously unable to colonise an area owing to the lack of suitable habitat; or because they have been excluded through competition.

4.2.4. Loss of Red listed species

A number of red listed faunal species are known from the area. The loss of habitat could result in a reduction or loss of these species, along with the red listed faunal species from the area. Although important habitats for animals would still remain within region, the increase in the loss of natural vegetation and habitat fragmentation from surrounding mining activities may result a cumulative impact which significantly increase the magnitude of this potential impact. The accidental or intentional killing of species of conservation concern are however more likely to occur.

4.3. Topography, soil erosion and associated degradation of ecosystems

The large amount of disturbance created during prospecting would potentially leave the site vulnerable to soil erosion. This will be most profound along the ephemeral watercourses and on the more sloping areas. It is likely that these would generate some amounts of runoff when disturbed. In addition, disturbance leading to the loss of plant cover over large parts of the site will certainly increase the risk of wind and water erosion at the site.

The changed topography in the form of infrastructure, tailings and open pits will generate a high runoff and as a result the amount of runoff the site experience is likely to increase. Soil erosion is therefore considered a likely impact during the course of the operation.

4.4. Broad-scale ecological processes

Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the moderate amount of mining activities in the area, this is a likely medium cumulative impact of the prospecting operation.

5. ECOLOGICAL IMPACT ASSESSMENT

This section provides a detailed analysis of the impacts associated with the Werda Prospecting operation. The impacts are assessed in terms of the relevant ecological aspects and each impact is associated with an outline of specific mitigation measures, which with proper implementation, monitoring and auditing, will serve to reduce the significance of the impact.

5.1. Vegetation and floristics

5.1.1. Loss of, and disturbance to indigenous vegetation

Source of the impact

Construction of roads and other necessary infrastructure; the placement of stockpiles; and the clearing of vegetation for excavations, materials storage and topsoil stockpiles; vehicular movement.

Description of the impact

Construction and prospecting activities on site will reduce the natural habitat for ecological systems to continue their operation. It is not expected that the areas of high ecological function will rehabilitate following disturbance events. Vehicle traffic generates lots of dust which can reduce the growth success and seed dispersal of many small plant species.

Significance of the impact

Severity		Spatial Scope		Duration		Probability		Significance
Medium (2)	+	Local (2)	+	Decommissioning (3)	x	Certain for life of operation (10)	=	Low - Medium (70)

Mitigation and monitoring

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of excavated areas, by effective backfilling.
- Encourage the growth of natural plant species by sowing indigenous seeds or by planting seedlings.
- Ensure measures for the adherence to the speed limit to minimise dust plumes.

5.1.2. Loss of flora with conservation concern

Source of the impact

Removal of listed or protected plant species; during the construction of roads and other necessary infrastructure; the placement of stockpiles; and the clearing of vegetation for excavations.

Description of the impact

It is possible that prospecting activities will destroy protected species and other species of conservation concern.

Significance of the impact

Severity	+	Spatial Scope	+	Duration	x	Probability	=	Significance
High (3)		Local (2)		Residual (4)		Possible frequently (8)		Low - Medium (72)

Mitigation and monitoring

- Footprint areas of the prospecting activities must be scanned for Red Listed and protected plant species prior to excavations.
- It is recommended that these plants are identified and marked prior to intended activity.
- These plants should, where possible, be incorporated into the design layout and left in situ.
- However, if threatened by destruction, these plants should be removed (with the relevant permits from DAFF and/or DENC) and relocated if possible.
- A management plan should be implemented to ensure proper establishment of ex situ individuals, and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation.
- The appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation.
- All those working on site must be educated about the conservation importance of the flora occurring on site.

5.1.3. Proliferation of alien vegetation

Source of the impact

Clearing of vegetation; prospecting activities.

Description of the impact

The extent of alien invasive species in the area shows the low levels of past disturbance interference in the natural ecosystem. While general clearing of the area and excavation activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the prospecting site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

Significance of the impact

Severity		Spatial Scope		Duration		Probability		Significance
High (2)	+	Regional (4)	+	Residual (4)	x	Possible infrequently (7)	=	Low - Medium (70)

Mitigation and monitoring

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of excavated areas.
- Encourage the growth of natural plant species.
- Mechanical methods of control to be implemented extensively.
- Annual follow-up operations to be implemented.

5.1.4. Encouragement of bush encroachment

Source of the impact

Clearing of vegetation; disturbances through prospecting activities.

Description of the impact

The extent of bush encroaching species on site shows the moderate level of past disturbance interference in the natural ecosystem, primarily through grazing practises. While general clearing of the area and prospecting activities destroy natural vegetation, bush encroaching plants can increase due to their opportunistic nature in disturbed areas. If encroaching plants establish in disturbed areas, it may the lower potential for future land use and decrease biodiversity. With proper mitigation, the impacts can be substantially reduced.

Significance of the impact

Severity		Spatial Scope		Duration		Probability		Significance
Medium (2)	+	Local (2)	+	Residual (4)	x	Possible infrequently (7)	=	Low – Medium (56)

Mitigation and monitoring

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of disturbed areas.
- Encourage the growth of a diverse selection of natural plant species.
- Mechanical methods of control to be implemented selectively.
- Annual follow-up monitoring to be implemented.

5.2. Fauna

5.2.1. Loss, damage and fragmentation of natural habitats

Source of the impact

Clearance of vegetation; prospecting activities.

Description of the impact

Prospecting activities and associated infrastructure will result in the loss of connectivity and fragmentation of natural habitat. Fragmentation of habitat will lead to the loss of migration corridors, in turn resulting in degeneration of the affected population's genetic make-up. This results in a subsequent loss of genetic variability between meta-populations occurring within the study site. Pockets of fragmented natural habitats hinder the growth and development of populations. This impact will be most profound in the watercourses.

Significance of the impact

Severity	+	Spatial Scope	+	Duration	x	Probability	=	Significance
High (3)		Regional (3)		Residual (4)		Possible for life of operation (9)		Medium - High (90)

Mitigation and monitoring

- All activities associated with the prospecting operation must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.
- The extent of the earmarked area should be demarcated on site layout plans. No staff, contractors or vehicles may leave the demarcated area except those authorised to do so.
- Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no go zone for employees, machinery or even visitors.
- Employ sound rehabilitation measures to restore the characteristics of the affected aquatic and riparian habitats.

5.2.2. Disturbance, displacement and killing of fauna

Source of the impact

Vegetation clearing; increase in noise and vibration; human and vehicular movement on site resulting from prospecting activities.

Description of the impact

The transformation of natural habitats will result in the loss of habitat, affecting individual species and ecological processes. This will result in the displacement of faunal species that depend on such habitats, e.g. resident Aardvark. Increased noise and vibration will disturb and possibly displace birds and other wildlife. Fast moving vehicles cause road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates. Intentional killing of snakes, reptiles, vultures and owls will negatively affect the local populations.

Significance of the impact

Severity	+	Spatial Scope	+	Duration	x	Probability	=	Significance
Medium (2)		Regional (3)		Decommissioning (3)		Possible for life of operation (9)		Low – Medium (72)

Mitigation and monitoring

- Careful planning of the operation is needed in order to avoid the destruction of pristine habitats and minimise the overall disturbance footprint.
- The extent of the prospecting activities should be demarcated on site layout plans, and no personnel or vehicles may leave the demarcated area except if authorised to do so. Areas surrounding the earmarked site that are not part of the demarcated area should be considered as a no go zone.
- A full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance.
- Everyone on site must undergo environmental induction for awareness on not harming or collecting species that are often persecuted out of superstition and to be educated about the conservation importance of the fauna occurring on site.
- Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Any mortalities resulting from birds flying into power lines, should be recorded with the date of the observation, the species affected and any other relevant information.
- Employ measures that ensure adherence to the speed limit.

