

3 FOXES BIODIVERSITY SOLUTIONS



Simon Todd Pr.Sci.Nat
Director & Principle Scientist
C: 082 3326502
O: 021 782 0377
Simon.Todd@3foxes.co.za

60 Forrest Way
Glencairn
7975

Ecological Solutions for
People & the Environment

Date: 10 December 2020


3Foxes Biodiversity Solutions
60 Forrest Way,
Glencairn,
7975.

To whom it may concern,

THE PROPOSED EXTENSION OF GRID CONNECTION INFRASTRUCTURE FOR THE GUNSTFONTEIN WIND FARM, NORTHERN CAPE PROVINCE (DEFF REFERENCE: 14/12/16/3/3/1/2228)

Simon Todd (in conjunction with Eric Hermann) conducted the Ecological and avifaunal Specialist Studies for the Basic Assessment Application related to the Grid Connection Infrastructure for the Gunstfontein Wind Farm (DEFF Ref: 14/12/16/3/3/1/2228). The draft BAR report was received by the Department of Environment, Forestry and Fisheries along with the application form on 04 September 2020. Following the draft BAR disclosure for public review and comment (04 September 2020 – 5 October 2020), minor refinements have been made by the proponent to the layout and location of the grid extension infrastructure based on technical considerations and consideration of environmental issues. As the specialist I have reviewed this refined layout and have determined it a minor adjustment of location only. In addition, the refined layout and location of the grid extension infrastructure remains within the 300m assessment corridor originally assessment by myself and therefore does not constitute a novel change.

This letter thereby serves to confirm that the refined layout related to the grid connection infrastructure (dated December 2020) has no material change on the assessment, findings, impacts (including nature, significance and mitigation measures) and recommendations of the specialist report. From an Ecological and Avifaunal Specialist viewpoint, the results are identical and the change in location has no material effect on the specialist assessment conducted for the project. The recommendations and findings of the report therefore apply without modification to the refined layout.

Signed:  _____

Simon Todd

Mobile: 082 332 6502

Landline: 021 782 0377

Email: Simon.Todd@3foxes.co.za

BASIC ASSESSMENT FOR THE EXTENSION OF GRID CONNECTION INFRASTRUCTURE
FOR THE GUNSTFONTEIN WIND FARM, NORTHERN CAPE PROVINCE:

FAUNA & FLORA BASIC ASSESSMENT SPECIALIST REPORT



PRODUCED FOR SAVANNAH ENVIRONMENTAL (Pty) Ltd

BY



3Foxes Biodiversity Solutions

Simon.Todd@3foxes.co.za

Final Revision - August 2020

EXECUTIVE SUMMARY

Gunstfontein Wind Farm (Pty) Ltd proposes the construction and operation of a grid connection solution, known as the “grid extension infrastructure” for the authorised Gunstfontein Wind Farm, near Sutherland. The grid connection solution will include the development of a double-circuit 132kV overhead power line (known as the Gunstfontein 132kV OHL extension double-circuit power line) to connect the Gunstfontein Wind Farm to the national grid, via the Hidden Valley substation. The proposed 132kV OHL extension will be an extension of the already authorised Gunstfontein Grid Connection (DEA Ref. 14/12/16/3/3/1/1619). Savannah Environmental is conducting the required Basic Assessment (BA) process for the Gunstfontein Grid Connection and have appointed 3Foxes Biodiversity Solutions to provide a specialist terrestrial biodiversity (fauna and flora) impact assessment study of the proposed extended grid connection corridor.

A field assessment as well as a review of the available ecological information for the area was conducted. The vegetation within the Gunstfontein WEF Grid Connection extended corridor consists entirely of Central Mountains Shale Renosterveld which is considered to represent a moderately sensitive vegetation type due to its low total extent and relatively high abundance of plant Species of Conservation Concern (SCC). Some impact on plant SCC would potentially occur as a result of habitat loss associated with the development, but with the appropriate mitigation (pre-construction walk-through), this is highly unlikely to compromise the local populations of any species. In terms of fauna, there are few species of conservation concern that are likely to be present or abundant at the site and the primary impact of the development on fauna would be minor habitat loss for the more common resident species. As such, no high long-term post-mitigation impacts on fauna are expected to occur. Consequently, the impacts of the development on fauna and flora are considered acceptable and would be of low significance after mitigation.

