

TERRESTRIAL FAUNAL SPECIES ASSESSMENT

PROPOSED EXPANSION OF AN EXISTING SHOPRITE CHECKERS DISTRIBUTION CENTRE ON A PORTION OF ERF 8741 AT WELLS ESTATE IN THE NELSON MANDELA BAY MUNICIPALITY



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April 2022

Final Report

CONTENTS

1. BACKGROUND AND TERMS OF REFERENCE	1
2. PROJECT DESCRIPTION	2
3. APPROACH TO THE ASSESSMENT	2
3.1 ASSUMPTIONS AND LIMITATIONS OF THE APPROACH	7
4. BROAD FAUNAL HABITATS	7
5. FAUNA AND THEIR CONSERVATION STATUS	10
6. SENSITIVE FAUNAL HABITATS	17
7. ASSESSMENT OF IMPACTS	18
8. CONCLUSIONS	25
9. LITERATURE SOURCES	25
10. APPENDICES	28

LIST OF FIGURES

Figure 1: Location of the project area, a portion of Erf 8741, for the proposed expansion of an existing Shoprite Checkers distribution centre in the Nelson Mandela Bay Municipality.	1
Figure 2: Layout for the expansion of an existing Shoprite Checkers distribution centre adjacent to the Markman industrial area and the Motherwell and Wells Estate informal settlements.	3
Figure 3: Distribution of broad faunal habitat types in the project area.	8
Figure 4: Distribution of sensitive faunal habitats in the fenced portion of the project area.	18
Figure 5: Distribution of sensitive faunal habitats in relation to the project layout alternatives.	20

LIST OF PLATES

Plate 1: Examples of the evidence used to assess potential faunal occurrences in the project area.	6
Plate 2: Examples of the broad faunal habitat types in the project area.	9
Plate 3: Example of the Secondary grassland habitats in the unfenced portion of the project area.	10
Plate 4: Examples of the historical dumping of industrial building material in the project area where alien invasive plants have established in the interim.	11
Plate 5: Examples of the evidence used to assess current threats to fauna in the project area.	14

LIST OF TABLES

Table 1: Species of Conservation Concern that potentially occur naturally in the project area.	12
Table 2: Fauna that potentially occur naturally in the project area and that are protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and fauna listed in terms of the Nature and Environmental Conservation Ordinance (NECO).	17

LIST OF APPENDICES

Appendix 1.	Specialist Curriculum Vitae	28
Appendix 2.	Prescribed impact assessment methodology used to assess the significance of potential impacts on fauna during the construction and operation of the proposed project.	36
Appendix 3.	List of amphibians, reptiles, mammals, birds, and butterflies that potentially occur naturally in the project area.	41

COMPLIANCE WITH THE PROTOCOLS FOR SPECIALIST ASSESSMENTS AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY (FAUNA, 30 OCTOBER 2020).

Contact details, curriculum vitae and professional registration of the specialist.	Appendix 1
Signed statement of independence by the specialist.	Pg iv
Duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Section 3.1
A description of the methodology used to undertake the impact assessment.	Section 3
A description of the assumptions made and any uncertainties or gaps in knowledge.	Section 3.1
The distribution, location, viability and detailed description of population size of the species of conservation concern (SCC) identified on the preferred development site.	Sections 4 & 5
The importance of the conservation of the population of SCC identified on the proposed development site based on information available in national and international databases.	Section 5
The nature and the extent of the potential impact of the proposed development on SCC on the proposed development site.	Section 7
Any dynamic ecological processes occurring within the site and its surrounds that might be disrupted by the proposed development and resulting impact on the identified SCC.	Sections 4, 5 & 7
Any potential impact of ecological connectivity (on site, and in relation to the broader landscape) and resulting impact on the identified SCC.	Sections 5 & 7
Buffer distances as per the <i>Species Environmental Assessment Best Practice Guidelines</i> used for the population of each SCC.	Section 9
The likelihood of other threatened species, undescribed species or highly localised endemics, migratory species, or SCC, occurring in the vicinity.	Section 5
Identify any alternative development footprints within the preferred development site which would be of “low” sensitivity as identified by the national web based environmental screening tool and verified through the initial site sensitivity verification.	Sections 2, 6 & 7
Areas not suitable for development, to be avoided during construction and operation where relevant.	Section 6
Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts.	Section 7
Impact management actions and impact management outcomes for inclusion in the Environmental Management Programme.	Section 7
A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not, and any conditions to which the opinion is subjected.	Section 9

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

Expansion of the existing Shoprite Checkers distribution centre situated on Erf 8741, located approximately 15 kilometres from the CBD of Gqeberha, Eastern Cape.

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4.2 The SPECIALIST

I, Marietjie Landman, declare that –

General declaration:

- I act as the independent Specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by

interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;

- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

Signature of the specialist:

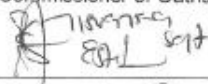


Name of company:

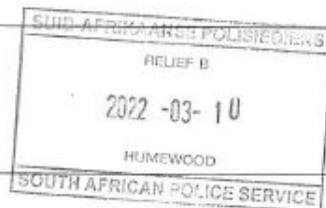
8 March 2022

Date:

Signature of the Commissioner of Oaths:



Date: 2022-03-10



Designation: SARU humewood-



DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

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PROJECT TITLE

Expansion of the existing Shoprite Checkers distribution centre situated on Erf 8741, located approximately 15 kilometres from the CBD of Gqeberha, Eastern Cape.

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4.2 The SPECIALIST

I, **Roy de Kock**, declare that –

General declaration:


- I act as the independent Specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by

- interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
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Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.
- I have a vested interest in the proposed activity proceeding, such vested interest being:

None _____



 Signature of the environmental assessment practitioner:

 Name of company:

BlueLeaf Environmental (Pty) Ltd

Date: 07 April 2022 _____

Signature of the Commissioner of Oaths:



 Date: 7/4/2022

 Designation: Professional Accountant (SA)

¹ Curriculum Vitae (CV) attached

Official stamp (below).

COMMISSIONER OF OATHS
CHARL MEISTRE
Ex Officio - Professional Accountant (SA)
 23 Bernart Road, Charlo, Port Elizabeth, 6070
 082 737 1406

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Roy de Kock

Registration Number: 400216/16

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective 21 September 2016

Expires 31 March 2023



Botha

Chairperson

R. Prinsloo

Chief Executive Officer



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1. BACKGROUND AND TERMS OF REFERENCE

This terrestrial faunal species impact assessment was commissioned by PHS Consulting to inform the basic assessment process for the expansion of an existing Shoprite Checkers distribution centre on a portion of Erf 8741 at Wells Estate in the Nelson Mandela Bay Municipality (Figure 1).

Because the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool identified the project area as important for terrestrial faunal species (Sensitivity rating: High), a faunal species impact assessment report (rather than a faunal species compliance statement) is required when applying for environmental authorisation in terms of the National Environmental Management Act (1998, as amended) and the Environmental Impact Assessment Regulations (2014, as amended).

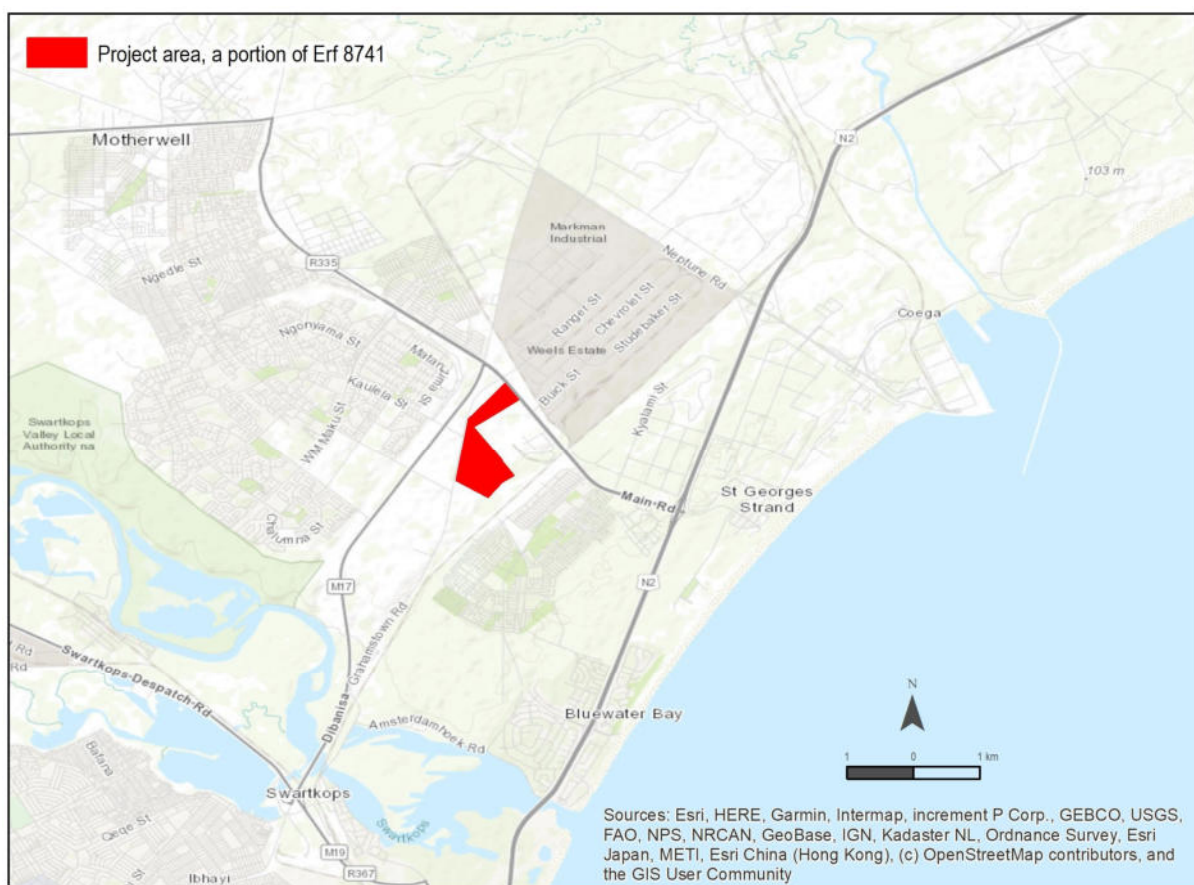


Figure 1: Location of the project area, a portion of Erf 8741, for the proposed expansion of an existing Shoprite Checkers distribution centre in the Nelson Mandela Bay Municipality.

To meet these requirements, this report covers the following:

- A description and delineation of the broad faunal habitats in the project area.
- A desktop assessment of the occurrence and distribution of terrestrial fauna that potentially occur naturally in the project area. Fauna in this case covers amphibians, reptiles, mammals, birds, and butterflies.
- A desktop assessment of the status of important invertebrate species identified by the Screening Tool that potentially occur naturally in the project area.
- A description of Species of Conservation Concern that might be affected by the project. Species of

- Conservation Concern include those with restricted distribution ranges, Red Data listing, or TOPS listing.
- A description and delineation of sensitive faunal habitats that might be influenced by the project.
 - An assessment of the potential impacts (positive, negative, or cumulative) of the project on fauna. This includes an assessment of project alternatives.
 - An assessment of mitigating measures, for enhancing benefits and avoiding or mitigating negative impacts and risks, which should be implemented during the design, construction, and operation of the project.

2. PROJECT DESCRIPTION

The owner of Erf 8741 is proposing the expansion of an existing Shoprite Checkers distribution centre, comprising of storage warehouses and a range of associated infrastructure (e.g., offices, workshops, wash bays, parking stands and hard stands, a refuse yard, guardhouses, and a stormwater retention facility).

The existing distribution centre covers an area of approximately 5.8 hectares, with an additional 19 hectares (in the case of the preferred layout) planned for the expansion (Figure 2). The existing distribution centre is located within a fenced portion (42.4 hectares) of the project area, and it is expected that the expansion will take place in this fenced portion; the remaining 15.4 hectares is unfenced.

The preferred layout was selected on the basis of feasible access from the R102 (Old Grahamstown Road) and to reduce impacts on sensitive vegetation communities (Grobler 2022) and faunal habitats (this report). The alternative (rejected) layout covers an expansion area of approximately 19.5 hectares (i.e., 0.5 hectares more than the preferred layout).

The project area abuts the Markman industrial area and the Motherwell and Wells Estate informal settlements.

3. APPROACH TO THE ASSESSMENT

To identify the faunal species that potentially occur naturally in the project area firstly required an understanding of the **broad faunal habitats** in the area. Faunal habitats were identified according to various biological and environmental characteristics, including vegetation type (Vlok et al. 2003, Mucina & Rutherford 2011, Nelson Mandela Bay Municipality Bioregional Plan 2015, South African National Biodiversity Institute 2006-2018, Grobler 2022), the degree of transformation of the vegetation, geology and soil type, and topography. Vegetation types that showed a high degree of similarity in terms of composition and structure, and for which any variations that exist were considered unlikely to significantly influence the potential occurrence of faunal species, were combined. Habitats were identified for the project area and in a 500 m buffer as the distribution ranges of many species likely extend beyond the area, and to assess options for habitat connectivity. Buffer distances reflect the recommendations of the Species Environmental Assessment Guidelines (SANBI 2020) for the most sensitive SCC (i.e., bird [raptors, large terrestrial birds] and invertebrate SCC identified by the Screening Tool) that likely occur naturally in the project area.