5.3. Erosion and loss of soil fertility

5.3.1. Soil erosion

Source of the impact

Infrastructure; excavations; alterations of the beds and banks of the watercourses.

Description of the impact

Vegetation will be stripped in preparation for placement of infrastructure and excavations, and therefore the areas will be bare and susceptible to erosion. Topsoil and overburden that is stripped and piled on surrounding areas can be eroded by wind, rain and flooding. The soil/sediments will be carried away during runoff. The affected areas will be rehabilitated, but full restoration might only occur over a number of years, subsequent to the re-establishment of vegetation and hydrologic regime.

Significance of the impact

Severity		Spatial Scope		Duration		Probability		Significance
High (3)	+	Local (2)	+	Decommissioning (3)	x	Possible infrequently (7)	=	Low – Medium (56)

Mitigation and monitoring

- Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased.
- Ground exposure should be minimised in terms of the surface area and duration.
- The operation must co-ordinate different activities in order to optimise the excavated trenches and thereby prevent repeated and unnecessary excavations.
- Construction/excavations during the rainy season (November to March) should be monitored and controlled.
- Run-off from exposed ground should be controlled with flow retarding barriers.
- All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses.
- Excavated and stockpiled soil material are to be stored on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate.
- Regular audits carried out to identify areas where erosion is occurring (incl. linear activities such as roads and pipelines); followed by appropriate remedial actions.

5.3.2. Loss of soil fertility

Source of the impact

During the removal of topsoil; stockpiling.

Description of the impact

Improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

Significance of the impact

Severity		Spatial Scope		Duration		Probability		Significance
High (3)	+	Local (2)	+	Residual (4)	x	Possible for life of operation (9)	=	Medium - High (81)

Mitigation and monitoring

- Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions.
- Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired.
- Topsoil must not be handled when the moisture content exceeds 12 %.
- Topsoil stockpiles must be kept separate from sub-soils.
- The topsoil should be replaced as soon as possible on to the backfilled areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.

5.4. Broad-scale ecological processes

Source of the impact

The construction of roads, plant site, as well as other necessary infrastructure; the clearing of vegetation for excavations; alterations of the beds and banks of the watercourses.

Description of the impact

Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. The fragmentation of the watercourses will destroy connectivity of vital ecological and aquatic linkages. Due to the moderate amount of mining activities in the area, this is a possible cumulative impact of the prospecting operation.

Significance of the impact

Severity	+	Spatial Scope	+	Duration	x	Probability	=	Significance
High (3)		Regional (3)		Residual (4)		Possible for life of operation (9)		Medium - High (90)

Mitigation and monitoring

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of affected areas.
- Encourage the growth of natural plant species.
- Employ sound rehabilitation measures to restore the characteristics of the affected watercourses.

6. CONCLUSION, RECOMMENDATIONS AND OPINION REGARDING AUTHORISATION

Five plant communities were identified on site of which the watercourses and woodland and grassland communities on the plains are included in the core prospecting area. The watercourses include several ephemeral pans and an ephemeral river, which are considered to be of very high sensitivity. The grassland and woodland community on the plains are considered to be of medium sensitivity. The most profound impacts are expected to be related to the destruction of watercourses and the alteration of aquatic habitats; which in turn will cause cumulative fragmentation of important ecological corridors in the area.

Species of conservation concern that are found in these earmarked habitats will most likely also be lost locally. These include the widespread *Olea europaea* subsp. *africana*; *Gymnosporia buxifolia* and *Euphorbia duseimata* in the woodlands; and *Harpagophytum procumbens* and *Ruschia* spp. in the grassland. Similarly, the prospecting operation will result in the large-scale clearance of indigenous vegetation. Additionally, any disturbances to the Aardvark burrows will displace this protected species locally. Permit applications regarding protected fauna and flora as well as the harvesting of indigenous vegetation need to be lodged with the Northern Cape Department of Environment and Nature Conservation prior to any clearance of vegetation or destruction of Aardvark burrows.

Although *Boscia albitrunca* shrubs are widespread across the hill they are not expected to be affected by the prospecting activities. Similarly, the *Vachellia erioloba* tree near the entrance of a neighbouring game farm is also not expected to be affected. Nevertheless, a licence application regarding protected trees should be lodged with Department of Agriculture, Forestry and Fisheries prior to any potential disturbances to these trees.

To conclude, it is clear that the destruction of the natural habitat within the study area is inevitable. The significance of the impacts will be affected by the success of the mitigation measures implemented and the rehabilitation programme for the prospecting area. The majority of the site is in a pristine condition and are expected to be adversely affected. In my opinion, authorisation should not be granted unless the applicant commits to the adherence of effective avoidance, management, mitigation and rehabilitation measures.

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APPENDICES

APPENDIX 1

Plant species list

Family	Scientific name	Status	NFA	NCNCA
ACANTHACEAE	<i>Barleria bechuanensis</i>	LC		
	<i>Glossochilus burchellii</i>	LC		
	<i>Justicia puberula</i>	LC		
	<i>Monechma divaricatum</i>	LC		
AIZOACEAE	<i>Galenia sarcophylla</i>	LC		
AMARANTHACEAE	<i>Hermbstaedtia fleckii</i>	LC		
	<i>Hermbstaedtia odorata</i> var. <i>aurantiaca</i>	LC		
	<i>Kyphocarpa angustifolia</i>	LC		
	<i>Sericorema sericea</i>	LC		
ANACARDIACEAE	<i>Searsia burchellii</i>	LC		
	<i>Searsia lancea</i>	LC		
	<i>Searsia pendulina</i>	LC		
	<i>Searsia pyroides</i> var. <i>pyroides</i>	LC		
	<i>Searsia tridactyla</i>	LC		
APIACEAE	<i>Deverra burchellii</i>	LC		S2
APOCYNACEAE	<i>Pachypodium succulentum</i>	LC		S2
	<i>Pentarrhinum insipidum</i>	LC		S2
ASPARAGACEAE	<i>Asparagus exuvialis</i>	LC		
	<i>Asparagus</i> sp.	LC		
	<i>Asparagus suaveolens</i>	LC		
ASPLENIACEAE	<i>Asplenium cordatum</i>	LC		
ASTERACEAE	<i>Amphiglossa triflora</i>	LC		
	<i>Berkheya</i> sp.	-		
	<i>Bidens</i> sp.	Exotic		
	<i>Chrysocoma ciliata</i>	LC		
	<i>Cirsium vulgare</i>	Exotic		
	<i>Eriocephalus ericoides</i> subsp. <i>griquensis</i>	LC		
	<i>Euryops dregeanus</i>	LC		
	<i>Felicia filifolia</i> subsp. <i>filifolia</i>	LC		
	<i>Geigeria filifolia</i>	LC		
	<i>Gnaphalium</i> sp.	-		
	<i>Helichrysum cerastioides</i> var. <i>cerastioides</i>	LC		
	<i>Helichrysum zeyheri</i>	LC		
	<i>Hertia ciliata</i>	LC		
	<i>Hertia pallens</i>	LC		
	<i>Lactuca inermis</i>	LC		
	<i>Laggera decurrens</i>	LC		
	<i>Lopholaena cneorifolia</i>	LC		
	<i>Osteospermum microphyllum</i>	LC		
	<i>Osteospermum scariosum</i> var. <i>scariosum</i>	LC		
	<i>Osteospermum spinescens</i>	LC		
<i>Pentzia calcarea</i>	LC			
<i>Pentzia incana</i>	LC			
<i>Pentzia quinquefida</i>	LC			