Although direct impacts on fauna and flora are considered acceptable with mitigation, the whole power line extension route falls within areas that have been classified as CBA 1 and CBA 2. As these are areas that have been identified as being of significance for biodiversity maintenance and ecological processes, development in these areas is generally not preferred. However, the footprint of the development would be less than 8ha and would also run adjacent to an existing power line (Soetwater-Hidden Valley line which is currently under construction), with the result that the additional extent of disturbance and habitat loss would be low. As a result, the low overall footprint of the power line would be very unlikely to compromise the ecological functioning of the affected CBAs in any way.

Cumulative impacts within the broader study area are of potential concern due to the proliferation of WEF energy development in the wider Roggeveld area. The contribution of the power line would however be very minor and is not considered to represent a significant

contributor to cumulative impact in the area. Cumulative impacts associated with the development of the power line are therefore considered acceptable.

Ecological Impact Statement

There are no impacts associated with the establishment of Gunstfontein WEF Grid Connection Extension that cannot be mitigated to a low significance. Although cumulative impacts in the area are a concern due to the high density of wind energy developments in the area, the contribution of the Gunstfontein Grid Connection Extension would be low and is not considered to be of significance. As such, there are no fatal flaws or high post-mitigation impacts that should prevent the development from proceeding. Based on the layout provided for the assessment, the Gunstfontein WEF Grid Connection Extension can be supported from a terrestrial ecology point of view.

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COMPLIANCE WITH APPENDIX 6 OF THE 2014 EIA REGULATIONS, AS AMENDED

Requirements of Appendix 6 – GN R326 2014 EIA Regulations, 7 April 2017	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain-	
a) details of- <ul style="list-style-type: none"> i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae; 	6
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	7
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
<u>(cA) an indication of the quality and age of base data used for the specialist report;</u>	Section 2
<u>(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;</u>	Section 3
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process <u>inclusive of equipment and modelling used;</u>	Section 2
f) details of an assessment of the specific identified sensitivity of the site related to the <u>proposed activity or activities</u> and its associated structures and infrastructure, <u>inclusive of a site plan identifying site alternatives;</u>	Section 3
g) an identification of any areas to be avoided, including buffers;	Section 3
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.3
j) a description of the findings and potential implications of such findings on the impact of the <u>proposed activity or activities;</u>	Section 3
k) any mitigation measures for inclusion in the EMPr;	Section 7
l) any conditions for inclusion in the environmental authorisation;	Section 5
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7
n) a reasoned opinion- <ul style="list-style-type: none"> i. whether the proposed activity, <u>activities</u> or portions thereof should be authorised; (iA) <u>regarding the acceptability of the proposed activity or activities and</u> ii. if the opinion is that the proposed activity, <u>activities</u> or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan; 	Section 6
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	See Main Report
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See Main Report
q) any other information requested by the competent authority.	
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

SHORT CV/SUMMARY OF EXPERTISE – SIMON TODD

 <p>3Foxes Biodiversity Solutions ECOLOGICAL SPECIALIST SERVICES Assessment/Management/Research</p>	<p>Simon Todd Pr.Sci.Nat Director & Principle Scientist C: 082 3326502 O: 021 782 0377 Simon.Todd@3foxes.co.za 60 Forrest Way Glencairn 7975</p>	<p>Ecological Solutions for People & the Environment</p>
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Simon Todd is Director and principal scientist at 3Foxes Biodiversity Solutions and has over 20 years of experience in biodiversity measurement, management and assessment. He has provided specialist ecological input on more than 200 different developments distributed widely across the country. This includes input on the Wind and WEF SEA (REDZ) as well as the Eskom Grid Infrastructure (EGI) SEA and Karoo Shale Gas SEA. He is on the National Vegetation Map Committee as representative of the Nama and Succulent Karoo Biomes. Simon Todd is a recognised ecological expert and is a past chairman and current deputy chair of the Arid-Zone Ecology Forum. He is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

A selection of recent work is as follows:

Strategic Environmental Assessments

Co-Author. Chapter 7 – Biodiversity & Ecosystems - Shale Gas SEA. CSIR 2016.