The potential **occurrence of fauna** (amphibians, reptiles, mammals, birds, and butterflies) in the vicinity of the project area was determined according to the habitat characteristics of the area and the particular species'

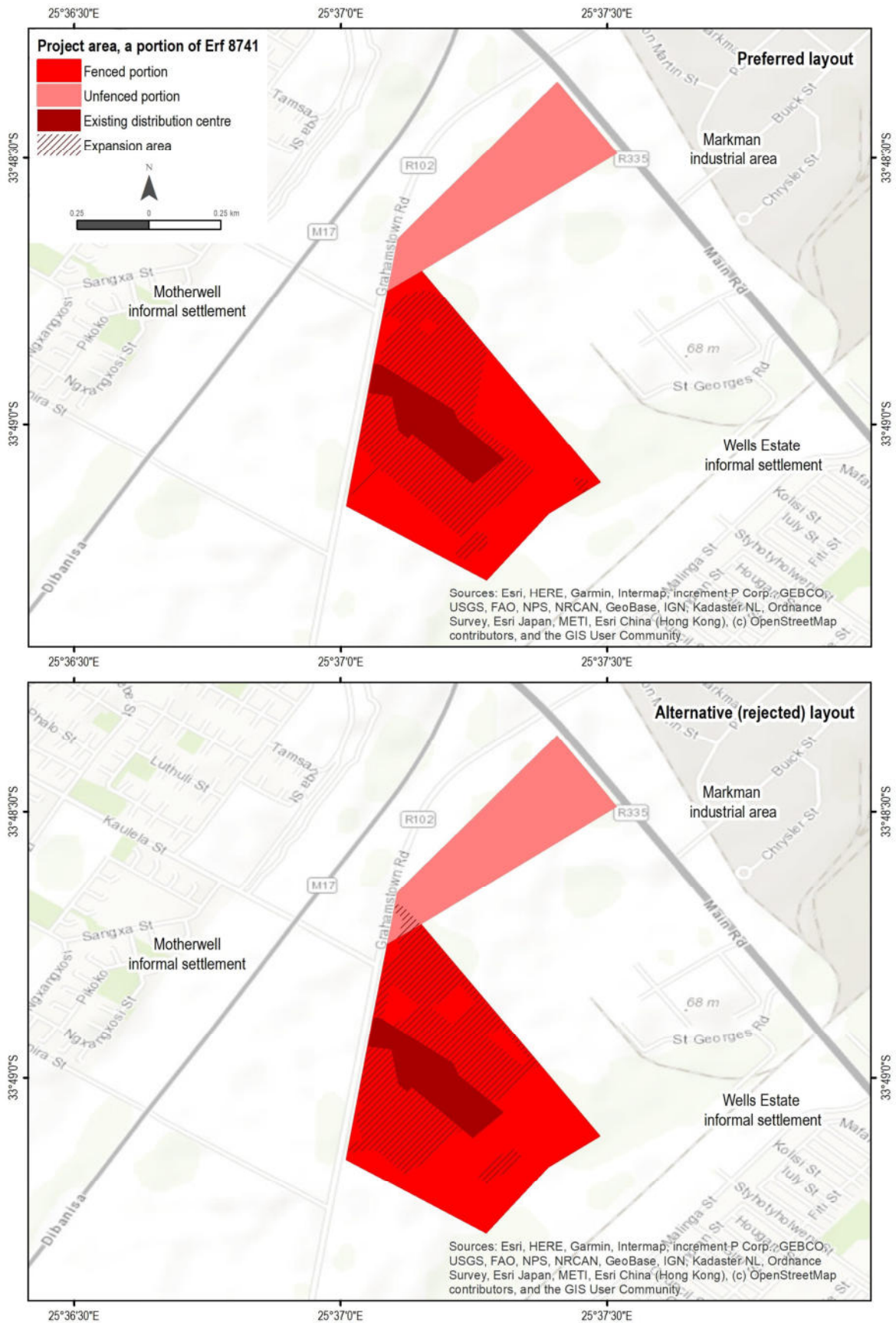


Figure 2: Layout for the expansion of an existing Shoprite Checkers distribution centre adjacent to the Markman industrial area and the Motherwell and Wells Estate informal settlements.

habitat requirements. Published literature and online resources that are continuously updated with new species observations were consulted to compile lists of fauna, including:

- Du Preez & Carruthers (2017), Frog Atlas of Southern Africa (FrogMap¹) for amphibians.
- Alexander & Marais (2007), Reptile Atlas of Southern Africa (ReptileMap¹) for reptiles.
- Skinner & Chimimba (2005), Mammal Atlas of Southern Africa (MammalMap¹) for mammals.
- Southern African Bird Atlas Project 2 (SABAP2) for birds (Harrison et al. 1997²).
- Woodhall (2020), Atlas of African Lepidoptera (LepiMap¹) for butterflies.
- iNaturalist³
- Global Biodiversity Information Facility (GBIF)⁴

Species of Conservation Concern (SCC) were defined to include:

- Fauna with their distribution ranges limited to the Eastern Cape Province.
- Red Data species identified using the IUCN Red List of Threatened Species⁵.
- Species listed in terms of Section 56 of the National Environmental Management: Biodiversity Act, 2004 (NEMBA) (Act 10 of 2004, as amended), and regulated by the Threatened or Protected Species (TOPS) Regulations, 2007⁶. Includes species that are Critically Endangered, Endangered, Vulnerable, and Protected.

In addition to SCC, the assessment also identified:

- Species protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)⁷.
- Species listed in terms of the Nature and Environmental Conservation Ordinance (NECO) (No 19 of 1974).

The inclusion of faunal species on CITES Appendices (I–III) and NECO Schedules (1–2) are not necessarily equivalent to the species' conservation status. Many common species are pragmatically included on these lists even though their conservation status may not be of demonstrated concern. A permit is required for the removal of species that occur on CITES and NECO lists.

Expected SCC were assessed according to the following criteria:

- 1) Probability of occurrence in the project area (4 categories: confirmed [observed during the site visit], high, medium, and low),
- 2) Potential distribution within the project area, and
- 3) Current threats (not project related).

¹ <http://vmus.adu.org.za>

² <http://sabap2.adu.org.za>

³ <http://inaturalist.org>

⁴ <http://gbif.org>

⁵ <http://iucnredlist.org>

⁶ Published in Government Notice 255 of 2015 in Government Gazette 38600 of 31 March 2015.

⁷ <http://cites.org>

Several SCC, identified by the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool as important, required specific consideration:

Group	Scientific name	Common name	Sensitivity rating
Mammals		Sensitive species 5	Medium
Birds	<i>Neotis denhami</i>	Denham's bustard	Medium
	<i>Campethera notata</i>	Knysna woodpecker	High
	<i>Circus maurus</i>	Black harrier	High
	<i>Circus ranivorus</i>	African marsh harrier	High
Invertebrates	<i>Aloeides clarki</i>	Coega russet	Medium
	<i>Aneuryphymus montanus</i>	Yellow-winged agile grasshopper	Medium

Because the likelihood of detecting any of the above listed SCC during environmental authorisation assessments is extremely low (even with optimal search methods and during optimal seasonal sampling) the precautionary principle was applied in the following way when assessing habitat suitability for these species in the project area:

- 1) If the Screening Tool predicts the occurrence of the species in the vicinity of the project area, and
- 2) Potentially suitable habitat exists in close proximity of known locations for the species, then the species is assigned a high probability of occurrence and assumed to be present.

The following criteria were evaluated during the site visit to assess habitat suitability for these species:

- 1) Vegetation type and cover,
- 2) Presence of host plants (in the case of butterflies),
- 3) Geology and soil type,
- 4) Rock cover,
- 5) Topography,
- 6) Habitat disturbance, and
- 7) Habitat connectivity.

Sensitive faunal habitats were identified as those habitats that are vulnerable to disturbances and potentially support SCC in the project area.

On 11 November 2021 (austral spring) a **visit to the project area** was conducted to:

- 1) Confirm the occurrence and distribution of broad faunal habitats,
- 2) Map broad habitats that could not be identified as part of an initial desktop analysis,
- 3) Note potential refuge habitats (e.g., caves relevant to bats, rocky outcrops used as refuges),
- 4) Note any evidence (e.g., sightings, presence of spoor, dung, shed skins, burrow systems, nesting material) of faunal occurrences (Plate 1). To avoid the influence of false negatives over the short site visit, these observations were only used to demonstrate the diversity of fauna that potentially occur in the project area.
- 5) Assess the extent of current threats (not project related) on faunal communities (e.g., evidence for direct exploitation, habitat transformation).

To assess the **significance of potential impacts** on fauna during the proposed project, the prescribed impact assessment methodology with a standard rating scale was used (Appendix 2). Using this methodology, the significance of each impact for the preferred project layout alternative was assessed according to the following criteria:

- The nature of the impact,
- The magnitude of the impact,
- The extent and location of the impact in space and time,
- The duration of the impact,
- The extent to which the impact can be reversed or not,
- The likelihood or probability of the impact actually occurring.

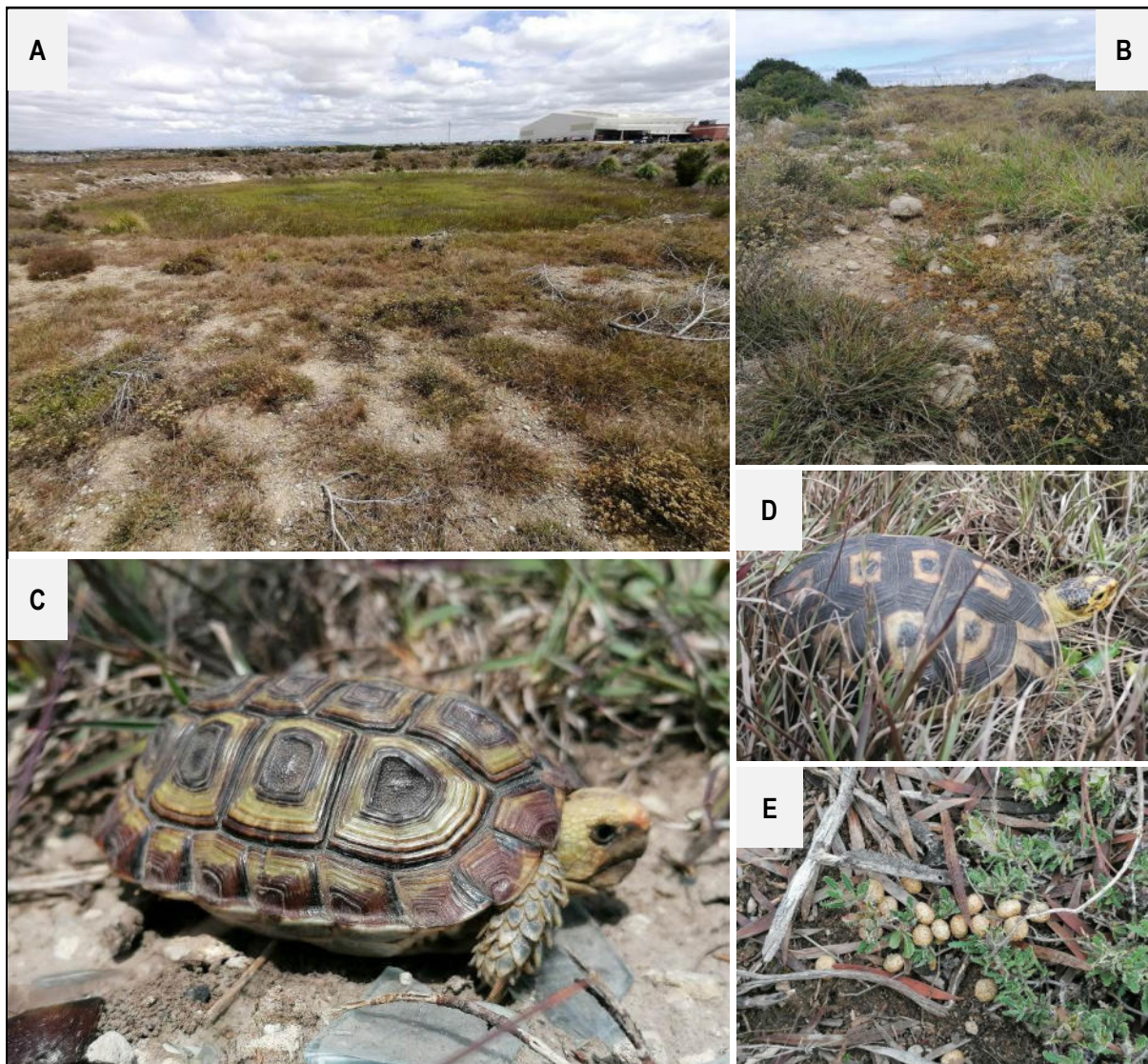


Plate 1: Examples of the evidence used to assess potential faunal occurrences in the project area. A, Wetland habitat in the fenced portion of the project area that might support water-dependent species; B, rocky outcrops used as potential refuge habitats; C–D, sightings of a Parrot-beaked dwarf tortoise *Homopus areolatus* and Angulate tortoise *Chersina angulata*; E, Scrub hare *Lepus saxatilis* droppings. Direct sightings of fauna shown here are from the fenced portion of the project area.

3.1 Assumptions and limitations of the approach

The assessment is largely based on a desktop analysis of published information on the broad habitats and faunal species in the vicinity of the project area and a single site visit and did not include any detailed field surveys for any of the faunal groups assessed. Even with optimal search methods the likelihood of detecting some species during field surveys is low. Therefore, the assessment provides information on potential faunal occurrences in the project area, which is adequate to inform the impact assessment process.

Published information on species distributions are often incomplete in terms of the species and areas covered, distribution maps only allow for very generalised species ranges to be determined, and the scales of these maps do not always match between faunal groups (e.g., amphibians versus reptiles, mammals, and birds). While the online species atlases (e.g., FrogMap, ReptileMap, MammalMap, SABAP2, LepiMap, iNaturalist) used in the assessment are continuously updated with new observation records, the approach of matching habitat features with the species' habitat requirements is a further robust way of dealing with data gaps. In the face of uncertainty, the precautionary principle is applied to allow for preventative action where necessary.

The site visit took place in spring (November 2021) during a period of elevated rainfall, which meant that faunal habitats were in a good condition for sampling. Although multiple site visits are preferred to gain a comprehensive understanding of the opportunities (and limits) for fauna, the desktop approach followed here is sufficiently robust to account for any faunal opportunities that might have been missed during the site visit.

This faunal species impact assessment report was prepared in compliance with the protocols for specialist assessments and minimum report content requirements for environmental impacts on terrestrial biodiversity (fauna)⁸ in terms of the National Environmental Management Act, 1998.

4. BROAD FAUNAL HABITATS

Three broad faunal habitat types, covering roughly 45 hectares, were identified in the project area, including Limestone bontveld, Grass-karoo mosaic, and Secondary grassland habitats (Figure 3). Although these habitat types also occur beyond the boundaries of the project area, their distributions are fragmented, meaning fragmented faunal communities.