Family	Scientific name	Status	NFA	NCNCA
ASTERACEAE	<i>Platycarphella parvifolia</i>	LC		
	<i>Pteronia cylindracea</i>	LC		
	<i>Rosenia humilis</i>	LC		
	<i>Schkuhria pinnata</i>	Exotic		
	<i>Senecio carnosus</i>	LC		
	<i>Tarchonanthus camphoratus</i>	LC		
	<i>Zinnia peruviana</i>	Exotic		
BIGNONIACEAE	<i>Tecoma stans</i> var. <i>stans</i>	Exotic		
BORAGINACEAE	<i>Ehretia alba</i>	LC		
	<i>Heliotropium ciliatum</i>	LC		
BRASSICACEAE	<i>Erucastrum strigosum</i>	LC		
	<i>Heliophila suavissima</i>	LC		
CACTACEAE	<i>Opuntia ficus-indica</i>	Exotic		
CAMPANULACEAE	<i>Wahlenbergia androsaema</i>	LC		
	<i>Wahlenbergia nodosa</i>	LC		
CAPPARACEAE	<i>Boscia albitrunca</i>	LC	X	S2
	<i>Cleome angustifolia</i> subsp. <i>diandra</i>	LC		
CARYOPHYLLACEAE	<i>Pollichia campestris</i>	LC		
CELASTRACEAE	<i>Gymnosporia buxifolia</i>	LC		S2
CHENOPODIACEAE	<i>Atriplex semibaccata</i> var. <i>appendiculata</i>	LC		
	<i>Chenopodium hederiforme</i> var. <i>dentatum</i>	LC		
COLCHICACEAE	<i>Ornithoglossum dinteri</i>	LC		
CONVOLVULACEAE	<i>Convolvulus boedeckerianus</i>	LC		
	<i>Ipomoea oenotheroides</i>	LC		
CUCURBITACEAE	<i>Coccinia sessilifolia</i>	LC		
	<i>Cucumis heptadactylus</i>	LC		
	<i>Kedrostis foetidissima</i>	LC		
EBENACEAE	<i>Diospyros austro-africana</i> var. <i>microphylla</i>	LC		
EBENACEAE	<i>Euclea crispa</i> subsp. <i>ovata</i>	LC		
EUPHORBIACEAE	<i>Euphorbia duseimata</i>	LC		S2
	<i>Euphorbia mauritanica</i> var. <i>mauritanica</i>	LC		S2
FABACEAE	<i>Caesalpinia gilliesii</i>	Exotic		
	<i>Calobota cuspidosa</i>	LC		
	<i>Cullen tomentosum</i>	LC		
	<i>Indigofera alternans</i> var. <i>alternans</i>	LC		
	<i>Indigofera denudata</i>	LC		
	<i>Lessertia affinis</i>	LC		S1
	<i>Melolobium microphyllum</i>	LC		
	<i>Parkinsonia aculeata</i>	Exotic		
	<i>Prosopis gladulosa</i>	Exotic		
	<i>Senegalia mellifera</i>	LC		
	<i>Senna italica</i> subsp. <i>arachoides</i>	LC		
	<i>Vachellia erioloba</i>	LC	X	

Family	Scientific name	Status	NFA	NCNCA
FABACEAE	<i>Vachellia haematoxylon</i>	LC	X	
	<i>Vachellia hebeclada</i> subsp. <i>hebeclada</i>	LC		
	<i>Vachellia tortilis</i> subsp. <i>heteracantha</i>	LC		
GERANIACEAE	<i>Pelargonium multicaule</i> subsp. <i>multicaule</i>	LC		S1
JUNCACEAE	<i>Juncus rigidus</i>	LC		
LAMIACEAE	<i>Leonotis pentadentata</i>	LC		
	<i>Salvia disermas</i>	LC		
	<i>Salvia stenophylla</i>	-		
	<i>Salvia verbenaca</i>	LC		
	<i>Stachys spathulata</i>	LC		
MALVACEAE	<i>Grewia flava</i>	LC		
	<i>Hermannia comosa</i>	LC		
	<i>Hermannia eenii</i>	LC		
	<i>Hermannia erodioides</i>	LC		
	<i>Hermannia jacobefolia</i>	LC		
	<i>Pavonia burchellii</i>	LC		
	<i>Pavonia burchellii</i>	LC		
MENISPERMACEAE	<i>Antizoma angustifolia</i>	LC		
MESEMBRYANTHEMACEAE	<i>Ruschia griquensis</i>	LC		S2
	<i>Ruschia hamata</i>	LC		S2
MOLLUGINACEAE	<i>Hypertelis salsoloides</i> var. <i>salsoloides</i>	LC		
	<i>Limeum argute-carinatum</i> var. <i>argute-carinatum</i>	LC		
MYRTACEAE	<i>Eucalyptus camaldulensis</i>	Exotic		
NYCTAGINACEAE	<i>Mirabilis jalapa</i>	Exotic		
OLEACEAE	<i>Menodora africana</i>	LC		
	<i>Olea europaea</i> subsp. <i>africana</i>	LC		S2
ONAGRACEAE	<i>Oenothera indecora</i>	Exotic		
OXALIDACEAE	<i>Oxalis depressa</i>	LC		S2
	<i>Oxalis lawsonii</i>	LC		S2
PEDALIACEAE	<i>Harpagophytum procumbens</i>	LC		S1
	<i>Sesamum triphyllum</i> var. <i>triphyllum</i>	LC		
PHYLLANTHACEAE	<i>Phyllanthus parvulus</i>	LC		
PLANTAGINACEAE	<i>Plantago lanceolata</i>	LC		
POACEAE	<i>Anthephora pubescens</i>	LC		
	<i>Aristida adscensionis</i>	LC		
	<i>Aristida congesta</i> subsp. <i>barbicollis</i>	LC		
	<i>Aristida congesta</i> subsp. <i>congesta</i>	LC		
	<i>Aristida meridionalis</i>	LC		
	<i>Aristida stipitata</i>	LC		
	<i>Aristida vestita</i>	LC		
	<i>Brachiaria marlothii</i>	LC		
	<i>Brachiaria serrata</i>	LC		
	<i>Chloris virgata</i>	LC		
	<i>Cymbopogon pospischilii</i>	Exotic		

Family	Scientific name	Status	NFA	NCNCA
POACEAE	<i>Cynodon dactylon</i>	LC		
	<i>Digitaria eriantha</i>	LC		
	<i>Enneapogon cenchroides</i>	LC		
	<i>Enneapogon desvauxii</i>	LC		
	<i>Enneapogon scoparius</i>	LC		
	<i>Eragrostis bicolor</i>	LC		
	<i>Eragrostis echinochloidea</i>	LC		
	<i>Eragrostis homomalla</i>	LC		
	<i>Eragrostis lehmanniana</i> var. <i>lehmanniana</i>	LC		
	<i>Eragrostis mexicana</i> subsp. <i>virescens</i>	Exotic		
	<i>Eragrostis nindensis</i>	LC		
	<i>Eragrostis pallens</i>	LC		
	<i>Eragrostis pilgeriana</i>	LC		
	<i>Eragrostis porosa</i>	LC		
	<i>Eragrostis procumbens</i>	LC		
	<i>Eragrostis trichophora</i>	LC		
	<i>Eragrostis truncata</i>	LC		
	<i>Fingerhuthia africana</i>	LC		
	<i>Heteropogon contortus</i>	LC		
	<i>Hyparrhenia hirta</i>	LC		
	<i>Leptochloa fusca</i>	LC		
	<i>Melinis repens</i> subsp. <i>repens</i>	LC		
	<i>Panicum stapfianum</i>	LC		
	<i>Pogonarthria squarrosa</i>	LC		
	<i>Schmidtia kalahariensis</i>	LC		
	<i>Schmidtia pappophoroides</i>	LC		
	<i>Sporobolus fimbriatus</i>	LC		
	<i>Stipagrostis ciliata</i> var. <i>capensis</i>	LC		
	<i>Stipagrostis uniplumis</i> var. <i>uniplumis</i>	LC		
	<i>Themeda triandra</i>	LC		
	<i>Tragus racemosus</i>	LC		
<i>Triraphis purpurea</i>	LC			
RHAMNACEAE	<i>Ziziphus mucronata</i>	LC		
RUBIACEAE	<i>Kohautia cynanchica</i>	LC		
SANTALACEAE	<i>Thesium lacinulatum</i>	LC		
SCROPHULARIACEAE	<i>Aptosimum albomarginatum</i>	LC		
	<i>Aptosimum marlothii</i>	LC		
	<i>Jamesbrittenia atropurpurea</i> subsp. <i>atropurpurea</i>	LC		S2
	<i>Jamesbrittenia aurantiaca</i>	LC		S2
	<i>Jamesbrittenia tysonii</i>	LC		S2
	<i>Nemesia lilacina</i>	LC		S2