Co-Author. Chapter 1 – Scenarios and Activities – Shale Gas SEA. CSIR 2016.

Co-Author – Ecological Chapter – Wind and Solar SEA. CSIR 2014.

Co-Author – Ecological Chapter – Eskom Grid Infrastructure SEA. CSIR 2015.

Contributor – Ecological & Conservation components to SKA SEA. CSIR 2017.

Recent Specialist Ecological Studies in the Vicinity of the Current Site

- Esizayo Wind Energy Facility, Roggeveld. WSP 2017.
- Maralla East & Maralla West WEFS, Roggeveld. WSP. 2017.
- Gunstfontein Wind Energy Facility, Sutherland. Savannah Environmental. 2016.
- Brandvalley Wind Energy Facility, Roggeveld. EOH. 2016.
- Kareebosch Wind Energy Facility, Roggeveld. Savannah Environmental 2015.
- Roggeveld Wind Energy Facility. 2013.
- Komsberg East & Komsberg West WEFs. Arcus Consulting. 2016

SPECIALIST DECLARATION

I, ..Simon Todd....., as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

-
- I act as the independent specialist in this application;
- I 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;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, 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 have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- 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 have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: _____

Name of Specialist: ____Simon Todd_____

Date: ____15 July 2020_____

1 INTRODUCTION

Gunstfontein Wind Farm (Pty) Ltd proposes the construction and operation of a grid connection solution, known as the “grid extension infrastructure” for the authorised Gunstfontein Wind Farm (DEA Ref: 14/12/16/3/3/2/826), near Sutherland, Northern Cape Province. The grid connection solution will include the development of a double-circuit 132kV overhead power line (known as the Gunstfontein 132kV OHL extension double-circuit power line) to connect the Gunstfontein Wind Farm to the national grid, via the Hidden Valley substation. The proposed 132kV OHL extension will be an extension of the already authorised Gunstfontein Grid Connection (14/12/16/3/3/1/1619). Savannah Environmental is conducting the required BA process for the Gunstfontein Grid Connection and have appointed 3Foxes Biodiversity Solutions to provide a specialist terrestrial biodiversity (fauna and flora) impact assessment study of the proposed grid connection corridor. A corridor 300m wide and approximately 7.5km long along with an assessment zone of 200m around the starting and terminating substation boundaries (collectively known as the grid corridor) is being assessed to allow for the optimisation of the grid (i.e. eventual micro siting) and associated infrastructure, and to accommodate environmental sensitivities and other energy infrastructure currently under construction on the properties.

The purpose of the Gunstfontein WEF Grid Connection Terrestrial Biodiversity Basic Assessment Report is to describe and detail the ecological features of the proposed grid connection corridor, provide an assessment of the ecological sensitivity of the affected area, and identify the likely impacts associated with the development of the proposed grid connection infrastructure within the grid connection corridor. A desktop review of the available ecological information for the grid connection corridor and adjacent areas was conducted in order to identify and characterise the ecological features of the affected area. This review was ground-truthed and supplemented by a site survey undertaken on 2 and 7 August 2020. Impacts are assessed for the pre-construction, construction, operation, and decommissioning phases of the development. A variety of avoidance and mitigation measures associated with each identified impact are recommended to reduce the likely impact of the development, which should be included in the Environmental Management Programme (EMPr) for the development. The full scope of study is detailed below.

SCOPE OF STUDY

The scope of the study includes the following activities

- a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project.
- a description and evaluation of environmental issues and potential impacts (incl. using direct, indirect and cumulative impacts) that have been identified.

- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts.
- an indication of the methodology used in determining the significance of potential environmental impacts.
- an assessment of the significance of direct, indirect, and cumulative impacts in terms of the following criteria:
 - the nature of the impact, which shall include a description of what causes the effect, what will be affected, and how it will be affected
 - the extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
 - the duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5- 15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity), or permanent
 - the probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood) probable (distinct possibility), highly probable (most likely), or definite (impact will occur regardless of any preventable measures)
 - the severity/beneficial scale indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight, or have no effect
 - the significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high
 - the status which will be described as either positive, negative or neutral
 - the degree to which the impact can be reversed
 - the degree to which the impact may cause irreplaceable loss of resources
 - the degree to which the impact can be mitigated
- a description and comparative assessment of all alternatives (where applicable)
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the EMPr.
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.
- a description of any assumptions, uncertainties and gaps in knowledge.
- an environmental impact statement which contains:
 - a summary of the key findings of the environmental impact assessment;

- an assessment of the positive and negative implications of the proposed activity;
- a comparative assessment of the positive and negative implications of identified alternatives.

General Considerations:

- Disclose any gaps in information or assumptions made.
- Identify recommendations for mitigatory measures to minimise impacts.
- Outline additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the Environmental Management Programme (EMPr) for faunal related issues.

A description of the potential impacts of the development and recommended mitigation measures are to be provided, which will be separated into the following project phases:

- Pre-construction
- Construction
- Operation Phase
- Decommissioning

1.1 ASSESSMENT APPROACH & PHILOSOPHY

This assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 326) in terms of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA), as well as best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers et al. (2005). This includes adherence to the following broad principles:

- That a precautionary and risk-averse approach be adopted towards projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning in threatened ecosystems or designated sensitive areas: i.e. Critical Biodiversity Areas (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas.
- Demonstrate how the proponent intends on complying with the principles contained in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA), which, amongst other things, indicates that environmental management should:

- In order of priority aim to: avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity;
- Avoid degradation of the environment;
- Avoid jeopardising ecosystem integrity;
- Pursue the best practicable environmental option by means of integrated environmental management;
- Protect the environment as the people's common heritage;
- Control and minimise environmental damage; and
- Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic or stressed ecosystems.

These principles serve as guidelines for all decision-making concerning matters that may affect the environment. As such, it is incumbent upon the proponent to show how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by the NEMA.

In order to adhere to the above principles and best-practice guidelines, the following approach forms the basis for the study approach and assessment philosophy:

The study will include data searches, desktop studies, site walkovers / field survey of the property and baseline data collection, describing the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of **pattern**, the following will be identified or described:

Community and ecosystem level

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography.
- Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, fine-scale systematic conservation plans, etc.*).

Species level

- Red Data Book (RDB) species (giving location if possible using GPS).
- The viability of an estimated population size of the RDB species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, Low 0-40% confident).
- The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Fauna

- Describe and assess the terrestrial fauna present in the area that will be affected by the proposed development.
- Conduct a faunal assessment that can be integrated into the ecological study.
- Describe the existing impacts of current land use as they affect the fauna.
- Clarify species of special concern (SSC) and that are known to be:
 - endemic to the region;
 - that are considered to be of conservational concern;
 - that are in commercial trade (CITES listed species); or
 - are of cultural significance.
- Provide monitoring requirements as input into the EMPr for faunal related issues.

Other pattern issues

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of **process**, the following will be identified or described:

- The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur within the grid connection corridor or within its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries).
- Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
- Furthermore, any further studies that may be required during or after the BA process will be outlined.
- All relevant legislation, permits and standards that would apply to the development will be identified.

- The opportunities and constraints for development will be described and shown graphically on an aerial photograph, satellite image or map delineated at an appropriate level of spatial accuracy.