Limestone bontveld habitats occur on gently undulating plains and shallow lime-rich soils, covering approximately 17 hectares of the project area (Plate 2). It comprises of sparse to well-developed low (2–3 m high) clumps of woody trees and shrubs (e.g., *Carissa bispinosa*, *Ehretia rigida*, *Euclea undulata*, *Schotia afra*, *Searsia* spp., *Sideroxylon inerme*) in a matrix of dwarf karroid shrubs (*Eriocephalus africanus*, *Helichrysum rosum*, *Jamesbrittenia microphylla*, *Passerina corumbosa*) and grasses (*Aristida* spp., *Digitaria eriantha*, *Eragrostis* spp., *Panicum maximum*, *Themeda triandra*). These habitats appear to be intact in the fenced portion of the project area, but vulnerable to transformation in the unfenced portion. Importantly, the thicket clumps are sensitive to disturbances and regenerate extremely slowly after transformation, usually degrading further (Vlok et al. 2003, Lechmere-Oertel et al. 2005, Landman et al. 2012, 2014). Thus, while intact thicket clumps might support a range of cover-loving indigenous fauna, transformed clumps support fewer faunal species. Transformed Limestone bontveld habitats, therefore, also have a reduced potential to support indigenous fauna.

⁸ Published in Government Notice 1150 in Government Gazette 43855 of 30 October 2020.

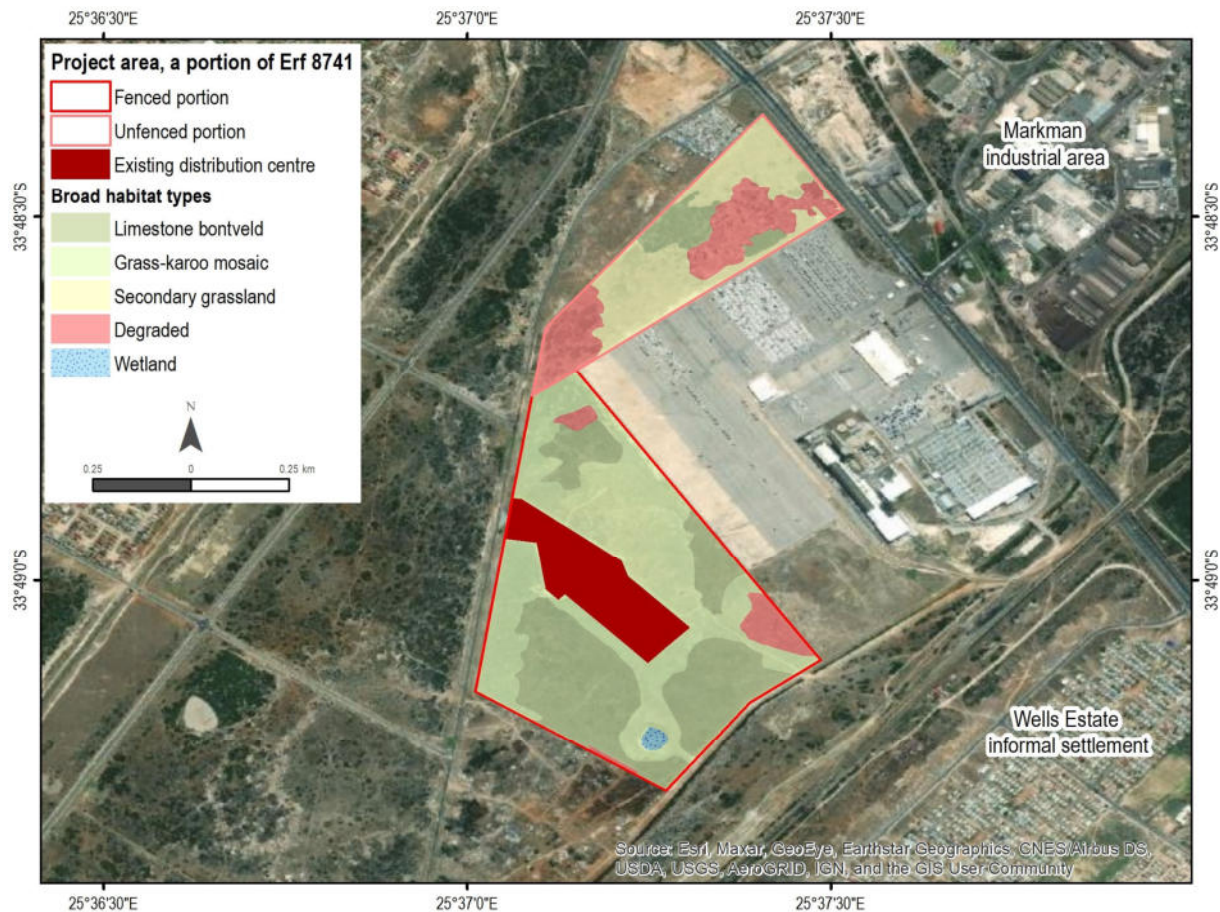


Figure 3: Distribution of broad faunal habitat types in the project area.

Along the margins of the fenced area, the Limestone bontveld habitats have been transformed and a mosaic of grasses (*Cynodon dactylon*, *Melica racemosa*, *P. maximum*) and dwarf shrubs (*Asparagus africanus*, *H. rosum*, *Lycium cinereum*, *Lycium ferocissimum*, *P. corumbosa*) have established (Plate 2). These **Grassy-karoo mosaic habitats** (19.5 hectares) likely developed in response to alien plant invasions and habitat clearing activities, previous overgrazing by domestic livestock (cattle, goats), and other disturbances (e.g., fire). Seedlings of the alien invasive coastal wattle *Acacia cyclops* are locally abundant, posing a threat to the long-term survival of the adjacent bontveld ecosystem. The replacement of indigenous plants with alien plants are well known to cause biotic homogenization (McKinney & Lockwood 1999, Proches et al. 2008, Clusella-Trullas & Garcia 2017) and alter a range of ecological processes, including interspecific interactions, soil processes, water resources, nutrient cycling, and fire regimes (Le Maitre et al. 2011). Importantly, once alien plant invasions have changed the abiotic environment, an alternative ecosystem state is achieved with altered species composition and structure and ecological processes.

Historically, the **Secondary grassland habitats** (8 hectares) of the unfenced area likely also comprised of Limestone bontveld. However, through various anthropogenic influences (urbanization, grazing by domestic livestock, fuel wood collections), these habitats have been replaced with ephemeral grasses (mainly *C. dactylon*), scattered short shrubs (e.g., *Asparagus* spp., *Lycium* spp.), and bulbs (e.g., *Albuca* spp.) (Plate 3). Importantly, the loss of the thicket clumps has smoothed the soil surface as resources and functionality was lost, meaning that the trajectory of transformation is likely irreversible (Vlok et al. 2003, Lechmere-Oertel et al. 2005, Landman et al. 2012, 2014). This transformation, combined with continued human influences, indicates that the Secondary grassland habitats have a severely reduced potential to support indigenous fauna.



Plate 2: Examples of the broad faunal habitat types in the project area. A, Limestone bontveld and B, Grassy-karoo mosaic habitats. Seedlings of the alien invasive coastal wattle *Acacia cyclops* continue to establish in Grassy-karoo mosaic habitats despite efforts to control them.



Plate 3: Example of the Secondary grassland habitats in the unfenced portion of the project area.

The remaining project area (7.4 hectares) has been severely degraded through the historical dumping of industrial building material (Figure 3, Plate 4). Tall alien invasive shrubs and trees (predominantly *A. cyclops*) have established locally in the interim, posing a significant threat to the long-term survival of the surrounding ecosystem. Such changes in both the abiotic and biotic environments severely compromises the extent to which these areas might support indigenous fauna and any of the ecological processes facilitated by fauna. For this reason, these areas are excluded from assessing habitat for indigenous fauna in the project area, and impacts from the proposed project on these areas are considered negligible.

5. FAUNA AND THEIR CONSERVATION STATUS

A total of 333 faunal species (3% amphibians, 14% reptiles, 12% mammals, 49% birds, and 22% butterflies) were identified to potentially occur naturally in the vicinity of the project area (Appendix 3). Approximately 2.7% of these species are considered SCC, meaning that they either have restricted distribution ranges, Red Data (Global or Regional) listing, or TOPS listing. The conservation status, habitat requirements, occurrence and distribution, and current threats to these species in the project area are described in Table 1.

No amphibian or butterfly SCC are known to occur in the project area and most SCC likely have their distributions limited to the Limestone bontveld habitats of the fenced area. Notable exceptions include the African



Plate 4: Examples of the historical dumping of industrial building material in the project area where alien invasive plants have established in the interim.

Table 1: Species of Conservation Concern that potentially occur naturally in the project area. Included are the habitats requirements of each species, their expected occurrence and distribution in the project area, and current threats (not project related) to fauna in the project area.

Group	Species	Common name	Conservation concern	Habitat requirements	Probability of occurrence in the project area	Current threats in the project area
Reptiles	<i>Acontias orientalis</i>	Eastern Cape legless skink	Endemic (EC)	Fossorial, in coastal areas and alluvial soils in inland valleys of the Eastern Cape.	Medium – Limestone bontveld	Habitat loss, transformation, and fragmentation.
	<i>Acontias lineicauda</i>	Algoa legless skink	Endemic (EC)	Fossorial, in coastal areas and alluvial soils in inland valleys of Algoa Bay in the Eastern Cape.	High – Limestone bontveld	Habitat loss, transformation, and fragmentation.
	<i>Nucras taeniolata</i>	Striped sandveld lizard	Endemic (EC)	Limited information, but have been recorded in thicket habitats of Algoa Bay in the Eastern Cape.	Medium – Limestone bontveld	Habitat loss, transformation, and fragmentation.
	<i>Scelotes anguineus</i>	Algoa dwarf burrowing skink	Endemic (EC)	Coastal thickets in the Eastern Cape.	High – Limestone bontveld	Habitat loss, transformation, and fragmentation.
Mammals	<i>Poecilogle albinocha</i>	African striped weasel	SA Red List: Near Threatened	Wide habitat tolerance, preferring grassy habitats.	Low – Limestone bontveld, Grassy-karoo mosaic	Habitat loss, transformation, and fragmentation; direct persecution.
Birds	<i>Falco biarmicus</i>	Falcon, Lanner	SA Red List: Vulnerable	Wide habitat tolerance.	Low – Limestone bontveld, Grassy-karoo mosaic	Habitat loss, transformation, and fragmentation; disturbance.
	<i>Circus ranivorus</i>	Harrier, African marsh	SA Red List: Endangered	Open grasslands, croplands, and fynbos; wetlands for breeding.	Low – Limestone bontveld, Grassy-karoo mosaic	Habitat loss, transformation, and fragmentation; disturbance.
	<i>Circus maurus</i>	Harrier, Black	Global Red List: Endangered; SA Red List: Endangered	Open fynbos, karoo, and grassland; Western Cape fynbos for breeding.	Low – Limestone bontveld, Grassy-karoo mosaic	Habitat loss, transformation, and fragmentation; disturbance.
	<i>Afrotis afra</i>	Korhaan, Southern black	SA Red List: Vulnerable	Open fynbos, karoo, and occasionally cultivated areas.	Low – Limestone bontveld	Habitat loss, transformation, and fragmentation; disturbance; direct persecution.

Listing definitions: Critically Endangered – species that are facing an extremely high risk of extinction in the wild; Endangered – Species that are facing a very high risk of extinction in the wild; Vulnerable – species that are facing a high risk of extinction in the wild; Near Threatened – species that do not qualify for the Critically Endangered, Endangered or Vulnerable categories now, but may be close to qualifying, or is likely to qualify, for a threatened category in the near future; Protected – species that have a high conservation value or national importance that require national protection.

striped weasel *Poecilogale albinucha* and three species of bird of prey (Lanner falcon *Falco biarmicus*, African marsh harrier *Circus ranivorus*, Black harrier *Circus maurus* [but see below]) with wide habitat tolerances that might include Grassy-karoo mosaic habitats.

The likely occurrence of SCC is inferred from the presence of suitable habitat and the extent of current threats (i.e., not project related). Thus, while suitable habitat might occur in the project area, meaning high likelihood of occurrence of SCC, this coincides with threats to faunal communities. By association, this also means threats to the ecological processes facilitated by fauna, including trophic– (browsing, frugivory, predation), transport– (pollination, seed dispersal, nutrient dispersal), habitat architecture– (plant forms, path opening), and biopedturbation (digging, hoof action) processes. In thicket habitats, such as those of the project area, herbivory by large mammals is probably the most important driver of ecological patterns and processes. For example, herbivore feeding preferences are known to influence the abundance and distribution of plants, competitive interactions between plants, and seed dispersal patterns. Large herbivores also change plant community composition by trampling and enriching the soil with their dung (Kerley et al. 1995, Kerley & Landman 2006). Because indigenous medium- and large-sized herbivore communities in the project area have all collapsed in response to various anthropogenic threats, the ecological processes facilitated by these species are undoubtedly also disrupted.

Threats to fauna and faunal-mediated processes in the project area are diverse (Plates 3, 4 and 5) and include:

- Extensive habitat loss, transformation, and fragmentation due to urbanization (human settlement development, industrial development, road and rail infrastructure, fencing), illegal dumping activities, overgrazing by domestic livestock (goats, cattle), fuel wood collections, and the establishment and clearing of alien invasive plants (particularly *A. cyclops*).
- Direct persecution (snares, predation by domestic dogs) of many medium- and large-sized mammals, reptiles, and large terrestrial birds for food or for their skins and use in traditional medicines.
- Disturbances to fauna due to chronic anthropogenic noise.

Although these threats are generally consistent across the project area, the establishment of the fence in 2012 likely arrested some threatening processes in this portion of the site, including human settlement development, illegal dumping activities, overgrazing by domestic livestock, fuel wood collections, and the direct persecution of fauna. However, because fencing also limits animal movements and fragments populations and threats outside the fence have persisted in the interim, it is unlikely that fencing has caused any material changes to faunal communities inside the fence.

Thus, for reptile SCC, probability of occurrence in the project area is expected to be relatively high given the presence of potentially suitable habitat and the fact that the listed species are not known to be vulnerable to the direct influences of humans. Although all the reptile SCC in Table 1 have restricted distribution ranges, these species are also generally common (Bates et al. 2013). However, probability of occurrence declines for the medium- and large-sized mammals and birds. That is, while potentially suitable habitat exists, populations of these species are vulnerable to habitat transformation and fragmentation, disturbances, and the direct influences of humans in close proximity of the project area (Table 1).