Family	Scientific name	Status	NFA	NCNCA
SCROPHULARIACEAE	<i>Peliostomum leucorrhizum</i>	LC		
	<i>Selago albida</i>	LC		
	<i>Selago mixta</i>	LC		
SINOPTERIDACEAE	<i>Cheilanthes eckloniana</i>	LC		
	<i>Cheilanthes hirta</i> var. <i>hirta</i>	LC		
SOLANACEAE	<i>Datura inoxia</i>	Exotic		
	<i>Lycium hirsutum</i>	LC		
	<i>Lycium horridum</i>	LC		
	<i>Solanum namaquense</i>	LC		
	<i>Withania somnifera</i>	LC		
THYMELAEACEAE	<i>Gnidia polycephala</i>	LC		
TYPHACEAE	<i>Typha capensis</i>	LC		
VERBENACEAE	<i>Chascanum pinnatifidum</i> var. <i>pinnatifidum</i>	LC		
	<i>Lantana rugosa</i>	LC		
VISCACEAE	<i>Viscum rotundifolium</i>	LC		
ZYGOPHYLLACEAE	<i>Zygophyllum pubescens</i>	LC		

APPENDIX 2

Fauna species list

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
CHIROPTERA	² <i>Eidolon helvum</i>	African Straw-coloured Fruit-bat	NT	Not listed	Wide habitat tolerance.	High
	² <i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	LC	LC	Mainly close to rivers and surrounding habitats.	Low
	² <i>Neoromicia capensis</i>	Cape Bat	LC	LC	Wide habitat tolerance, but often found in arid areas, grassland, bushveld and <i>Acacia</i> woodland. Animals roost under the bark of trees and similar vegetation.	High
	³ <i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC	Not listed	Mainly roosts in caves or mine shafts, but also in crevices and holes in trees.	High
	² <i>Nycteris thebaica</i>	Common Slit-faced Bat	LC	LC	Savanna species with wide habitat tolerance. Roosts in caves, mine adits, aardvark holes, rock crevices and hollow trees in open savanna woodland.	High
	² <i>Rhinolophus denti</i>	Dent's Horseshoe Bat	LC	NT	Savanna habitats.	High
	² <i>Rhinolophus clivus</i>	Geoffroy's Horseshoe Bat	LC	NT	Wide habitat tolerance.	High
	² <i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	NT	Savanna habitats.	High
	² <i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	LC	Wide habitat tolerance.	High

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
MACROSCELIDIDAE	² <i>Macroselides proboscideus</i>	Round-eared Sengi	LC	LC	A habitat specialist occupying gravel plains associated with alluvial plains and relatively flat areas between higher elevation areas such as outcrops, scarps, hills, and mountains .	High
	² <i>Elephantulus rupestris</i>	Western Rock Sengi	LC	LC	Arid habitats, including deserts, dry savannas, and dry shrublands. Typically associated with rocky ridges, outcrops or koppies (rocky hills), and boulder fields at the bases of mountains.	High
TUBULENTATA	¹ <i>Orycteropus afer</i>	Aardvark	LC	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil.	Confirmed
HYRACOIDEA	² <i>Procavia capensis</i>	Rock Hyrax	LC	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies.	High

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
LAGOMORPHA	² <i>Lepus capensis</i>	Cape Hare	LC	LC	Dry, open regions, with palatable bush and grass.	High
	² <i>Lepus saxatilis</i>	Scrub Hare	LC	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	Medium
	² <i>Pronolagus rupestris</i>	Smith's Red Rock Rabbit	LC	LC	Rocky habitats, from isolated outcrops to mountain ranges; in high and low rainfall areas, but absent from true desert.	High
RODENTIA	² <i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC	Catholic in habitat requirements.	Confirmed
	² <i>Xerus inauris</i>	South African Ground Squirrel	LC	LC	Open terrain with a sparse bush cover and hard substrate.	Confirmed
	² <i>Pedetes capensis</i>	Springhare	LC	LC	Occurs widespread: open sandy ground, sandy scrub, overgrazed grassland, edges of vleis and dry river beds.	Confirmed
	² <i>Graphiurus ocularis</i>	Spectacled Dormouse	LC	LC	Rocky habitats, but also trees.	High

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
RODENTIA	² <i>Saccostomus campestris</i>	Pouched Mouse	LC	LC	Wide habitat tolerance but prefers soft, particularly sandy soils; can be found in open and dense vegetation and in rocky areas; annual rainfall of 250 - 1 200 mm.	High
	² <i>Malacothrix typica</i>	Large-eared (Gerbil) Mouse	LC	LC	Short grass habitats over hard soil.	Medium
	³ <i>Rhabdomys dilectus</i>	Mesic Four-striped Grass Mouse	LC	<i>Not listed</i>	Wide habitat tolerance, from desert fringe to high-rainfall montane areas with grass cover.	High
	² <i>Rhabdomys pumilio</i>	Four-striped Grass Mouse	LC	LC	Essentially a grassland species; occurs in wide variety of habitats where there is good grass cover.	High
	³ <i>Mus musculus</i>	House Mouse	LC	<i>Not listed</i>	Wide habitat tolerance.	High
	² <i>Thallomys nigricauda</i>	Black-tailed Tree Rat	LC	LC	Arboreal species generally associated with <i>Acacia</i> bushland habitats.	Medium

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
RODENTIA	² <i>Mastomys coucha</i>	Southern Multimammate Mouse	LC	LC	Wide habitat tolerance.	High
	² <i>Parotomys littledalei</i>	Littledale's Whistling Rat	LC	NT	Occurs in shrublands and is not known to persist in disturbed or modified habitats.	High
	² <i>Micaelamys namaquensis</i>	Namaqua Rock Mouse	LC	LC	Catholic habitat requirements, but prefer rocky hills, outcrops or boulder-strewn hillsides.	High
	² <i>Myotomys unisulcatus</i>	Bush Karoo Rat	LC	LC	Shrub and fynbos associations in areas with rocky outcrops. Tend to avoid damp situations but exploit the semi-arid Karoo through behavioural adaptation.	High
	² <i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil	LC	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush.	High

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
RODENTIA	² <i>Gerbillurus paeba</i>	Pygmy Hairy-footed Gerbil	LC	LC	Associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover.	High
	² <i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	DD	Sandy soils; wooded and more open grassland; areas of cultivation.	High
	² <i>Gerbilliscus brantsii</i>	Highveld Gerbil	LC	LC	Sandy soils; wooded and more open grassland; areas of cultivation.	High
PRIMATES	⁴ <i>Papio ursinus</i>	Chacma Baboon	LC	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	Medium
PHOLIDOTA	¹ <i>Smutsia temminckii</i>	Ground Pangolin	VU	VU	Low to high rainfall areas, including open grassland, woodland and rocky hills, but excluding forest and true desert; nevertheless present throughout the Kalahari sand country.	Medium