1.2 RELEVANT ASPECTS OF THE DEVELOPMENT

A single power line alternative is considered in this assessment. The alignment of the corridor as assessed is a result of the proposed OHL being an extension of an already authorised 132kV OHL with the consequence that no alternative start points are possible. The end-point is the Hidden Valley substation, as this is the only substation in the vicinity with sufficient capacity to evacuate the power from the Gunstfontein Wind Farm. The proposed routing between the start- and end-points runs directly parallel to an already authorised 132kV OHL (the Soetwater-Hidden Valley OHL, currently under construction by Soetwater Wind Farm) in order to minimise the development corridor in the landscape. A more direct routing between the start- and end-point was initially considered, as this would have been shorter and more cost effective, however this would result in an additional disturbance corridor / servitude on the property, which is not preferred by the land owners. This option was therefore discounted and was not assessed further.

The details of the grid connection are as follows:

- » A 132kV double circuit power line extending from the already authorised 132kV Gunstfontein powerline, by-passing Heuwels (Soetwater) Substation and linking up to the Hidden Valley Substation, which will be the end point of the proposed 132kV double-circuit power line grid connection. The proposed 132kV double-circuit power line grid connection extension will be parallel and maintain a minimum spacing distance of approximately 15m in accordance with Eskom requirements away from an authorised powerline (currently under construction by Soetwater Wind Farm) that connects the Heuwels (Soetwater) and Hidden Valley substations. The proposed 132kV double-circuit power line grid connection extension will be approximately 7.5km long. Ancillary activities associated with the grid connection extension include establishment of a service track (jeep track) along the powerline routing, and laydown areas during construction.

The full length of the assessed 300m wide corridor and 200m assessment area at the start and end points around each substation traverses four (4) affected properties, namely:

- » Portion 1 of the Farm Orange Fontein 203;
- » RE of the Farm Annex Orange Fontein 185;
- » RE of the Farm Leeuwe Hoek 183; and
- » The Farm De Hoop 202.

It must be noted that the assessed corridor route is located directly adjacent (centreline of the corridor is ~15m away) and parallel to the approved Soetwater power line routing (this

powerline connects the Heuwels and Hidden Valley substations, and is currently under construction by Soetwater Wind Farm). The key infrastructure components proposed as part of the facility are described in greater detail in Chapter 2 of the BA Report. A detailed description of the proposed grid connection infrastructure is provided below.

Table 1.1: A detailed description of the grid connection corridor for the development of the proposed grid connection infrastructure for the Gunstfontein Wind Farm.

Province	Northern Cape Province
District Municipality	Namakwa District Municipality (DC6)
Local Municipality	Karoo Hoogland Municipality
Ward number(s)	3
Nearest town(s)	Sutherland (+/- 39km) Laingsburg (+/- 49km)
Affected Properties: Farm name(s), number(s) and portion numbers	Grid Connection Corridor (300m wide): <ul style="list-style-type: none"> » Portion 1 of the Farm Orange Fontein 203; » RE of the Farm Annex Orange Fontein 185; » RE of the Farm Leeuwe Hoek 183; and » The Farm De Hoop 202.
SG 21 Digit Code (s): Affected Properties	Grid Connection Corridor (300m wide): <ul style="list-style-type: none"> » Portion 1 of the Farm Orange Fontein 203 - C072000000000203000001 » RE of the Farm Annex Orange Fontein 185 - C07200000000018500000 » RE of the Farm Leeuwe Hoek 183 - C07200000000018300000 » The Farm De Hoop 202 - C07200000000020200000