According to the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool, several SCC require specific consideration for the project area:

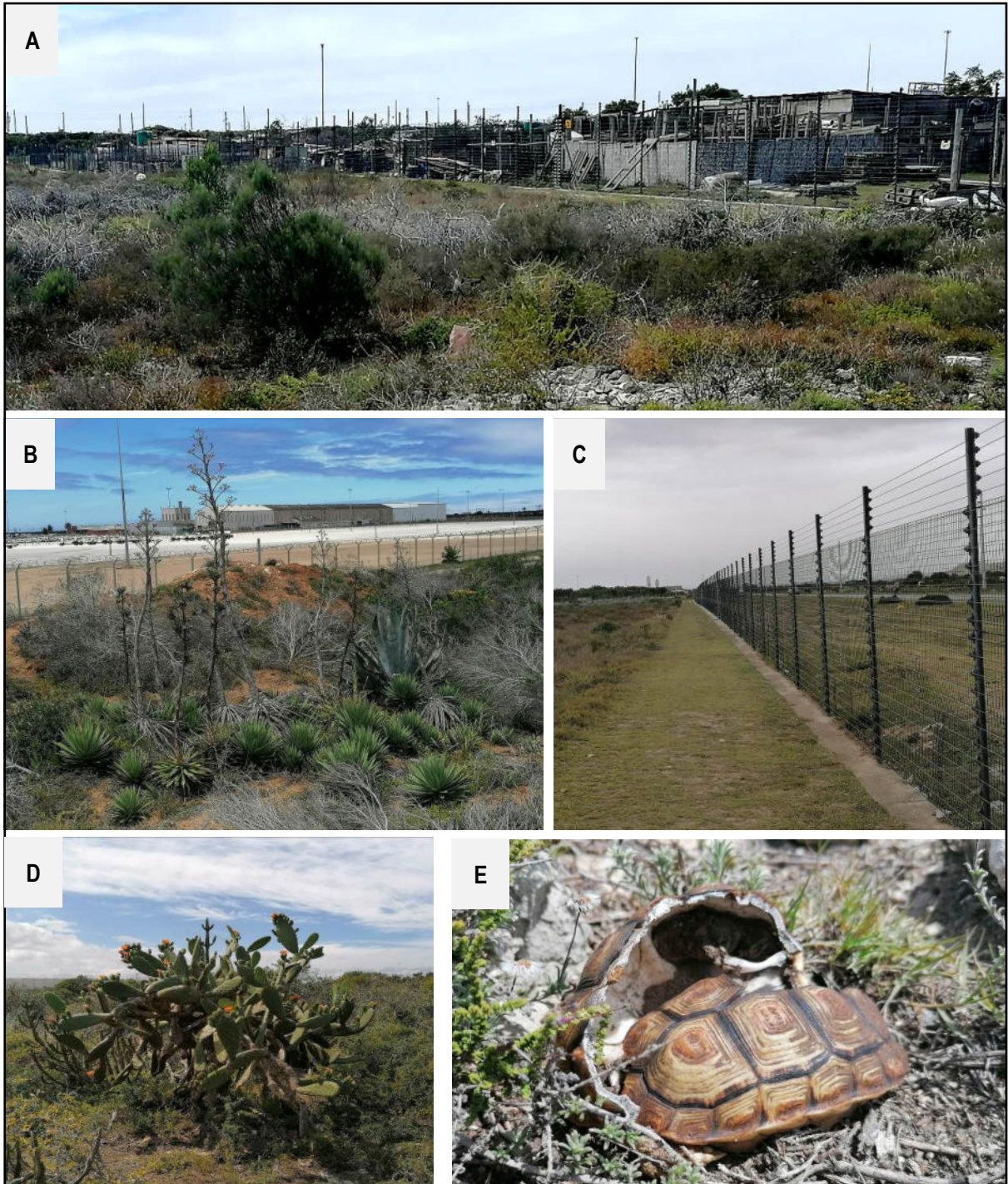


Plate 5: Examples of the evidence used to assess current threats to fauna in the project area. Habitat loss, transformation and fragmentation due to A, human settlement development; B, industrial development; C, fences that limit animal movements and fragment populations; D, establishment of alien invasive plants (e.g., prickly pear *Opuntia ficus-indica*; also see Plate 4 for invasion by *Acacia cyclops*). Additionally, many medium- and large-sized mammals, reptiles, and large terrestrial birds are vulnerable to direct persecution (E).

- **Sensitive species 5**

Sensitive Species 5 is a rare and secretive species, listed as Vulnerable in the South African Red Data species assessment and under the TOPS regulations. The species occurs in a wide range of forested and wooded habitats, including coastal forests, dense coastal bush and dense thickets. Extensive habitat transformation usually causes populations to collapse (Skinner & Chimimba 2005).

According to the Screening Tool, Sensitive species 5 has a Sensitivity rating: Medium in the project area. This means that the site might contain suitable habitat for the species (based on spatial models), but that there are no distribution records in the area. However, neither the desktop analysis nor the site visit could confirm the presence of suitable habitat (and therefore the Medium-sensitivity rating) at the site, and the species is therefore not expected to be present.

- **Denham's bustard *Neotis denhami***

Denham's bustard, listed as Vulnerable in the South African Red Data species assessment and under the TOPS regulations, occurs widely but sparsely over much of the eastern half of South Africa in open grassy habitats (Taylor et al. 2015).

Although the Screening Tool identified Denham's bustard with Sensitivity rating: Medium in the project area, there is no suitable habitat for the species on site, and the species is therefore not expected to occur there. The Grassy-karoo mosaic habitats are unsuitable for the species, and large terrestrial birds are vulnerable to the direct influences of humans in close proximity of the project area.

- **Knysna woodpecker *Campethera notata***

The Near Threatened Knysna woodpecker occupies a variety of dense arboreal habitats, including Afromontane forest and dense woodlands, along the coastal plain of the Western and Eastern Cape provinces (Taylor et al. 2015).

According to the Screening Tool, the Knysna woodpecker has a Sensitivity rating: High, meaning that recent (post-2002) occurrence records and potentially suitable habitat are available for them in the project area. Despite this sensitivity rating, SABAP2 provides only a single broad [0.8667° x 0.8667° grid cells] record of occurrence for the species in the vicinity of the project area, and the site visit could not confirm the presence of suitable habitat. The likelihood that the Knysna woodpecker occurs on site is therefore extremely low, and impacts from the proposed project on the species could be considered negligible.

- **Black harrier *Circus maurus* and African marsh harrier *Circus ranivorus***

Both these species, listed in Table 1, have a Sensitivity rating: High in the project area. However, while SABAP2 provides broad records of occurrence for the Black harrier (1 record in 2017) and African marsh harrier (2 records in 2016 and 2017) in the vicinity of the project area, and potentially suitable open grassy habitats occur on site, the likelihood that either species will be present is low. This reflects the paucity in distribution records, low habitat connectivity, and the fact that human activities will likely displace both species away from the area. Impacts from the proposed project on these species could, therefore, be considered negligible.

- **Coega russet *Aloeides clarki***

The Coega russet, listed as Endangered in both the Global and Regional Red Data species assessments, is endemic to the Eastern Cape, occurring in the Coega and Sundays River areas near Gqeberha (Pringle 2020, E Pringle Personal communication⁹). Known populations occur on dry, sandy and limestone ridges at the transition between limestone bontveld and mesic thicket habitats (Mecenero et al. 2020). Neither the host plant nor the host ant of the species is well established, but the larvae have been raised on *Aspalathus spinosa* in the laboratory (Heath et al. 2008, Heath & Fisher 2010, Williams 2020). Flight period is between October and November.

According to the Screening Tool, the Coega russet has a Sensitivity rating: Medium in the project area. While there are no reliable biological associations on which to base the habitat requirements of *A. clarki*, neither the desktop analysis nor the site visit could identify suitable habitat for the species in the project area. That is, although the site visit revealed the presence of Limestone bontveld habitats and potential host plants (*Aspalathus spinosa*), the project area does not contain suitable limestone-ridge microhabitats. The species is, therefore, not expected to occur on site and this was corroborated by a species-specific expert¹⁰.

- **Yellow-winged agile grasshopper *Aneuryphymus montanus***

The Vulnerable Yellow-winged agile grasshopper is known from only six locations in fynbos habitats on rocky slopes in the Cape region; all these locations are west of Kareedouw (Brown 1960; Hochkirck et al. 2018). Two other records – one near Maclear in the Eastern Cape and another in the KwaZulu-Natal Midlands – are uncertain and likely misidentifications (Hochkirck et al. 2018).

Although the Screening Tool identified the Yellow-winged agile grasshopper with Sensitivity rating: Medium in the project area, there is no suitable habitat for the species on site. That is, there are no fynbos habitats, the available habitat is located on gently undulating plains, and there are no suitable rocky microhabitats on site. The species is, therefore, not expected to occur there.

In addition to the identified SCC, some species that potentially occur naturally in the project area are protected by CITES and listed in terms of NECO (Table 2). Although the status of these species is not necessarily equivalent to that of SCC, a permit is required for their removal. For example, tortoises are listed on Schedule 2 of NECO and will, therefore, require permits for their removal (where necessary) during the construction phase of the project. Similarly, a permit is required for activities that disturb protected bird species, particularly during the breeding season. Sites with eggs or chicks are considered to be protected sites.

⁹ EL Pringle, Custodians of Rare and Endangered Lepidoptera.

Table 2: Fauna that potentially occur naturally in the project area and that are protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and fauna listed in terms of the Nature and Environmental Conservation Ordinance (NECO).

Species	Common name	CITES	NECO
All amphibians			Schedule 2
All reptiles, and (scaled reptiles - lizards)	<i>Bradypodion ventrale</i>	Eastern Cape dwarf chameleon	App II
	<i>Cordylus cordylus</i>	Cape girdled lizard	App II
	<i>Varanus albigularis</i>	Southern rock monitor	App II
	<i>Varanus niloticus</i>	Nile monitor	App II
(chelonians)	<i>Chersina angulata</i>	Angulate tortoise	App II
	<i>Homopus areolatus</i>	Parrot-beaked dwarf tortoise	App II
	<i>Stigmochelys pardalis</i>	Leopard tortoise	App II
Mammals			
(bats)	All Bats		Schedule 2
(insectivores)	<i>Crocidura cyanea</i>	Reddish-grey musk shrew	Schedule 2
	<i>Crocidura flavescens</i>	Greater musk shrew	Schedule 2
	<i>Myosorex varius</i>	Forest shrew	Schedule 2
	<i>Suncus infinitesimus</i>	Least dwarf shrew	Schedule 2
(large-sized herbivores)	<i>Sylvicapra grimmia</i>	Common duiker	Schedule 2
(large-sized carnivores)	<i>Caracal caracal</i>	Caracal	App II
	<i>Felis silvestris cafra</i>	African wild cat	App II
	<i>Mellivora capensis</i>	Honey badger	Schedule 2
	<i>Poecilogale albinucha</i>	African striped weasel	Schedule 2
(primates)	<i>Cercopithecus pygerythrus</i>	Vervet monkey	App II
	<i>Papio hamadryas ursinus</i>	Chacma baboon	App II
Birds	Most birds, and		Schedule 2
	<i>Falco biarmicus</i>	Falcon, Lanner	App II
	<i>Afrotis afra</i>	Korhaan, Southern black	App II

Listing definitions:

CITES App I: species that are the most endangered among CITES-listed animals, and are threatened with extinction. CITES generally prohibits international trade in specimens of these species.

CITES App II: species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.

NECO Schedule 1: Endangered wild animals.

NECO Schedule 2: Protected wild animals.

6. SENSITIVE FAUNAL HABITATS

Sensitive faunal habitats comprise those habitats that are vulnerable to disturbances and potentially support SCC.

In Limestone bontveld habitats, the thicket clumps are particularly vulnerable to disturbances and transformed bontveld has a reduced potential to support indigenous fauna (Vlok et al. 2003, Lechmere-Oertel et al. 2005, Landman et al. 2012, 2014). While intact Limestone bontveld habitats persist in the fenced portion (15.2 hectares, Figure 4) of the project area and SCC likely occur there (Table 1), current threats to fauna and faunal-mediated processes are diverse. This reduces the sensitivity of the site and the bontveld habitat type.

Fragments of transformed bontveld habitats in the unfenced portion of the project area are unlikely to persist in the long-term due to extensive current anthropogenic threats.

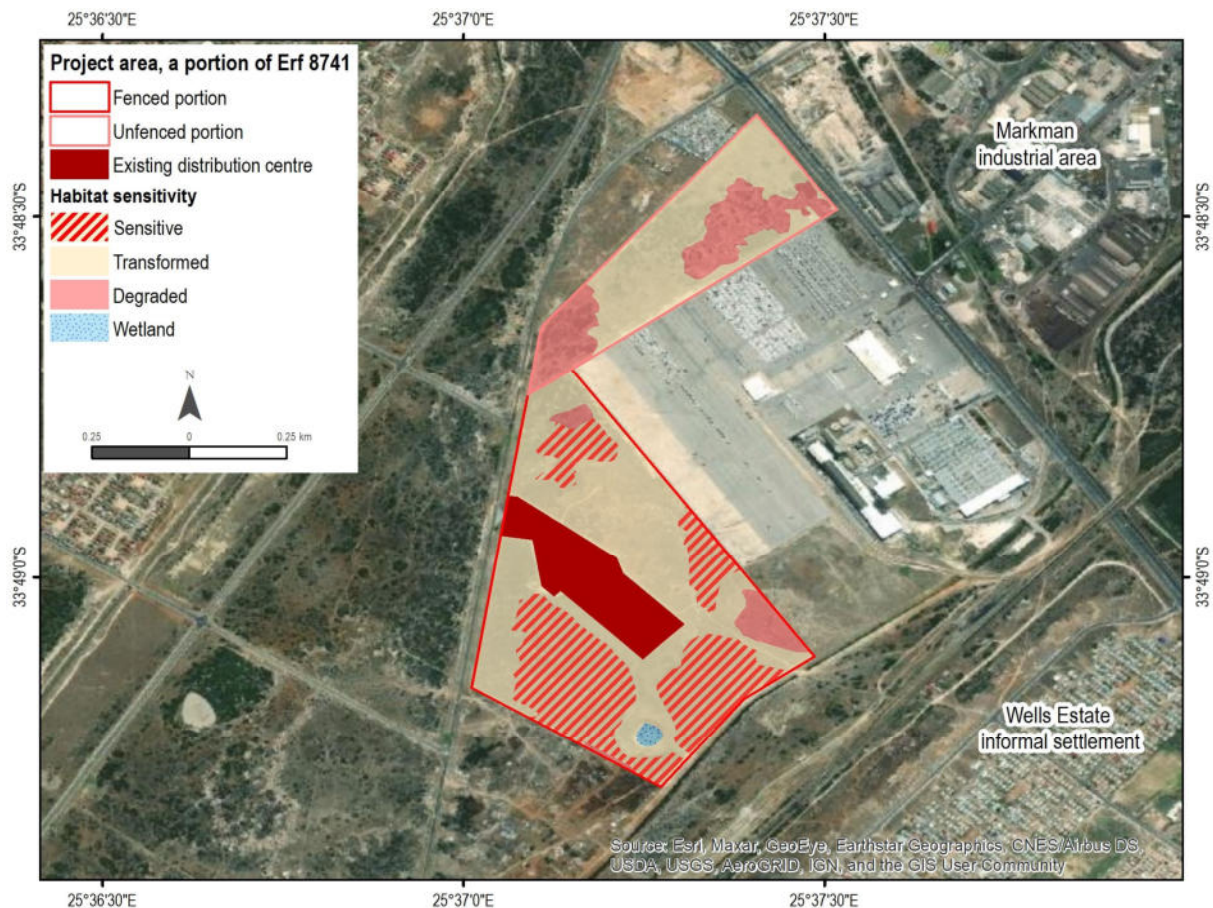


Figure 4: Distribution of sensitive faunal habitats in the fenced portion of the project area.