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
EULIPTYPHLA	² <i>Crocidura cyanea</i>	Reddish-Grey Musk Shrew	LC	DD	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
	² <i>Suncus varilla</i>	Lesser Dwarf Shrew	LC	DD	Generally associated with termite mounds, grassland habitat.	High
	¹ <i>Atelerix frontalis</i>	South African Hedgehog	LC	NT	Generally found in semi-arid and sub-temperate environments with ample ground cover.	Medium
CARNIVORA	¹ <i>Proteles cristata</i>	Aardwolf	LC	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes.	High
	⁴ <i>Caracal caracal</i>	Caracal	LC	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions.	High
	¹ <i>Felis silvestris</i>	African Wild Cat	LC	LC	Wide habitat tolerance.	High

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
CARNIVORA	¹ <i>Felis nigripes</i>	Black-footed cat	VU	LC	Associated with arid country, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub.	Medium
	² <i>Genetta genetta</i>	Common (Small-spotted) Genet	LC	LC	Occur in open arid habitats.	High
	² <i>Suricata suricatta</i>	Suricate	LC	LC	Open arid country with hard and stony substrate. Occur in Nama- and Succulent Karoo but also fynbos.	Confirmed
	² <i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC	Semi-arid country on a sandy substrate.	High
	² <i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC	Wide habitat tolerance, but areas with adequate cover.	High
	¹ <i>Vulpes chama</i>	Cape Fox	LC	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub.	High

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
CARNIVORA	⁴ <i>Canis mesomelas</i>	Black-backed Jackal	LC	LC	Wide habitat tolerance.	High
	¹ <i>Hyaena brunnea</i>	Brown Hyena	NT	NT	Found in dry areas, generally with annual rainfall of 100 - 700 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna.	Low
	¹ <i>Otocyon megalotis</i>	Bat-eared Fox	LC	LC	Open country with mean annual rainfall of 100-600 mm.	High
	¹ <i>Poecilogale albinucha</i>	African Striped Weasel	LC	DD	Wide habitat tolerance, but most common in grassland areas.	High
	¹ <i>Ictonyx striatus</i>	Striped Polecat	LC	LC	Widely distributed throughout the sub-region.	High
	¹ <i>Mellivora capensis</i>	Honey Badger	LC	NT	Wide habitat tolerance.	High
CETARTIODACTYLA	² <i>Oryx gazella</i>	Gemsbok	LC	LC	Semi-arid and arid bushland and grassland of the Kalahari and Karoo and adjoining regions of Southern Africa.	Low
	² <i>Tragelaphus strepsiceros</i>	Greater Kudu	LC	LC	Wooded savanna	Confirmed

LIST OF MAMMALS (continued)

Mammals protected according to NCNCA are indicated with their respective Schedule no. in superscript

	Scientific name	Common name	IUCN	RDB	Habitat	Potential occurrence
CETARTIODACTYLA	² <i>Damaliscus pygargus phillipsi</i>	Blesbok	LC	LC	Open grassland with water	Confirmed
	² <i>Alcelaphus caama</i>	Red Hartebeest	LC	LC	Open savanna country and open woodland.	Low
	² <i>Antidorcas marsupialis</i>	Springbok	LC	LC	Open arid plains with short vegetation	Confirmed
	² <i>Raphicerus campestris</i>	Steenbok	LC	LC	Inhabits open country.	High
	² <i>Sylvicapra grimmia</i>	Common Duiker	LC	LC	Presence of bushes are important.	High

LIST OF REPTILES

Reptiles protected according to NCNCA are indicated with their respective Schedule no. in superscript.

Family	Scientific name	Common name	IUCN status
AGAMIDAE	³ <i>Agama aculeata aculeata</i>	Western Ground Agama	LC
	³ <i>Agama atra</i>	Southern Rock Agama	LC
AMPHISBAENIDAE	³ <i>Monopeltis capensis</i>	Cape Worm Lizard	LC
	³ <i>Monopeltis infuscata</i>	Dusky Worm Lizard	LC
	³ <i>Zygaspis quadrifrons</i>	Kalahari Dwarf Worm Lizard	LC
CHAMAELEONIDAE	¹ <i>Chamaeleo dilepis dilepis</i>	Common Flap-neck Chameleon	LC
COLUBRIDAE	² <i>Dispholidus typus</i>	Boomslang	LC
	² <i>Philothamnus semivariegatus</i>	Spotted Bush Snake	LC
CORDYLIDAE	¹ <i>Karusasaurus polyzonus</i>	Southern Karusa Lizard	LC
ELAPIDAE	³ <i>Naja nivea</i>	Cape Cobra	LC
GEKKONIDAE	³ <i>Chondrodactylus bibronii</i>	Bibron's Gecko	LC
	³ <i>Pachydactylus capensis</i>	Cape Gecko	LC
	³ <i>Pachydactylus mariquensis</i>	Common Banded Gecko	LC
	³ <i>Ptenopus garrulus garrulus</i>	Common Barking Gecko	LC
GERRHOSAURIDAE	³ <i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC
LACERTIDAE	² <i>Heliobolus lugubris</i>	Bushveld Lizard	LC
	² <i>Nucras intertexta</i>	Spotted Sandveld Lizard	LC
	² <i>Pedioplanis lineocellata lineocellata</i>	Spotted Sand Lizard	LC
	² <i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard	LC
LAMPROPHIIDAE	² <i>Boaedon capensis</i>	Common House Snake	LC
	² <i>Lamprophis aurora</i>	Aurora Snake	LC
	³ <i>Psammophis trinasalis</i>	Fork-marked Sand Snake	LC
	³ <i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC
	³ <i>Pseudaspis cana</i>	Mole Snake	LC
LEPTOTYPHLOPIDAE	³ <i>Leptotyphlops scutifrons</i>	Peter's Thread Snake	LC
PELOMEDUSIDAE	³ <i>Pelomedusa subrufa</i>	Marsh Terrapin	LC
SCINCIDAE	³ <i>Trachylepis capensis</i>	Cape Skink	LC
	³ <i>Trachylepis sulcata sulcata</i>	Western Rock Skink	LC
	³ <i>Trachylepis variegata</i>	Variegated Skink	LC

LIST OF REPTILES

Reptiles protected according to NCNCA are indicated with their respective Schedule no. in superscript.

Family	Scientific name	Common name	IUCN status
TESTUDINIDAE	³ <i>Homopus femoralis</i>	Greater Dwarf Tortoise	LC
	³ <i>Psammobates oculifer</i>	Serrated Tent Tortoise	LC
	³ <i>Psammobates tentorius</i>	Tent Tortoise	LC
	³ <i>Stigmochelys pardalis</i>	Leopard Tortoise	LC
TYPHLOPIDAE	³ <i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC
VARANIDAE	² <i>Varanus albigularis albigularis</i>	Southern Rock Monitor	LC
VIPERIDAE	³ <i>Bitis arietans arietans</i>	Puff Adder	LC

LIST OF AMPHIBIANS

Amphibians protected according to NCNCA are indicated with their respective Schedule no. in superscript.

Family	Scientific name	Common name	IUCN status
BUFONIDAE	² <i>Amietophrynus gutturalis</i>	Guttural Toad	LC
	² <i>Amietophrynus poweri</i>	Western Olive Toad	LC
	² <i>Bufo gariensis</i>	Karoo Toad	LC
HYPEROLIIDAE	² <i>Kassina senegalensis</i>	Bubbling Kassina	LC
MICROHYLIDAE	² <i>Breviceps adspersus</i>	Bushveld Rain Frog	LC
PIPIDAE	² <i>Xenopus laevis</i>	Common Platanna	LC
PYXICEPHALIDAE	² <i>Amietia queketti</i>	Common River Frog	LC
	² <i>Cacosternum boettgeri</i>	Boettger's Caco	LC
	¹ <i>Pyxicephalus adspersus</i>	Giant Bullfrog	NT
	² <i>Tomopterna cryptotis</i>	Tremolo Sand Frog	LC
	² <i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC

LIST OF BIRDS

Birds protected according to NCNCA are indicated with their respective Schedule no. in superscript.