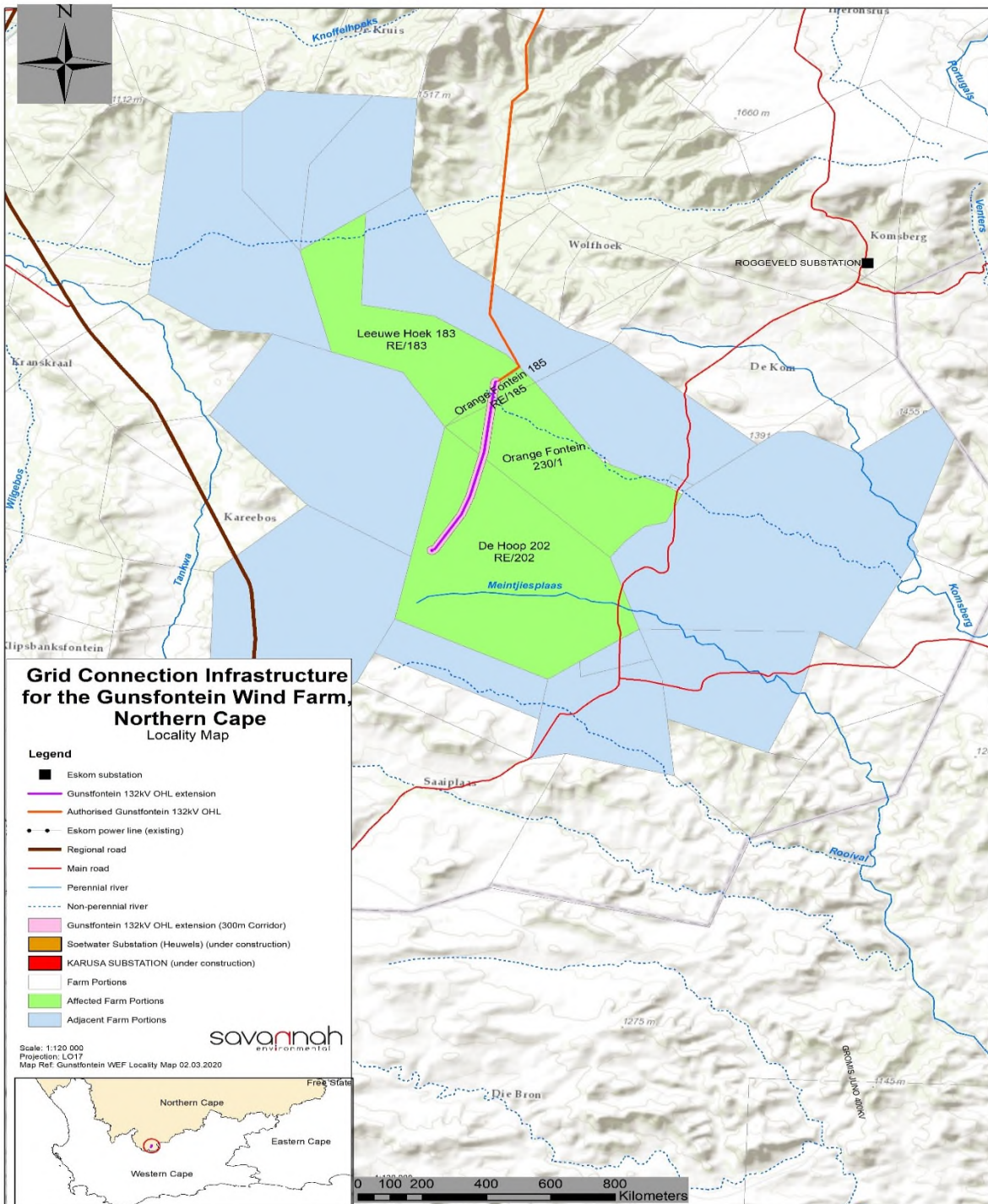


Figure. Map of the grid connection corridor showing the assessment corridor and layout of the grid connection between the two approved substations and running adjacent to the already approved Soetwater line.

2 METHODOLOGY

2.1 DATA SOURCING AND REVIEW

Data sources from the literature consulted and used where necessary in the study includes the following:

Vegetation:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina & Rutherford 2006 and 2018 update) as well as the National List of Threatened Ecosystems (2011), where relevant.
- Information on plant species recorded for the broad area around the site was extracted from the SANBI POSA database hosted by SANBI. The species list was derived from a considerably larger area than the study site, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself or the immediate area has not been well sampled in the past.
- The IUCN conservation status of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2020).