Although the preferred project layout was selected to reduce the loss of sensitive vegetation communities (Grobler 2022) and faunal habitats (see below), it will further be important to reduce current threats in the fenced portion of the project area to ensure the long-term persistence of the remaining bontveld ecosystem. This may, in part, be achieved by ensuring the removal of alien invasive plants. The alternative (i.e., not controlling alien invasives) will likely lead to increased habitat transformation and fragmentation and a further loss of faunal species.

7. ASSESSMENT OF IMPACTS

The following section provides details on the anticipated direct and indirect impacts of the proposed project. Impacts on fauna are expected to emerge either directly, through disturbances and mortalities, or indirectly, through habitat loss and transformation. These impacts may in turn influence the ecological processes facilitated by animal species. The significance of impacts on fauna depends on a range of factors, including the area of influence, the duration, the extent of current impacts (not project related), the uniqueness and/or sensitivity of the habitat, and the uniqueness and/or sensitivity of the faunal species occupying those habitats.

Two project layout alternatives, described in Section 2, have been proposed. Because the preferred layout alternative is clearly more desirable in terms of reducing the loss of sensitive Limestone bontveld habitats (from

6.7 hectares to 6.3 hectares when compared to the rejected alternative), reducing fragmentation, and maintaining connectivity between bontveld patches (Figure 5), only this preferred alternative is assessed in detail.

Potential impacts of the preferred alternative are assessed according to the prescribed impact assessment methodology (Appendix 2), and recommendations for mitigation are provided.

1. Impact on faunal species

Project phase	Construction phase			
Type of impact	Direct (negative)			
Description of the impact	Direct impacts (disturbances and mortalities) on faunal species during the construction phase.			
Mitigation	<ul style="list-style-type: none"> • Conduct a pre-construction walk through (search and rescue) of the project footprint to identify fauna threatened by construction activities. Threatened fauna should be removed to similar habitat within close proximity of the project area by the Environmental Control Officer or other suitably qualified individual. • Limit construction activities in sensitive Limestone bontveld habitats to a minimum (Figure 4). • Construction camps: 1) ensure strict control of staff movements to reduce faunal disturbances, 2) ensure strict poaching control, 3) exclude all domestic/feral dogs and cats. Domestic dogs and cats present on site should be removed to a suitable facility. • Construction staff should undergo environmental induction before construction commences to raise awareness and reduce potential faunal impacts. • Conservation-orientated clauses should form part of construction contracts, complete with penalty clauses for non-compliance. 			
Assessment	Without mitigation		With mitigation	
Extent	Local	2	Site	1
Duration	Short term	1	Short term	1
Intensity	Low	4	Very low	2
Probability	Highly probable	3	Probable	2
Significance	Low	24	Very low	8

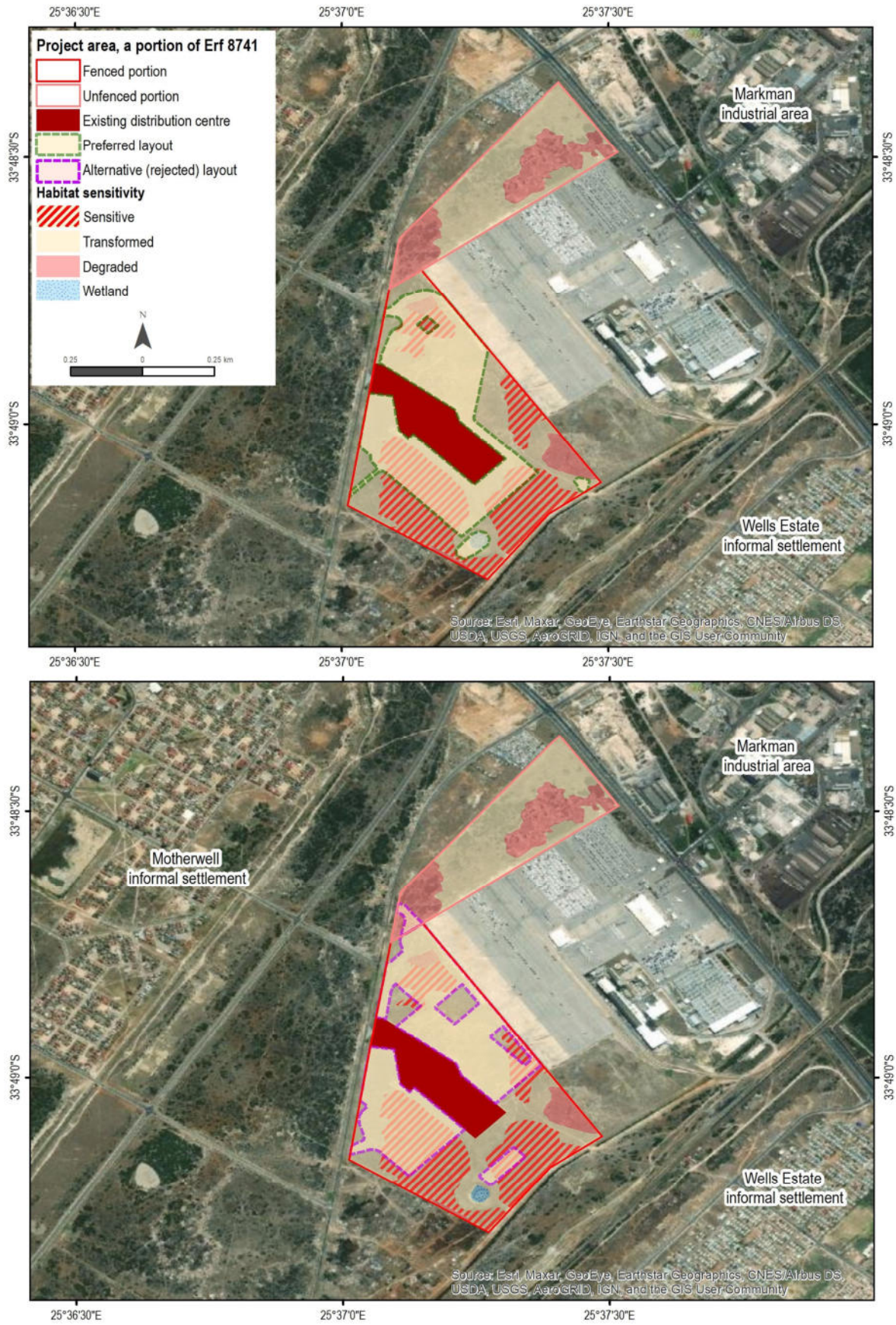


Figure 5: Distribution of sensitive faunal habitats in relation to the project layout alternatives.

2. Loss and transformation of faunal habitats

Project phase	Construction phase			
Type of impact	Indirect (negative)			
Description of the impact	Loss and transformation of sensitive Limestone bontveld habitats during the construction of project infrastructure.			
Mitigation	<ul style="list-style-type: none"> • Limit clearing of sensitive Limestone bontveld habitats to a minimum (Figure 4). • Clearly demarcate all construction areas to avoid any unplanned loss and transformation of sensitive habitats. • Temporary equipment stockpiles must be located in transformed habitats or at existing construction sites and away from sensitive habitats. • Construction camps: 1) ensure these are located in transformed habitats away from sensitive habitats, 2) ensure camps are fenced to control staff movements, 3) prohibit fuel-wood collections 4) prohibit campfires, and 5) ensure the provision of appropriate refuse facilities for staff, and monitor refuse removal weekly. All refuse should be disposed of appropriately offsite. • Where appropriate, cleared areas should be rehabilitated or landscaped with indigenous vegetation according to an appropriately formulated plan, developed by an appropriately qualified specialist. • Develop and implement an invasive plant control and management plan to eradicate these species on site. The plan should be developed by an appropriately qualified specialist, and monitored by the Environmental Control Officer. • Hazardous materials (chemicals, fuels, oils) should be stored appropriately to prevent contamination. Accidental spills that occur on site should be cleaned up immediately and appropriately. 			
Assessment	Without mitigation		With mitigation	
Extent	Site	1	Site	1
Duration	Permanent	4	Permanent	4
Intensity	Medium	6	Low	4
Probability	Definite	4	Highly probable	3
Significance	Medium	44	Low	27

3. Impact on faunal species

Project phase	Operation phase			
Type of impact	Direct (negative)			
Description of the impact	Direct impacts (disturbances and mortalities) on faunal species during the operational phase.			
Mitigation	<ul style="list-style-type: none"> • Develop and implement an environmental awareness programme for staff. The plan should be developed by an appropriately qualified specialist, and implemented and monitored by the SHE Officer. • Ensure control of staff movements to clearly designated areas and access routes to limit disturbances to fauna. • Ensure strict poaching control. • Exclude all domestic/feral dogs and cats. • Ensure appropriate waste (particularly food) management to prevent increases in the incidence of opportunistic species (e.g., vervet monkeys, pied crows, starlings, sparrows, and rats and mice) that displace other indigenous fauna, and come into conflict with humans: 1) cover temporary waste storage facilities appropriately, and 2) empty temporary storage facilities regularly. • Reduce light pollution through the use of low UV-emitting LEDs that attract fewer insects, and use down-lighting to reduce light spill. 			
Assessment	Without mitigation		With mitigation	
Extent	Site	1	Site	1
Duration	Long term	3	Short term	1
Intensity	Low	4	Very low	2
Probability	Highly probable	3	Probable	2
Significance	Low	24	Very low	8

4. Loss and transformation of faunal habitats

Project phase	Operation phase			
Type of impact	Indirect (negative)			
Description of the impact	Transformation of sensitive Limestone bontveld habitats through 1) maintenance activities, and 2) establishment of invasive plants in disturbed areas.			
Mitigation	<ul style="list-style-type: none"> • Develop and implement an environmental awareness programme for staff. The plan should be developed by an appropriately qualified specialist, and implemented and monitored by the SHE Officer. • Ensure control of staff movements to clearly designated areas and access routes. • Prohibit fuel-wood collections. • Prohibit campfires. • Develop and implement an invasive plant control and management plan to eradicate these species on a continuous basis. Monitoring should be conducted by the Environmental Officer. 			
Assessment	Without mitigation		With mitigation	
Extent	Local	1	Site	1
Duration	Long term	3	Short term	1
Intensity	Medium	6	Low	4
Probability	Highly probable	3	Probable	2
Significance	Medium	33	Low	12

5. Disruption of ecological patterns and processes facilitated by fauna

Project phase	Operation phase			
Type of impact	Indirect (negative)			
Description of the impact	Direct (disturbances and mortalities) and indirect (habitat loss and transformation) impacts on faunal species may alter the ecological patterns and processes facilitated by fauna, including trophic– (browsing, frugivory, predation), transport– (seed dispersal, nutrient dispersal), habitat architecture– (plant forms, path opening), and bipedurbation (digging, hoof action) processes.			
Mitigation	<ul style="list-style-type: none"> • Limit clearing of sensitive Limestone bontveld habitats to a minimum (Figure 4). • Locate infrastructure in already transformed habitats as much as possible. • Cleared areas should be rehabilitated or landscaped with indigenous vegetation according to an appropriately formulated plan, developed by an appropriately qualified specialist. • Develop and implement an invasive plant control and management plan to eradicate these species on a continuous basis. Monitoring should be conducted by the Environmental Officer. 			
Assessment	Without mitigation		With mitigation	
Extent	Site	1	Site	1
Duration	Long term	3	Short term	1
Intensity	Low	4	Very low	2
Probability	Highly probable	3	Probable	2
Significance	Low	24	Very low	8

6. Cumulative habitat loss and transformation and impact on ecological processes

Project phase	Operation phase			
Type of impact	Cumulative (negative)			
Description of the impact	The project area has appreciable current impacts (i.e., habitat loss, transformation and fragmentation; disturbances to fauna), and the proposed project would potentially contribute to further impacts on faunal habitats and the interruption of ecological processes.			
Mitigation	<ul style="list-style-type: none"> • Limit clearing of sensitive Limestone bontveld habitats to a minimum (Figure 5). • Locate infrastructure in already transformed habitats as much as possible. • Where appropriate, cleared areas should be rehabilitated or landscaped with indigenous vegetation according to an appropriately formulated plan, developed by an appropriately qualified specialist. Monitoring of the plan should be conducted by the Environmental Control Officer. • Develop and implement an invasive plant control and management plan to eradicate these species on a continuous basis. Monitoring should be conducted by the Environmental Officer. 			
Assessment	Without mitigation		With mitigation	
Extent	Site	1	Site	1
Duration	Permanent	4	Permanent	4
Intensity	Medium	6	Low	4
Probability	Highly probably	3	Probable	2
Significance	Medium	33	Low	18

8. CONCLUSIONS

The proposed expansion of the Shoprite Checkers distribution centre on a portion of Erf 8741 at Wells Estate in the Nelson Mandela Bay Municipality will likely influence faunal species, the habitats that they occupy, and the ecological processes facilitated by these species. Of the 333 faunal species that potentially occur naturally in the vicinity of the project area, nine (four reptiles, four birds, and a single mammal species) are SCC (Table 1). While the Limestone bontveld habitats occurring in the fenced portion of the project area likely support SCC (Figure 4), its distribution is fragmented beyond the site, meaning fragmented faunal communities. Additionally, current threats to fauna and faunal-mediated processes in these habitats are diverse, reducing the sensitivity of the project area for fauna. Potential impacts from the proposed project on fauna may, therefore, be within acceptable limits, provided that the appropriate mitigation measures are applied.