Scientific name	Common name	IUCN status
¹ <i>Accipiter badius</i>	Shikra	
² <i>Acrocephalus baeticatus</i>	African Reed-Warbler	
² <i>Acrocephalus gracilirostris</i>	Lesser Swamp-Warbler	
² <i>Actitis hypoleucos</i>	Common Sandpiper	
² <i>Alcedo cristata</i>	Malachite Kingfisher	
² <i>Alopochen aegyptiacus</i>	Egyptian Goose	
² <i>Amadina erythrocephala</i>	Red-headed Finch	
² <i>Amaurornis flavirostris</i>	Black Crake	
² <i>Anas capensis</i>	Cape Teal	
² <i>Anas erythrorhyncha</i>	Red-billed Teal	
² <i>Anas hottentota</i>	Hottentot Teal	
² <i>Anas smithii</i>	Cape Shoveler	
² <i>Anas sparsa</i>	African Black Duck	
² <i>Anas undulata</i>	Yellow-billed Duck	
² <i>Anhinga rufa</i>	African Darter	
² <i>Anthoscopus minutus</i>	Cape Penduline-Tit	
² <i>Anthopoides paradisea</i>	Blue Crane	NT
² <i>Anthus cinnamomeus</i>	African Pipit	
² <i>Anthus vaalensis</i>	Buffy Pipit	
² <i>Apus affinis</i>	Little Swift	
² <i>Apus apus</i>	Common Swift	
² <i>Apus bradfieldi</i>	Bradfield's Swift	
² <i>Apus caffer</i>	White-rumped Swift	
² <i>Apus horus</i>	Horus Swift	
¹ <i>Aquila rapax</i>	Tawny Eagle	EN
¹ <i>Aquila verreauxii</i>	Verreaux's Eagle	VU
² <i>Ardea cinerea</i>	Grey Heron	
² <i>Ardea goliath</i>	Goliath Heron	
² <i>Ardea melanocephala</i>	Black-headed Heron	
² <i>Ardea purpurea</i>	Purple Heron	
² <i>Ardeola ralloides</i>	Squacco Heron	
² <i>Ardeotis kori</i>	Kori Bustard	NT
² <i>Batis pririt</i>	Pririt Batis	
² <i>Bostrychia hagedash</i>	Hadedda Ibis	
² <i>Bradornis infuscatus</i>	Chat Flycatcher	
² <i>Bradornis mariquensis</i>	Marico Flycatcher	
¹ <i>Bubo africanus</i>	Spotted Eagle-Owl	
¹ <i>Bubo lacteus</i>	Verreaux's Eagle-Owl	
² <i>Bubulcus ibis</i>	Cattle Egret	
² <i>Burhinus capensis</i>	Spotted Thick-knee	

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Scientific name	Common name	IUCN status
¹ <i>Buteo rufofuscus</i>	Jackal Buzzard	
¹ <i>Buteo vulpinus</i>	Steppe Buzzard	
² <i>Calandrella cinerea</i>	Red-capped Lark	
² <i>Calendulauda africanoides</i>	Fawn-coloured Lark	
² <i>Calendulauda bradfieldi</i>	Bradfield's Lark	
² <i>Calidris alba</i>	Sanderling	
² <i>Calidris ferruginea</i>	Curlew Sandpiper	
² <i>Calidris minuta</i>	Little Stint	
² <i>Campethera abingoni</i>	Golden-tailed Woodpecker	
¹ <i>Caprimulgus europaeus</i>	European Nightjar	
¹ <i>Caprimulgus rufigena</i>	Rufous-cheeked Nightjar	
¹ <i>Caprimulgus tristigma</i>	Freckled Nightjar	
² <i>Cercomela familiaris</i>	Familiar Chat	
² <i>Cercomela sinuata</i>	Sickle-winged Chat	
² <i>Cercotrichas coryphoeus</i>	Karoo Scrub-Robin	
² <i>Cercotrichas paena</i>	Kalahari Scrub-Robin	
² <i>Ceryle rudis</i>	Pied Kingfisher	
² <i>Charadrius asiaticus</i>	Caspian Plover	
² <i>Charadrius hiaticula</i>	Common Ringed Plover	
¹ <i>Charadrius pallidus</i>	Chestnut-banded Plover	NT
² <i>Charadrius pecuarius</i>	Kittlitz's Plover	
² <i>Charadrius tricollaris</i>	Three-banded Plover	
² <i>Chersomanes albofasciata</i>	Spike-heeled Lark	
² <i>Chlidonias hybridus</i>	Whiskered Tern	
² <i>Chlidonias leucopterus</i>	White-winged Tern	
² <i>Chrysococcyx caprius</i>	Diderick Cuckoo	
² <i>Ciconia abdimii</i>	Abdim's Stork	NT
² <i>Ciconia ciconia</i>	White Stork	
¹ <i>Ciconia nigra</i>	Black Stork	VU
² <i>Cinnyris fusca</i>	Dusky Sunbird	
² <i>Cinnyris mariquensis</i>	Marico Sunbird	
¹ <i>Circaetus pectoralis</i>	Black-chested Snake-Eagle	
¹ <i>Circus maurus</i>	Black Harrier	EN
¹ <i>Circus pygargus</i>	Montagu's Harrier	
¹ <i>Circus ranivorus</i>	African Marsh-Harrier	EN
² <i>Cisticola aridulus</i>	Desert Cisticola	
² <i>Cisticola fulvicapillus</i>	Neddicky	
² <i>Cisticola juncidis</i>	Zitting Cisticola	
² <i>Cisticola subruficapillus</i>	Grey-backed Cisticola	
² <i>Cisticola tinniens</i>	Levaillant's Cisticola	

LIST OF BIRDS

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Scientific name	Common name	IUCN status
² <i>Clamator glandarius</i>	Great Spotted Cuckoo	
² <i>Clamator jacobinus</i>	Jacobin Cuckoo	
² <i>Colius colius</i>	White-backed Mousebird	
² <i>Columba guinea</i>	Speckled Pigeon	
² <i>Columba livia</i>	Rock Dove	
² <i>Coracias caudata</i>	Lilac-breasted Roller	
² <i>Coracias garrulus</i>	European Roller	NT
² <i>Coracias naevia</i>	Purple Roller	
² <i>Corvus albus</i>	Pied Crow	
² <i>Corvus capensis</i>	Cape Crow	
² <i>Cossypha caffra</i>	Cape Robin-Chat	
² <i>Coturnix coturnix</i>	Common Quail	
² <i>Creatophora cinerea</i>	Wattled Starling	
² <i>Cuculus clamosus</i>	Black Cuckoo	
² <i>Cursorius rufus</i>	Burchell's Courser	VU
² <i>Cursorius temminckii</i>	Temminck's Courser	
² <i>Cypsiurus parvus</i>	African Palm-Swift	
² <i>Dendrocygna bicolor</i>	Fulvous Duck	
² <i>Dendrocygna viduata</i>	White-faced Duck	
² <i>Dendropicus fuscescens</i>	Cardinal Woodpecker	
² <i>Dicrurus adsimilis</i>	Fork-tailed Drongo	
² <i>Egretta alba</i>	Great Egret	
² <i>Egretta garzetta</i>	Little Egret	
² <i>Egretta intermedia</i>	Yellow-billed Egret	
¹ <i>Elanus caeruleus</i>	Black-shouldered Kite	
² <i>Emberiza capensis</i>	Cape Bunting	
² <i>Emberiza flaviventris</i>	Golden-breasted Bunting	
² <i>Emberiza impetuani</i>	Lark-like Bunting	
² <i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	
² <i>Eremomela icteropygialis</i>	Yellow-bellied Eremomela	
² <i>Eremopterix verticalis</i>	Grey-backed Sparrowlark	
² <i>Estrilda astrild</i>	Common Waxbill	
² <i>Estrilda erythronotos</i>	Black-faced Waxbill	
² <i>Euplectes afer</i>	Yellow-crowned Bishop	
² <i>Euplectes orix</i>	Southern Red Bishop	
² <i>Eupodotis afraoides</i>	Northern Black Korhaan	
² <i>Eupodotis ruficrista</i>	Red-crested Korhaan	
¹ <i>Falco biarmicus</i>	Lanner Falcon	VU
¹ <i>Falco naumanni</i>	Lesser Kestrel	-