While the preferred project layout makes provision for minimising impacts on sensitive faunal habitats (Figure 5), it will also be important to reduce current threats to ensure the long-term persistence of the remaining bontveld ecosystem. This may, in part, be achieved through the continuous removal of alien invasive plants. The alternative (i.e., not controlling alien invasives) will likely lead to increased habitat transformation and fragmentation.

The Species Environmental Assessment Guidelines (SANBI 2020) recommends that for Endangered or Vulnerable species (Table 1), in particular, no further loss of habitat should be permitted as the species are likely to go extinct in the near future if current pressures continue. Because the likely presence of these species in the project area could only be inferred from the available suitable habitat and broad records of occurrence, appropriate habitat exclusion buffers (i.e., No-Go buffers) could not be applied for the project area. Furthermore, because the presence of sensitive species is not confirmed, population sizes are not known, and accurate spatial information on the geographic distribution of these species is often not available (important when evaluated against the availability of potentially suitable habitat within the project area), calculation of the Site Ecological Importance (as per the Species Assessment Guidelines) is problematic.

Nevertheless, through appropriate mitigation, both the direct and indirect impacts of the proposed project on fauna can be kept to a minimum. Risks to faunal species as a result of the specific activity may, therefore, be expected to be low.

9. LITERATURE SOURCES

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10. APPENDICES

Appendix 1. Specialist Curriculum Vitae

DR MARIETJIE LANDMAN

Summerstrand • Port Elizabeth 6031

Email: marietjie.landman@mandela.ac.za



EDUCATION

PhD (Ecology) • Nelson Mandela University | 2013

EXPERIENCE

- Consulting ecologist • Freelance • 2020–present
 - Research Associate | Nelson Mandela University Centre for African Conservation Ecology | 2019–present
 - Senior lecturer • Sol Plaatje University Department of Biological and Agricultural Sciences • 2019–2020
 - Postdoctoral research fellow • Nelson Mandela University • 2014–2018
 - Vegetation scientist • South African National Parks • 2013–2014
 - Lecturer • Nelson Mandela University Department of Zoology • 2009–2018
 - Research scientist • Nelson Mandela University Centre for African Conservation Ecology • 2007–2013
-

SELECTION OF SPECIALIST ECOLOGICAL WORK

I consult widely in the conservation (both formal and private conservation) and biodiversity fields, advising on wildlife ecology, conservation, management and monitoring, and biodiversity specialist assessments across key sectors. I focus on the arid and semi-arid areas of South Africa. Prior to 2020, I consulted on a part-time basis for more than 10 years.

Typical projects:	Wildlife conservation ecology and vegetation management – ... introduction of mountain zebra to Pleroma Nature Reserve, Northern Cape, for Wilderness Foundation Africa ... re-introduction of elephant to Samara Private Game Reserve ... digital production on small carnivore-livestock conflicts for the National Wool Growers Association of South Africa ... wildlife conservation management plan for Bucklands Private Game Reserve ... introduction of black rhinoceros and mountain zebra to Namaqua National Park for Conservation International South Africa Ecological monitoring – ... monitoring and evaluation plan for the N2 Wild Coast biodiversity offset project Various terrestrial biodiversity specialist assessments in the agricultural-, energy-, housing and infrastructure-, and mining-sectors.
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SELECTED TECHNICAL REPORTS

1. Landman M 2022. Terrestrial fauna assessment for the proposed application for mineral prospecting rights between Oyster Bay and St Francis Bay in the Kouga Municipality, Eastern Cape. Report to Algoa Consulting Mining Engineers.
2. Landman M 2021. Terrestrial fauna species assessment for the proposed residential development on Portion 8 of Kuyga 31 in the Nelson Mandela Bay Municipality. Report to Setplan.
3. Landman M & Cohen M 2021. Terrestrial fauna species assessment for the proposed resort development on Erf 1618 Colchester, Nelson Mandela Bay. Report to CEN Integrated Environmental Management Unit.
4. Landman M & Pote J 2021. Terrestrial fauna species assessment for the proposed extension of the electrical grid connection corridor for the Impofu wind farms, between the Chatty and Dedisa substations, Gqeberha, Eastern Cape. Report to CEN Integrated Environmental Management Unit.
5. Landman M 2021. Habitat suitability assessment for the Hartmann's Mountain zebra *Equus zebra hartmannae* at Pleroma Nature Reserve, Northern Cape. Report to Wilderness Foundation Africa.
6. Grobler BA & Landman M 2021. Botanical impact amendment report: Intsomi goat-breeding facility development, Sundays River Valley Municipality, Eastern Cape. Report to Public Process Consultants.
7. Landman M 2020. Potential secondary impacts on biodiversity of the proposed goat breeding facility on Farm 661 of Intsomi, Sundays River Valley, Eastern Cape. Report to Public Process Consultants.
8. Landman M & Barkhuyzen A 2020. Scoping and environmental impact assessment for the Eindelik citrus expansion project. Report to East Cape Diverse Consultants.
9. Sigwela A, Howarth D & Landman M 2020. Monitoring and evaluation framework for the N2 Wild Coast Biodiversity Offset Project. Sigwela and Associates Environmental Consultants Report to Eastern Cape Parks and Tourism Agency.
10. Landman M & Kerley GIH 2018. Survey of small elephant populations in South Africa. Centre for African Conservation Ecology Report to the Department of Environmental Affairs.
11. Landman M, Lochner C & Kerley GIH 2017. Outcomes of using habitat expansion to mediate the impacts of elephant in Eastern Cape succulent thicket. Centre for African Conservation Ecology Report to the Department of Environmental Affairs.
12. Greaver C, Bezuidenhout H, Swemmer T, Daemane & Landman M 2015. A review of vegetation monitoring projects in Savanna and Arid National Parks. South African National Parks: Scientific Services Report.
13. Landman M 2014. Prospects for the re-introduction of elephant to Samara Private Game Reserve. Centre for African Conservation Ecology Report to Samara Private Game Reserve.
14. Landman M 2014. Vegetation specialist study for the development of telecommunications infrastructure in the Eastern Cape. Report to East Cape Diverse Consultants.
15. Kerley GIH, Landman M, Wilson SL & Boshoff AF 2006. Mammalian herbivores as drivers of Thicket. Proceedings of the Thicket Forum, Centre for African Conservation Ecology Report, Nelson Mandela University, Port Elizabeth.
16. Landman M & Kerley GIH 2009. Elephant impacts and potential indicators of elephant-induced change to vegetation composition and structure in Addo Elephant National Park. Centre for African Conservation Ecology Report to South African National Parks.
17. Landman M & Kerley GIH 2009. Faunal specialist study for the development of the Kadouw Private Nature Reserve Leisure Estate. Centre for African Conservation Ecology Report to CEN Environmental Management Unit.
18. Landman M, Boshoff AF & Kerley GIH 2007. Faunal specialist study for the Intsomi Resort Development. Centre for African Conservation Ecology Report to Dennis Moss Partnership.
19. Kerley GIH & Landman M 2007. Assessment of the broad habitats and potential distributions and abundances of large herbivores on Bucklands Private Game Reserve. Centre for African Conservation Ecology Report to Bucklands Private Game Reserve.

20. Landman M, Boshoff AF & Kerley GIH 2007. Faunal specialist study for the development of the Gamma-Grassridge 765kV Transmission-line/substation. Centre for African Conservation Ecology Report to ACER Africa (Pty) Ltd.
21. Kerley GIH, Hallam S & Landman M 2007. A small mammal survey in the Maloti-Drakensberg Bioregion. Centre for African Conservation Ecology Report to the Maloti-Drakensberg Transfrontier Conservation and Development Project.
22. Landman M, Shrader SM & Kerley GIH 2006. Habitat assessment for the introduction of black rhinoceros and mountain zebra to Namaqua National Park. Centre for African Conservation Ecology Report to Conservation International.
23. Kerley GIH & Landman M 2005. Gardeners of the Gods: the role of elephants in the Eastern Cape Subtropical Thickets. In Elephant effects on biodiversity: an assessment of current knowledge and understanding as a basis for elephant management in SANParks. South African National Parks: Scientific Services Report.
24. Landman M, Smirnova Y, Kaynas B, Bodnar A & Shenbrot GI 2001. The influence of *Psammomys obesus* burrows on the species diversity of Tenebrionid beetles in the Negev Desert, Israel. Jacob-Blaustein Institute for Desert Research, Israel.

Curriculum Vitae

I worked as an environmental consultant for the past 14 years and since December 2019 have been self-employed as a botanical, agricultural and soil specialist. I have a BSc Hons in Geology, an MSc in Botany and is currently completing a PhD in Botany/Soil science. I have experience in project management and have led numerous EIAs in the Eastern Cape, Northern Cape, Gauteng, Mpumalanga, and North West Provinces. My projects include SANRAL road projects, renewable energy developments, mining applications (quarries and BPs), mixed-use developments and numerous smaller infrastructure EIAs. My largest project was a multi-million Rand Special Economic Zone (SEZ) development in Upington, Northern Cape. Before studying I worked as a financial advisor for ABSA Bank for 9 years and have 3 years high school mathematics and science teaching experience.

Personal Details

Name	Roy de Kock
Identification number	7606 2205 3202 082
Current address	31 Aster Avenue, Sunridge Park, Port Elizabeth, Eastern Cape, South Africa
Email	roy@blueleafenviro.co.za
Contact number	+27 76 281 9660
Driver's license	Code 08 (EB)
Language competencies	English (excellent verbal and writing) Afrikaans (excellent verbal and writing)

Education

Qualification	Institution	Year
PhD Botany and Soil Science	Nelson Mandela University	Current
MSc Botany	Nelson Mandela University	2010
BSc (Hons.) Geology	Nelson Mandela University	2008
BSc Botany & Geology	Nelson Mandela University	2007
Diploma in Marketing	University of Witwatersrand	2003

Skill Highlights

Project Management and Environmental Consulting	<ul style="list-style-type: none">- Extensive experience in project management and have led numerous projects of various scales throughout South Africa.- Managed over 200 projects over an 11-year period.- Managed up to 15 projects at a single time.
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	<ul style="list-style-type: none"> - My projects included SANRAL road projects, renewable energy developments, mining applications (quarries and BPs), mixed-use developments and numerous smaller infrastructure EIAs. - My largest project was a multi-million Rand Special Economic Zone development in Upington, Northern Cape. - Experience in conservation management and have developed various management plans for protected areas within the Eastern Cape and Gauteng.
Environmental Legislation	<p>I have extensive experience in interpreting and applying the following International, National, Provincial legislation:</p> <p><u>International:</u></p> <ul style="list-style-type: none"> - IFC Performance Standards - Equator Principles <p><u>National:</u></p> <ul style="list-style-type: none"> - National Environmental Management Act - National Environmental Management Act (EIA Regulations) - National Environmental Management Waste Act - National Environmental Management Air Quality Act - National Environmental Management Biodiversity Act - National Environmental Management Protected Areas Act - National Water Act - National Forestry Act - Conservation of Agricultural Resources Act <p><u>Provincial</u></p> <p>I am well versed in provincial environmental legislation and regulations in the following provinces:</p> <ul style="list-style-type: none"> - Gauteng - Western Cape - Eastern Cape - Northern Cape - North West - Mpumalanga
Specialist consulting	<ul style="list-style-type: none"> - Worked as a specialist for the last 11 years while managing projects. - Self-employed as a botanical and soil specialist since January 2020. - SACNASP registered as a Professional Natural Scientist. - Written over 50 botanical, ecological and biodiversity assessments.

	<ul style="list-style-type: none"> - Done over 25 agricultural and soil assessments for numerous mining (and other) EIAs throughout SA and Mozambique and even have experience drafting rehabilitation and closure plans for large mines (graphite, REEs, Iron). - In the last 2-3 years I have started drafting wetland and river assessments - Drafted a few visual assessments throughout the years. - Done numerous Water Use Licences for a variety of cliens including farmers, contractors and developers
Finance	<ul style="list-style-type: none"> - 9 years working experience as a financial advisor for ABSA Bank. - Consulted commercial clients to assist in cash flow issues - Done retail consulting for small businesses and private individuals
Teaching	<ul style="list-style-type: none"> - 3 years' experience in teaching Mathematics, Science, Biology and Geography to High School grades. - 1-year experience in teaching advance mathematics as an online course to Secondary School grades.
Environmental Auditing	<ul style="list-style-type: none"> - Drafted over 100 environmental and safety protocols for various developers throughout South Africa - Implemented and audited numerous environmental and safety protocols during all phases of development (Planning, construction, operations, decommissioning and closure) - Drafted numerous Environmental and Social Management Systems (ESMS) for international clients - Audited various ESMS's throughout South Africa

Work Experience

Environmental and Soil Consultant

BlueLeaf Environmental (Pty) Ltd – 12/2019 to current

- Conducting specialist studies for various projects in South Africa including:
 - Ecological assessments
 - Biodiversity studies
 - Agricultural and Soil assessments
 - Aquatic assessments
 - Visual assessments
- Water Use Licensing (abstraction, borehole, bridges & culverts)

- Plant and animal relocation permits (National and Provincial)
- Plant and animal Search and Rescue.
- Environmental Risk Assessments
- Mine Rehabilitation and Closure Plans

Principal Environmental Consultant

Employer: CES Environmental and Social Advisory Services, East London, Eastern Cape - 04/2010 to 12/2019

- Managed numerous projects of various sizes including budget management, client liaison, timeframe targets, managing junior consultants and sub-consultants.
- Prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc.
- Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining license /permit applications.

Feasibility assessments

- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.

Specialist studies

- Conducting specialist studies for various projects in both South Africa and the rest of Africa (Mozambique, Madagascar, Zambia, Malawi) including:
 - Ecological assessments
 - Agricultural and Soil assessments
 - Aquatic assessments
 - Water Use Licensing (abstraction, borehole, bridges & culverts)
 - Plant and animal relocation permits (National and Provincial), and
 - Plant and animal Search and Rescue.

Laboratory technician

Nelson Mandela University (Faculties of Botany, Zoology and Biochemistry, Port Elizabeth, Eastern Cape – 02/2009 to 03/2010

Assisting students and postgraduates in receiving, labeling, and analyzing samples, design, set-up and conducting of experiments. Designing and executing laboratory testing according standard procedures. General laboratory maintenance of equipment including calibrations, glassware, and chemicals.

School Teacher

Hananja Private School, Jeffreys Bay, Eastern Cape – 01/2007 to 12/2009
Private online tutor East London, Eastern Cape – 01/2020 to current

Teaching Grades 8 to 12 Mathematics, Geography, Biology and Science.
Online teaching Advanced Mathematics and Science Grades 4-7 (2019-current)
Financial Advisor
ABSA Bank Florida, Gauteng – 02/1995 to 12/2003

Assisting clients to determine their expenses, income, insurance coverage, financial objectives, tax status, risk tolerance, or other information needed to develop a financial plan. Answering client questions about financial plans and strategies and giving financial advice. Also worked as:

- Bankteller
- Enquiries clerk
- Administrative assistant
- Treasurer
- Retail sales consultant

Professional Registrations

- SACNASP – Registered as a professional natural scientist (Ref 400216/16)
- IAIASa – Registered as an environmental practitioner
- SAAB – South African Association of Botanists
- LaRSSA – Land Rehabilitation Society of South Africa

Appendix 2. Prescribed impact assessment methodology used to assess the significance of potential impacts on fauna during the construction and operation of the proposed project.

Types of impacts

Different types of impacts may occur from the undertaking of an activity. The impacts may be positive or negative and may be categorized as being direct (primary), indirect (secondary) or cumulative impacts.

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal blooms and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Factors that should be taken into account in impact prediction and assessment include:

- the nature of the impact i.e. positive, negative, direct, indirect, cumulative;
- the magnitude of the impact i.e. severe, moderate, low;
- the extent and location of the impact in terms of the area covered, volume distribution, etc;
- when the impact will occur i.e. during construction, operation and/or decommissioning as well as whether the impact will occur immediately or be delayed;
- the duration of the impact i.e. short term, long term, intermittent or continuous;
- the extent to which the impact can be reversed or not;
- the likelihood or probability of the impact actually occurring; and
- the significance of the impact on a local, regional or global level

Criteria used to assess impacts

The following criteria will be utilized to assess the significance of predicted impacts. For each identified impact, a comparison must be made between the preferred development option, and the 'no-go' option; with and without mitigation measures in place.

In the criteria presented below, a scale of how each can be measured and/or rated is discussed. This scale is based on qualitative data and the assignment of 'values' in each instance will be done in an objective manner. This will be achieved by using objectively-derived data gathered from various sources (i.e. recommendations from specialist studies and other scientific publications, observations made during detailed site investigations, consideration of comments from interested and affected parties, discussions with relevant stakeholders, and perusal of relevant environmental planning guidelines).

Extent:

Whether the impact will occur on a scale limited to the immediate areas or site of the development activity or will the impact occur on a sub-regional, regional and/or national scale.

Table 1: Extent

Description	Explanation	Scoring
Footprint Site	The impact could affect the whole, or a significant portion of the site.	1
Local	Impact could affect the adjacent landowners and areas surrounding the site.	2
Regional	Impact could affect the wider area around the site, that is, from a few kilometres, up to the wider region.	3
National	Impact could have an effect that expands throughout a significant portion of South Africa – that is, as a minimum has an impact across provincial borders.	4

Duration:

Whether the lifetime of the impact will be of a short duration (0-5 years); medium term (5-15 years); long-term (15 years, with the impact ceasing after the operational life of the development); or considered permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Table 2: Duration

Description	Explanation	Scoring
Short term	The impact will either disappear with mitigation or will be mitigated through a natural process, and will be relevant for 0 to 5 years.	1
Medium term	The impact will be relevant for 5 to 15 years.	2
Long term	The impact will continue or last for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter (i.e. more than 15 years).	3
Permanent	This is the only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient (i.e. impact will remain after the operational lifetime of the project).	4

Intensity/Magnitude:

Whether the intensity (magnitude / size) of the impact is high, medium, low or negligible (no impact). Where possible the intensity of impacts are quantified. This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Note that intensity is scored differently as this is a critical issue in terms of the overall risk and impact assessment. The intensity is thus measured as the degree to which the project affects or changes the environment.

Table 3: Intensity

Description	Explanation	Scoring
Very Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.	2
Low	The impact alters the affected environment in such a way that the natural processes or functions are slightly affected.	4
Description	Explanation	Scoring
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.	6
High	Function or process of the affected environment is disturbed to the extent where the function or process temporarily or permanently ceases.	8

Probability:

The probability of the impact actually occurring as either improbable (low likelihood); probable (distinct possibility); highly probable (most likely) or definite (impact will occur regardless of preventative measures).

Table 4: Probability

Description	Explanation	Scoring
Unlikely	The possibility of the impact occurring is none, due either to the circumstances, design or experience.	1
Probable	There is a possibility that the impact will occur to the extent that provisions must therefore be made.	2
Highly Probable	It is most likely that the impacts will occur at some stage of the Development. Plans must be drawn up before carrying out the activity.	3
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied upon.	4

Significance:

The significance of impacts of the proposed project are assessed with the mitigation measures which will be included in the contractors specifications as well as with the additional mitigation measures recommended in this report being implemented. The significance of the identified impacts on the components of the affected environment (and where relevant, with respect to potential legal infringement) are described as:

1. No Impact

Where the project action will not cause any adverse or beneficial changes to the natural (biophysical), and/or socio-economic environment.

2. Impact of Low Significance

Where the project actions will result in minor short-term changes to the biophysical and/or socio-economic environment. The impacts will usually be restricted to the immediate area of the project action. The affected system should return to its natural or almost natural state in a short period of time (0 - 5 years). The impacts on human populations will be of a short duration and will not have any lasting consequences.

3. Impact of Moderate Significance

Where the project actions will result in moderate short-term or medium term changes to the biophysical and/or socio-economic environment. The effects of the impact could be experienced outside of the project action area and may be evident at a sub-regional or even a regional level. Minor indirect impacts may arise from the project action. The system should recover but it is unlikely that it will return to its natural state. Recovery would only take place in the medium term (5-15 years). Impacts on the human population will be felt after the project action is completed but are not severe and/or disruptive to their quality of life or economic wellbeing.

4. Impacts of High Significance

Where the project actions will result in major long-term changes to the biophysical and/or socio-economic environment. The effects of the impact will be experienced outside of the project action area and may be evident at a regional, national and even at the international level. Secondary or indirect impacts may arise from the project action. The system may recover over the long-term (>15 years) but will not revert to its natural state. Impacts on human populations will be felt after the project action is completed. The impacts are of a long-term nature and are disruptive to the previous life style of the affected population.

Determination of significance is made on the assumption that any mitigation and / or management measure, which is recommended, will be implemented by the developer. The level of significance is expressed as the sum of the area exposed to the risk (extent), the length of time that exposure may occur over in total (duration), the severity of the exposure (intensity) and the likelihood of the event occurring (probability).

Significance value = (Extent + Duration + Intensity) x Probability.

A distinction will be made for the significance rating without the implementation of mitigation measures and with the implementation of mitigation measures. The purpose of mitigation measures is to reduce the significance level of the anticipated impact. Therefore, the reduction in the significance level after mitigation is directly related to the scores used in the impact assessment criteria. The effect of potential mitigation measures to reduce the overall significance level is also to be considered in each issues table (i.e. values with or without mitigation are presented).

Table 5: Significance

Description	Explanation	Scoring
No / Very Low Impact	There is no impact or a very low impact.	1-9
Low	The impacts are less important, but some mitigation is required to reduce the negative impacts.	10-27
Medium	The impacts are important and require attention; mitigation is required to reduce the negative impacts.	28-45

High	The impacts are of high importance and mitigation is essential to reduce the negative impacts	46-64
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Status of the Impact:

This describes whether the impact is positive (a benefit) or negative (a cost), or neutral.

Degree of Confidence in Predictions:

The degree of confidence in the predictions, based on the availability of information and/or specialist knowledge.

Appendix 3. List of amphibians, reptiles, mammals, birds, and butterflies that potentially occur naturally in the project area.

Species	Common name	Species	Common name
BUTTERFLIES		BUTTERFLIES (cont.)	
(Hesperiidae) <i>Afrogegenes letterstedti</i>	Brown dodger	<i>Charaxes varanes varanes</i>	Pearl charaxes
<i>Eretis umbra umbra</i>	Small marbled elf	<i>Danaus chrysippus orientis</i>	African plain tiger
<i>Kedestes lepenula</i>	Chequered ranger	<i>Dira clytus eurina</i>	Cape autumn widow
<i>Metisella malgacha malgacha</i>	Grassveld sylph	<i>Hypolimnas misippus</i>	Common diadem
<i>Metisella metis paris</i>	Gold-spotted sylph	<i>Junonia hierta cebrene</i>	Yellow pansy
<i>Sarangesa phidyle</i>	Small elfin	<i>Junonia oenone oenone</i>	Dark blue pansy
<i>Spialia asterodia</i>	Star sandman	<i>Junonia orithya madagascariensis</i>	African blue pansy
<i>Spialia nanus</i>	Dwarf sandman	<i>Pardopsis punctatissima</i>	Polka dot
<i>Spialia satespes</i>	Boland sandman	<i>Precis archesia archesia</i>	Garden inspector
<i>Spialia spio</i>	Mountain sandman	<i>Precis octavia sesamus</i>	Southern gaudy commodore
<i>Tsitana uitenhaga</i>	Uitenhage sylph	<i>Pseudonympha magoides</i>	False silver-bottom brown
<i>Zophopetes dysmephila</i>	Palm-tree night-fighter	<i>Pseudonympha magus</i>	Silver-bottom brown
(Lycaenidae) <i>Aloeides depicta</i>	Depicta russet	<i>Vanessa cardui</i>	Painted lady
<i>Aloeides trimeni trimeni</i>	Brown russet	<i>Vanessa hippomene hippomene</i>	Southern short-tailed admiral
<i>Anthene amarah amarah</i>	Black-striped ciliate blue	(Papilionidae) <i>Papilio demodocus demodocus</i>	Citrus swallowtail
<i>Anthene definita definita</i>	Steel-blue-ciliate blue	<i>Papilio nireus lyaeus</i>	Narrow green-banded swallowtail
<i>Axiocerses croesus</i>	Dark-banded scarlet	(Pieridae) <i>Belenois aurota</i>	Pioneer caper white
<i>Azonus moriqua</i>	Black-bordered babul blue	<i>Belenois creona severina</i>	African caper white
<i>Azonus natalensis</i>	Natal babul blue	<i>Belenois gidica abyssinica</i>	African veined white
<i>Brephidium metophis</i>	Tinktinkie pygmy blue	<i>Catopsilia florella</i>	African migrant
<i>Cacyreus fracta fracta</i>	Water geranium bronze	<i>Colias electo electo</i>	African clouded yellow
<i>Cacyreus marshalli</i>	Common geranium bronze	<i>Colotis antevippe gavisa</i>	Red tip
<i>Chilades trochylus</i>	Grass jewel blue	<i>Colotis euippe omphale</i>	Southern round-winged orange tip
<i>Chrysoritis chrysaor</i>	Burnished opal	<i>Colotis evagore antigone</i>	Small orange tip
<i>Deudorix antalus</i>	Brown playboy	<i>Dixeia charina charina</i>	African ant-heap white
<i>Eicochrysops messapus messapus</i>	Cupreous ash blue	<i>Eurema brigitta brigitta</i>	Broad-bordered grass yellow
<i>Iolaus mimosae mimosae</i>	Mimosa sapphire	<i>Mylothris agathina agathina</i>	Eastern dotted border
<i>Iolaus silas</i>	Southern sapphire	<i>Nepheronia buquetii buquetii</i>	Buquet's vagrant
<i>Lachnocnema bibulus</i>	Common woolly legs	<i>Pinacopteryx eriphia eriphia</i>	Zebra white
<i>Lampides boeticus</i>	Pea blue	<i>Pontia helice helice</i>	Southern meadow white
<i>Lepidochrysops patricia</i>	Patrician giant cupid	<i>Teracolus eris eris</i>	Banded gold tip
<i>Leptomyrina lara</i>	Cape black-eye	AMPHIBIANS	
<i>Leptotes pirithous pirithous</i>	Common zebra blue	<i>Cacosternum boettgeri</i>	Boettger's caco
<i>Myrina silenus ficedula</i>	Common fig tree blue	<i>Cacosternum nanum</i>	Bronze caco
<i>Oraidium barberae</i>	Dwarf blue	<i>Hyperolius marmoratus verrucosus</i>	Painted reed frog
<i>Tarucus thespis</i>	Vivid pierrot	<i>Kassina senegalensis</i>	Bubbling kassina
<i>Zizeeria knysna knysna</i>	African grass blue	<i>Phrynobatrachus natalensis</i>	Snoring puddle frog
(Nymphalidae) <i>Acraea horta</i>	Garden acraea	<i>Sclerophrys pardalis</i>	Eastern leopard toad
<i>Bicyclus safitza safitza</i>	Black-haired bush brown	<i>Semnodactylus wealii</i>	Rattling frog
<i>Cassionympha cassius</i>	Rainforest dull brown	<i>Strongylopus fasciatus</i>	Striped stream frog
<i>Catacroptera cloanthe cloanthe</i>	Pirate	<i>Strongylopus grayii</i>	Clicking stream frog
<i>Charaxes brutus natalensis</i>	White-barred charaxes	<i>Xenopus laevis</i>	Common platanna
<i>Charaxes jahluca jahluca</i>	Pearl-spotted charaxes		

Appendix 3 (continue):