LIST OF BIRDS

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Scientific name	Common name	IUCN status
¹ <i>Falco peregrinus</i>	Peregrine Falcon	-
¹ <i>Falco rupicolis</i>	Rock Kestrel	-
¹ <i>Falco rupicoloides</i>	Greater Kestrel	-
² <i>Fulica cristata</i>	Red-knobbed Coot	
² <i>Gallinago nigripennis</i>	African Snipe	
² <i>Gallinula chloropus</i>	Common Moorhen	
¹ <i>Glareola nordmanni</i>	Black-winged Pratincole	NT
¹ <i>Glaucidium perlatum</i>	Pearl-spotted Owlet	-
² <i>Granatina granatina</i>	Violet-eared Waxbill	
¹ <i>Gyps africanus</i>	White-backed Vulture	CR
¹ <i>Gyps coprotheres</i>	Cape Vulture	EN
² <i>Halcyon chelicuti</i>	Striped Kingfisher	
¹ <i>Haliaeetus vocifer</i>	African Fish-Eagle	-
¹ <i>Hieraaetus pennatus</i>	Booted Eagle	-
² <i>Himantopus himantopus</i>	Black-winged Stilt	
² <i>Hippolais icterina</i>	Icterine Warbler	
² <i>Hirundo albigularis</i>	White-throated Swallow	
² <i>Hirundo cucullata</i>	Greater Striped Swallow	
² <i>Hirundo dimidiata</i>	Pearl-breasted Swallow	
² <i>Hirundo fuligula</i>	Rock Martin	
² <i>Hirundo rustica</i>	Barn Swallow	
² <i>Hirundo semirufa</i>	Red-breasted Swallow	
² <i>Hirundo spilodera</i>	South African Cliff-Swallow	
² <i>Indicator indicator</i>	Greater Honeyguide	
² <i>Ixobrychus minutus</i>	Little Bittern	
² <i>Lagonosticta senegala</i>	Red-billed Firefinch	
² <i>Lamprotornis nitens</i>	Cape Glossy Starling	
² <i>Laniarius atrococcineus</i>	Crimson-breasted Shrike	
² <i>Lanius collaris</i>	Common Fiscal	
² <i>Lanius collurio</i>	Red-backed Shrike	
² <i>Lanius minor</i>	Lesser Grey Shrike	
² <i>Larus cirrocephalus</i>	Grey-headed Gull	
¹ <i>Leptoptilos crumeniferus</i>	Marabou Stork	NT
² <i>Malcorus pectoralis</i>	Rufous-eared Warbler	
² <i>Megaceryle maxima</i>	Giant Kingfisher	
² <i>Melierax canorus</i>	Southern Pale Chanting	
¹ <i>Melierax gabar</i>	Gabar Goshawk	-
² <i>Merops apiaster</i>	European Bee-eater	
² <i>Merops hirundineus</i>	Swallow-tailed Bee-eater	
² <i>Milvus aegyptius</i>	Yellow-billed Kite	

LIST OF BIRDS

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Scientific name	Common name	IUCN status
¹ <i>Milvus migrans</i>	Black Kite	-
² <i>Mirafra fasciolata</i>	Eastern Clapper Lark	
² <i>Mirafra passerina</i>	Monotonous Lark	
² <i>Monticola brevipes</i>	Short-toed Rock-Thrush	
² <i>Motacilla capensis</i>	Cape Wagtail	
² <i>Muscicapa striata</i>	Spotted Flycatcher	
² <i>Myrmecocichla formicivora</i>	Anteating Chat	
¹ <i>Neotis ludwigii</i>	Ludwig's Bustard	EN
² <i>Netta erythrophthalma</i>	Southern Pochard	
² <i>Nilaus afer</i>	Brubru	
² <i>Numenius phaeopus</i>	Common Whimbrel	
² <i>Numida meleagris</i>	Helmeted Guineafowl	
² <i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	
² <i>Oena capensis</i>	Namaqua Dove	
² <i>Oenanthe monticola</i>	Mountain Wheatear	
² <i>Oenanthe pileata</i>	Capped Wheatear	
² <i>Onychognathus naboroupp</i>	Pale-winged Starling	
² <i>Oriolus oriolus</i>	Eurasian Golden Oriole	
² <i>Ortygospiza atricollis</i>	African Quailfinch	
² <i>Oxyura maccoa</i>	Maccoa Duck	NT
² <i>Parisoma layardi</i>	Layard's Tit-Babbler	
² <i>Parisoma subcaeruleum</i>	Chestnut-vented Tit-Babbler	
² <i>Parus cinerascens</i>	Ashy Tit	
² <i>Passer diffusus</i>	Southern Grey-headed Sparrow	
² <i>Passer domesticus</i>	House Sparrow	
² <i>Passer melanurus</i>	Cape Sparrow	
² <i>Passer motitensis</i>	Great Sparrow	
² <i>Phalacrocorax africanus</i>	Reed Cormorant	
² <i>Phalacrocorax lucidus</i>	White-breasted Cormorant	
² <i>Philetairus socius</i>	Sociable Weaver	
² <i>Philomachus pugnax</i>	Ruff	
¹ <i>Phoenicopterus minor</i>	Lesser Flamingo	NT
¹ <i>Phoenicopterus ruber</i>	Greater Flamingo	NT
² <i>Phylloscopus trochilus</i>	Willow Warbler	
² <i>Platalea alba</i>	African Spoonbill	
² <i>Plectropterus gambensis</i>	Spur-winged Goose	
² <i>Plegadis falcinellus</i>	Glossy Ibis	
² <i>Plocepasser mahali</i>	White-browed Sparrow-Weaver	
² <i>Ploceus velatus</i>	Southern Masked-Weaver	