Species	Common name	Species	Common name
REPTILES		REPTILES (cont.)	
(lizards) <i>Acontias lineicauda</i>	Algoa legless skink	<i>Chersina angulata</i>	Angulate tortoise
<i>Acontias meleagris</i>	Cape legless skink	<i>Pelomedusa subrufa</i>	Marsh terapin
<i>Acontias orientalis</i>	Eastern Cape legless skink	<i>Stigmochelys pardalis</i>	Leopard tortoise
<i>Agama atra</i>	Southern rock agama	MAMMALS	
<i>Bradypodion ventrale</i>	Eastern Cape dwarf chameleon	(bats) <i>Miniopterus natalensis</i>	Natal long-fingered bat
<i>Cordylus cordylus</i>	Cape girdled lizard	<i>Miniopterus fraterculus</i>	Lesser long-fingered bat
<i>Gerrhosaurus flavigularis</i>	Yellow-throated plated lizard	<i>Myotis tricolor</i>	Temminck's hairy bat
<i>Hemidactylus mabouia</i>	Common tropical house gecko	<i>Neoromicia capensis</i>	Cape serotine bat
<i>Nucras taeniolata</i>	Striped sandveld lizard	<i>Nycteris thebaica</i>	Egyptian slit-face bat
<i>Pachydactylus maculatus</i>	Spotted gecko	<i>Rhinolophus capensis</i>	Cape horseshoe bat
<i>Pachydactylus mariquensis</i>	Common banded gecko	<i>Rhinolophus clivosus</i>	Geoffrey's horseshoe bat
<i>Pedioplanis lineocellata</i>	Spotted sand lizard	<i>Rousettus aegyptiacus</i>	Egyptian fruit bat
<i>Scelotes anguineus</i>	Algoa dwarf burrowing skink	(insectivores) <i>Myosorex varius</i>	Forest shrew
<i>Trachylepis capensis</i>	Cape skink	<i>Amblysomus hottentotus</i>	Hottentot golden mole
<i>Trachylepis homalocephala</i>	Red-sided skink	<i>Crociodura cyanea</i>	Reddish-grey musk shrew
<i>Varanus albigularis</i>	Southern rock monitor	<i>Crociodura flavescens</i>	Greater musk shrew
<i>Varanus niloticus</i>	Nile monitor	<i>Suncus infinitesimus</i>	Least dwarf shrew
(snakes) <i>Afrotrophlops bibronii</i>	Bibron's blind snake	(rodents) <i>Otomys irroratus</i>	Vlei rat
<i>Aspidelaps lubricus</i>	Coral shield cobra	<i>Cryptomys hottentotus</i>	African mole-rat
<i>Bitis arietans</i>	Puff adder	<i>Desmodillus auricularis</i>	Cape short-tailed gerbil
<i>Boaedon capensis</i>	Brown house snake	<i>Georchus capensis</i>	Cape mole-rat
<i>Causus rhombeatus</i>	Rhombic night adder	<i>Graphiurus murinus</i>	Woodland dormouse
<i>Crotaphopeltis hotamboeia</i>	Red-lipped snake	<i>Hystrix africaeaustralis</i>	Cape porcupine
<i>Dasypeltis scabra</i>	Rhombic egg-eater	<i>Mastomys natalensis</i>	Natal multimammate mouse
<i>Dispholidus typus</i>	Boomslang	<i>Micaelamys namaquensis</i>	Namaqua rock mouse
<i>Duberria lutrix</i>	South African slug-eater	<i>Mus domesticus</i>	House mouse
<i>Hemachatus haemachatus</i>	Rinkhals	<i>Mus minutoides</i>	Pygmy mouse
<i>Homoroselaps lacteus</i>	Spotted harlequin snake	<i>Otomys unisulcatus</i>	Karoo bush rat
<i>Lamprophis aurora</i>	Aurora snake	<i>Rattus rattus</i>	House rat
<i>Lamprophis inornatus</i>	Olive ground snake	<i>Rhabdomys pumilio</i>	Four-striped grass mouse
<i>Leptotyphlops nigricans</i>	Black thread snake	<i>Saccostomus campestris</i>	Pouched mouse
<i>Lycodonomorphus rufulus</i>	Brown water snake	(hares) <i>Lepus saxatilis</i>	Scrub hare
<i>Lycophidion capense</i>	Cape wolf snake	(primates) <i>Cercopithecus pygerythrus</i>	Vervet monkey
<i>Naja nivea</i>	Cape cobra	<i>Papio hamadryas ursinus</i>	Chacma baboon
<i>Philothamnus hoplogaster</i>	Southeastern green snake	(large) <i>Sylvicapra grimmia</i>	Common duiker
<i>Philothamnus semivariiegatus</i>	Spotted bush snake	(small & medium) <i>Atilax paludinosus</i>	Water mongoose
<i>Prosymna sundevalli</i>	Sundevall's shovel snout	carnivores) <i>Caracal caracal</i>	Caracal
<i>Psammophis crucifer</i>	Cross-marked grass snake	<i>Cynictis penicillata</i>	Yellow mongoose
<i>Psammophis notostictus</i>	Karoo sand snake	<i>Felis silvestris cafra</i>	African wild cat
<i>Psammophylax rhombeatus</i>	Spotted grass snake	<i>Galerella pulverulenta</i>	Small grey mongoose
<i>Pseudaspis cana</i>	Mole snake	<i>Genetta genetta</i>	Small-spotted genet
<i>Rhinotyphlops lalandei</i>	Delalande's beaked blind snake	<i>Ictonyx striatus</i>	Striped polecat
(chelonians) <i>Homopus areolatus</i>	Parrot-beaked dwarf tortoise	<i>Mellivora capensis</i>	Honey badger

Appendix 3 (continue):

Species	Common name	Species	Common name	
MAMMALS (cont.)		BIRDS (cont.)		
(small & medium)	<i>Poecilogale albinucha</i> <i>Suricata suricatta</i>	<i>Streptopelia semitorquata</i> <i>Columba livia</i> <i>Dicrurus adsimilis</i> <i>Anas sparsa</i> <i>Thalassornis leuconotus</i> <i>Anas undulata</i> <i>Haliaeetus vocifer</i> <i>Ardea intermedia</i> <i>Egretta garzetta</i> <i>Bubulcus ibis</i> <i>Falco biarmicus</i> <i>Lagonosticta rubricata</i> <i>Lanius collaris</i> <i>Muscicapa adusta</i> <i>Melaenornis silens</i> <i>Scleroptila afra</i> <i>Anser anser</i> <i>Alopochen aegyptiaca</i> <i>Melierax canorus</i> <i>Tachybaptus ruficollis</i> <i>Andropadus importunus</i> <i>Tringa nebularia</i> <i>Numida meleagris</i> <i>Chroicocephalus cirrocephalus</i> <i>Circus ranivorus</i> <i>Circus maurus</i> <i>Nycticorax nycticorax</i> <i>Ardea melanocephala</i> <i>Ardea goliath</i> <i>Ardea cinerea</i> <i>Indicator indicator</i> <i>Indicator minor</i> <i>Indicator variegatus</i> <i>Upupa africana</i> <i>Threskiornis aethiopicus</i> <i>Bostrychia hagedash</i> <i>Falco rupicolus</i> <i>Halcyon albiventris</i> <i>Corythornis cristatus</i> <i>Ceryle rudis</i> <i>Elanus caeruleus</i> <i>Milvus aegyptius</i>	Dove, Red-eyed Dove, Rock Drongo, Fork-tailed Duck, African Black Duck, White-backed Duck, Yellow-billed Eagle, African Fish Egret, Intermediate Egret, Little Egret, Western Cattle Falcon, Lanner Firefinch, African Fiscal, Southern Flycatcher, African Dusky Flycatcher, Fiscal Francolin, Grey-winged Goose, Domestic Goose, Egyptian Goshawk, Pale Chanting Grebe, Little Greenbul, Sombre Greenshank, Common Guineafowl, Helmeted Gull, Grey-headed Harrier, African Marsh Harrier, Black Heron, Black-crowned Night Heron, Black-headed Heron, Goliath Heron, Grey Honeyguide, Greater Honeyguide, Lesser Honeyguide, Scaly-throated Hoopoe, African Ibis, African Sacred Ibis, Hadada Kestrel, Rock Kingfisher, Brown-hooded Kingfisher, Malachite Kingfisher, Pied Kite, Black-winged Kite, Yellow-billed	
	African striped weasel Suricate			
	BIRDS			
	<i>Apalis thoracica</i> <i>Recurvirostra avosetta</i> <i>Tricholaema leucomelas</i> <i>Lybius torquatus</i> <i>Euplectes orix</i> <i>Laniarius ferrugineus</i> <i>Pycnonotus capensis</i> <i>Emberiza tahapisi</i> <i>Chlorophoneus olivaceus</i> <i>Buteo buteo</i> <i>Buteo rufofuscus</i> <i>Camaroptera brachyura</i> <i>Crithagra sulphurata</i> <i>Serinus canicollis</i> <i>Crithagra albogularis</i> <i>Crithagra mozambica</i> <i>Oenanthe familiaris</i> <i>Cisticola subruficapilla</i> <i>Cisticola aberrans</i> <i>Cisticola tinniens</i> <i>Cisticola juncidis</i> <i>Fulica cristata</i> <i>Microcarbo africanus</i> <i>Phalacrocorax lucidus</i> <i>Centropus burchellii</i> <i>Zapornia flavirostra</i> <i>Sylvietta rufescens</i> <i>Corvus capensis</i> <i>Corvus albus</i> <i>Cuculus clamosus</i> <i>Chrysococcyx caprius</i> <i>Clamator jacobinus</i> <i>Chrysococcyx klaas</i> <i>Campephaga flava</i> <i>Anhinga rufa</i> <i>Streptopelia capicola</i> <i>Turtur chalcospilos</i> <i>Spilopelia senegalensis</i> <i>Oena capensis</i>	Apalis, Bar-throated Avocet, Pied Barbet, Acacia Pied Barbet, Black-collared Bishop, Southern Red Boubou, Southern Bulbul, Cape Bunting, Cinnamon-breasted Bushshrike, Olive Buzzard, Common Buzzard, Jackal Camaroptera, Green-backed Canary, Brimstone Canary, Cape Canary, White-throated Canary, Yellow-fronted Chat, Familiar Cisticola, Grey-backed Cisticola, Lazy Cisticola, Levillant's Cisticola, Zitting Coot, Red-knobbed Cormorant, Reed Cormorant, White-breasted Coucal, Burchell's Crake, Black Crombec, Long-billed Crow, Cape Crow, Pied Cuckoo, Black Cuckoo, Diederik Cuckoo, Jacobin Cuckoo, Klaas's Cuckooshrike, Black Darter, African Dove, Cape Turtle Dove, Emerald-spotted Wood Dove, Laughing Dove, Namaqua		

Appendix 3 (continue):

Species	Common name	Species	Common name
	BIRDS (cont.)		BIRDS (cont.)
<i>Afrotis afra</i>	Korhaan, Southern Black	<i>Onychognathus morio</i>	Starling, Red-winged
<i>Vanellus armatus</i>	Lapwing, Blacksmith	<i>Creophora cinerea</i>	Starling, Wattled
<i>Vanellus coronatus</i>	Lapwing, Crowned	<i>Himantopus himantopus</i>	Stilt, Black-winged
<i>Calandrella cinerea</i>	Lark, Red-capped	<i>Calidris minuta</i>	Stint, Little
<i>Mirafra africana</i>	Lark, Rufous-naped	<i>Saxicola torquatus</i>	Stonechat, African
<i>Macronyx capensis</i>	Longclaw, Cape	<i>Chalcomitra amethystina</i>	Sunbird, Amethyst
<i>Riparia paludicola</i>	Martin, Brown-throated	<i>Cinnyris afer</i>	Sunbird, Greater Double-collared
<i>Ptyonoprogne fuligula</i>	Martin, Rock	<i>Nectarinia famosa</i>	Sunbird, Malachite
<i>Gallinula chloropus</i>	Moorhen, Common	<i>Cinnyris chalybeus</i>	Sunbird, Southern Double-collared
<i>Urocolius indicus</i>	Mousebird, Red-faced	<i>Hirundo rustica</i>	Swallow, Barn
<i>Colius striatus</i>	Mousebird, Speckled	<i>Cecropis cucullata</i>	Swallow, Greater Striped
<i>Acridotheres tristis</i>	Myna, Common	<i>Cecropis abyssinica</i>	Swallow, Lesser Striped
<i>Columba guinea</i>	Pigeon, Speckled	<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted
<i>Anthus cinnamomeus</i>	Pipit, African	<i>Hirundo albigularis</i>	Swallow, White-throated
<i>Charadrius hiaticula</i>	Plover, Common Ringed	<i>Apus horus</i>	Swift, Horus
<i>Charadrius pecuarius</i>	Plover, Kittitz's	<i>Apus affinis</i>	Swift, Little
<i>Charadrius tricollaris</i>	Plover, Three-banded	<i>Apus caffer</i>	Swift, White-rumped
<i>Charadrius marginatus</i>	Plover, White-fronted	<i>Tchagra tchagra</i>	Tchagra, Southern
<i>Prinia maculosa</i>	Prinia, Karoo	<i>Anas capensis</i>	Teal, Cape
<i>Coturnix coturnix</i>	Quail, Common	<i>Anas erythrorhyncha</i>	Teal, Red-billed
<i>Quelea quelea</i>	Quelea, Red-billed	<i>Chlidonias hybrida</i>	Tern, Whiskered
<i>Rallus caerulescens</i>	Rail, African	<i>Burhinus capensis</i>	Thick-knee, Spotted
<i>Corvus albicollis</i>	Raven, White-necked	<i>Burhinus vermiculatus</i>	Thick-knee, Water
<i>Cossypha caffra</i>	Robin-Chat, Cape	<i>Turdus olivaceus</i>	Thrush, Olive
<i>Actitis hypoleucos</i>	Sandpiper, Common	<i>Pogoniulus pusillus</i>	Tinkerbird, Red-fronted
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	<i>Motacilla capensis</i>	Wagtail, Cape
<i>Tringa glareola</i>	Sandpiper, Wood	<i>Acrocephalus baeticatus</i>	Warbler, African Reed
<i>Psalidoprocne pristopectera holomelas</i>	Saw-wing, Black (Southern Africa)	<i>Curruca subcoerulea</i>	Warbler, Chestnut-vented
<i>Cercotrichas coryphoeus</i>	Scrub Robin, Karoo	<i>Acrocephalus gracilirostris</i>	Warbler, Lesser Swamp
<i>Cercotrichas leucophrys</i>	Scrub Robin, White-browed	<i>Bradypterus baboecala</i>	Warbler, Little Rush
<i>Crithagra gularis</i>	Seedeater, Streaky-headed	<i>Estrilda astrild</i>	Waxbill, Common
<i>Tadorna cana</i>	Shelduck, South African	<i>Ploceus capensis</i>	Weaver, Cape
<i>Spatula smithii</i>	Shoveler, Cape	<i>Ploceus velatus</i>	Weaver, Southern Masked
<i>Passer melanurus</i>	Sparrow, Cape	<i>Ploceus ocularis</i>	Weaver, Spectacled
<i>Passer domesticus</i>	Sparrow, House	<i>Numenius phaeopus</i>	Whimbrel, Eurasian
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	<i>Zosterops virens</i>	White-eye, Cape
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	<i>Vidua macroura</i>	Whydah, Pin-tailed
<i>Platalea alba</i>	Spoonbill, African	<i>Phoeniculus purpureus</i>	Wood Hoopoe, Green
<i>Pternistis afer</i>	Spurfowl, Red-necked	<i>Jynx ruficollis</i>	Wryneck, Red-throated
<i>Lamprotornis nitens</i>	Starling, Cape		
<i>Sturnus vulgaris</i>	Starling, Common		
<i>Lamprotornis bicolor</i>	Starling, Pied		