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Scientific name	Common name	IUCN status
² <i>Podiceps cristatus</i>	Great Crested Grebe	
² <i>Podiceps nigricollis</i>	Black-necked Grebe	
¹ <i>Polemaetus bellicosus</i>	Martial Eagle	EN
¹ <i>Polihierax semitorquatus</i>	Pygmy Falcon	-
¹ <i>Polyboroides typus</i>	African Harrier-Hawk	-
² <i>Porphyrio madagascariensis</i>	African Purple Swamphen	
² <i>Prinia flavicans</i>	Black-chested Prinia	
² <i>Psophocichla litsipsirupa</i>	Groundscraper Thrush	
² <i>Pterocles burchelli</i>	Burchell's Sandgrouse	
² <i>Pterocles namaqua</i>	Namaqua Sandgrouse	
¹ <i>Ptilopus granti</i>	Southern White-faced Scops-Owl	-
² <i>Pycnonotus nigricans</i>	African Red-eyed Bulbul	
² <i>Pytilia melba</i>	Green-winged Pytilia	
² <i>Quelea quelea</i>	Red-billed Quelea	
² <i>Rallus caerulescens</i>	African Rail	
² <i>Recurvirostra avosetta</i>	Pied Avocet	
² <i>Rhinopomastus cyanomelas</i>	Common Scimitarbill	
² <i>Rhinoptilus africanus</i>	Double-banded Courser	
² <i>Riparia paludicola</i>	Brown-throated Martin	
² <i>Riparia riparia</i>	Sand Martin	
¹ <i>Rostratula benghalensis</i>	Greater Painted-snipe	NT
¹ <i>Sagittarius serpentarius</i>	Secretarybird	VU
² <i>Scleroptila levaillantoides</i>	Orange River Francolin	
² <i>Scopus umbretta</i>	Hamerkop	
² <i>Serinus albogularis</i>	White-throated Canary	
² <i>Serinus atrogularis</i>	Black-throated Canary	
² <i>Serinus flaviventris</i>	Yellow Canary	
² <i>Sigelus silens</i>	Fiscal Flycatcher	
² <i>Spizocorys conirostris</i>	Pink-billed Lark	
² <i>Sporopipes squamifrons</i>	Scaly-feathered Finch	
² <i>Spreo bicolor</i>	Pied Starling	
² <i>Stenostira scita</i>	Fairy Flycatcher	
² <i>Streptopelia capicola</i>	Cape Turtle-Dove	
² <i>Streptopelia semitorquata</i>	Red-eyed Dove	
² <i>Streptopelia senegalensis</i>	Laughing Dove	
² <i>Struthio camelus</i>	Common Ostrich	
² <i>Sylvia borin</i>	Garden Warbler	
² <i>Sylvietta rufescens</i>	Long-billed Crombec	
² <i>Tachybaptus ruficollis</i>	Little Grebe	
² <i>Tachymarptis melba</i>	Alpine Swift	

LIST OF BIRDS

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Scientific name	Common name	IUCN status
² <i>Tadorna cana</i>	South African Shelduck	
² <i>Tchagra australis</i>	Brown-crowned Tchagra	
² <i>Telophorus zeylonus</i>	Bokmakierie	
² <i>Threskiornis aethiopicus</i>	African Sacred Ibis	
² <i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill	
² <i>Tockus nasutus</i>	African Grey Hornbill	
¹ <i>Torgos tracheliotus</i>	Lappet-faced Vulture	EN
² <i>Trachyphonus vaillantii</i>	Crested Barbet	
² <i>Tricholaema leucomelas</i>	Acacia Pied Barbet	
² <i>Tringa glareola</i>	Wood Sandpiper	
² <i>Tringa nebularia</i>	Common Greenshank	
² <i>Tringa stagnatilis</i>	Marsh Sandpiper	
² <i>Turdus smithi</i>	Karoo Thrush	
² <i>Turnix sylvatica</i>	Small Buttonquail	
¹ <i>Tyto alba</i>	Barn Owl	-
² <i>Upupa africana</i>	African Hoopoe	
² <i>Urocolius indicus</i>	Red-faced Mousebird	
² <i>Vanellus armatus</i>	Blacksmith Lapwing	
² <i>Vanellus coronatus</i>	Crowned Lapwing	
² <i>Vidua chalybeata</i>	Village Indigobird	
² <i>Vidua macroura</i>	Pin-tailed Whydah	
² <i>Vidua regia</i>	Shaft-tailed Whydah	
² <i>Zosterops pallidus</i>	Orange River White-eye	

APPENDIX 3

**A photographic guide for species of conservation concern that were
encountered or potentially occur on site**

Deverra burchellii
(All Protected in terms of Schedule 2 of the NCNCA)



Euphorbia mauritanica* var. *mauritanica
***Euphorbia* spp. are protected under Schedule 2 of the NCNCA**



Leaf scars

Fruit

Ruschia griquensis
(Protected in terms of Schedule 2 of the NCNCA)



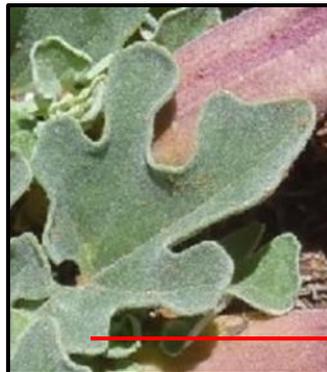
Characteristic hooks on leaf tips

Ruschia hamata
(Protected in terms of Schedule 2 of the NCNCA)



Characteristic recurved leaf tips

Harpagophytum procumbens subsp. *procumbens*
(Protected in terms of **Schedule 1** of the NCNCA)



A perennial, prostrate
creeper with annual stems

Rough, shallowly-lobed
leaves

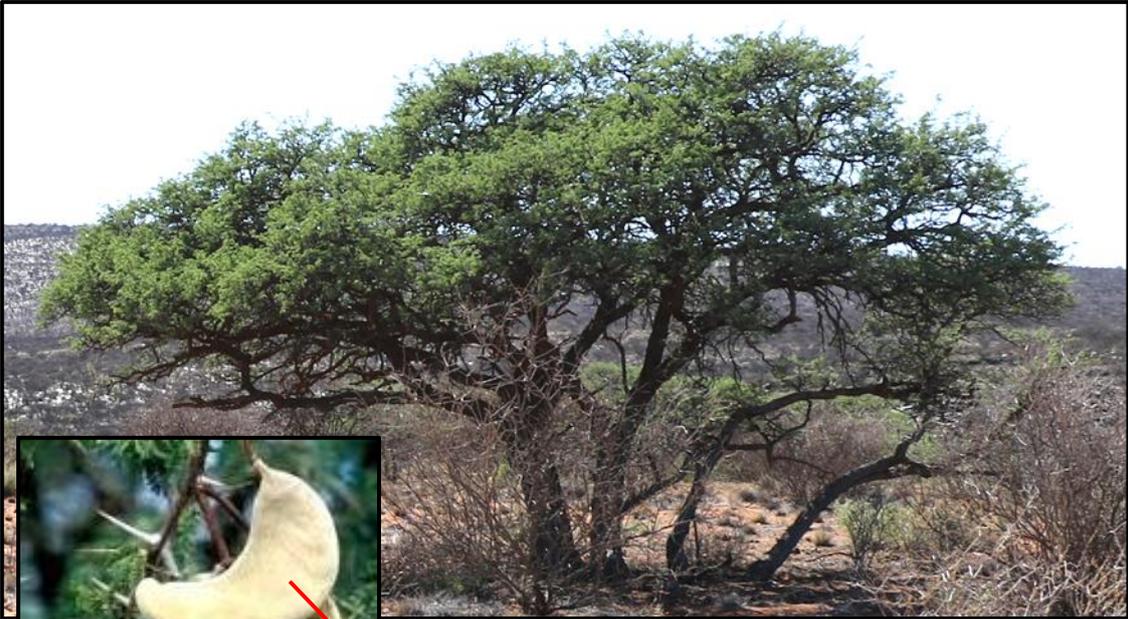
Dry seed head (Devil's claw)

Jamesbrittenia tysonii

(All *Jamesbrittenia* spp. are protected in terms of Schedule 2 of the NCNCA)



Vachellia erioloba
(Protected under the NFA)



Pods are thickened and velvety

Spines are often swollen and fused at the base

Gymnosporia buxifolia
(All *Gymnosporia* spp. are protected under Schedule 2 of NCNCA)



Spiny shrub or small tree.
Leaves in tufts, obovate,
toothed above.

Many white flowers with
an unpleasant smell in
axillary cymes.

Boscia albitrunca
(Protected under the NFA and Schedule 2 of the NCNCA)



Olea europaea subsp. *africana*
(Protected in terms of Schedule 2 of the NCNCA)