Ecosystem

- Critical Biodiversity Areas (CBAs) were extracted from the Northern Cape Critical Biodiversity Areas Map (Oosthuysen & Holness 2016 (latest update as available on BGIS)).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment (NFEPA) (Nel et al. 2011).
- Important catchments and protected areas expansion areas were extracted from the Northern Cape Protected Areas Expansion Strategy 2016 (NC-PAES).

Fauna

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and Animal Demography Unit (ADU) Virtual Museum spatial database (<http://vmus.adu.org.za/>).
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- Apart from the literature sources, additional information on fauna was extracted from the ADU web portal <http://vmus.adu.org.za>
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.

- The conservation status of mammals is based on the IUCN Red List Categories (EWT/SANBI 2016), while reptiles are based on the South African Reptile Conservation Assessment (Bates et al. 2013) and amphibians on Minter et al. (2004) as well as the IUCN (2020).

Apart from the above sources, a variety of previous specialist studies conducted for the area were interrogated to inform the current project. This includes the BAR for the Soetwater-Karusa OHL as well as the original specialist and walk-down studies conducted for the Hidden Valley WEF.

2.2 SITE VISIT

The assessment corridor (grid corridor) was sampled over two days, with the southern half of the line being sampled on the 2nd of August 2020 and the northern section of the power line on the 7th of August 2020. During the site visit, the different biodiversity features, habitat, and landscape units present at the site were investigated in the field. During the site visit, all plant and animal species observed within the assessment corridor were recorded.

2.3 SENSITIVITY MAPPING & ASSESSMENT

An ecological sensitivity map of the development area was produced by integrating data collected during the site survey with the available ecological and biodiversity information available in the literature and various spatial databases with mapping based on the satellite imagery and personal knowledge of the area. This includes delineating different habitat units identified on the satellite imagery and assigning likely sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. Most types of development can proceed within these areas with little ecological impact.
- **Medium** – Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area.

These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible.

2.4 SAMPLING LIMITATIONS AND ASSUMPTIONS

This study is based on a field assessment as well as a desktop review of the available information, including the ecological study for the adjacent Soetwater-Hidden Valley powerline. The major potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. However, this is rarely possible due to time and cost constraints and therefore, the representivity of the species sampled at the time of the site visit should be critically evaluated.

The site visit for the current study took place in spring, near the optimal time for such a visit. As such, the abundance of geophytes, annuals and forbs was high and the presence of species of conservation concern at the site could be well documented. It is not likely that additional site visits and field assessment would significantly alter the results of the study as the current baseline is adequate to describe the site at an appropriate level of detail. The timing and duration of the site visit, is therefore not seen as a significant limitation for the current study and is not considered to be a limiting factor which might compromise the results in any way.

The lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. Several site visits have been conducted during various seasons to the broader area and information on fauna observed in the area is included where relevant. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

3.1 BROAD-SCALE VEGETATION DESCRIPTION

According to the national vegetation map (Mucina & Rutherford 2006/2018), there are two vegetation types within the affected area Central Mountain Shale Renosterveld and Tanqua Escarpment Shrubland (Figure 2). The power line is however restricted entirely to the

Central Mountains Shale Renosterveld vegetation type. Central Mountain Shale Renosterveld occurs in the Western and Northern Cape on the southern and southeastern slopes of the Klein Roggeveldberge and Komsberg, below the Komsberg section of the Great Escarpment, as well as farther east below Besemgoedberg and Suurkop and in the west in the Karookop area. It is associated with clayey soils overlying Adelaide Subgroup mudstones and subordinate sandstones with land types mostly Ib and Fc. Although this vegetation type is classified as Least Threatened, it has a very limited extent of 1236km² and is not formally conserved anywhere. Levels of transformation are however low and it is considered to be 99% intact. Although no endemic species are known to occur within this vegetation type, little is known about this Renosterveld type and it has been poorly sampled. Experience from this and other projects in the area indicate that this should be considered to be a relatively sensitive vegetation type with a relatively high abundance of species of conservation concern.

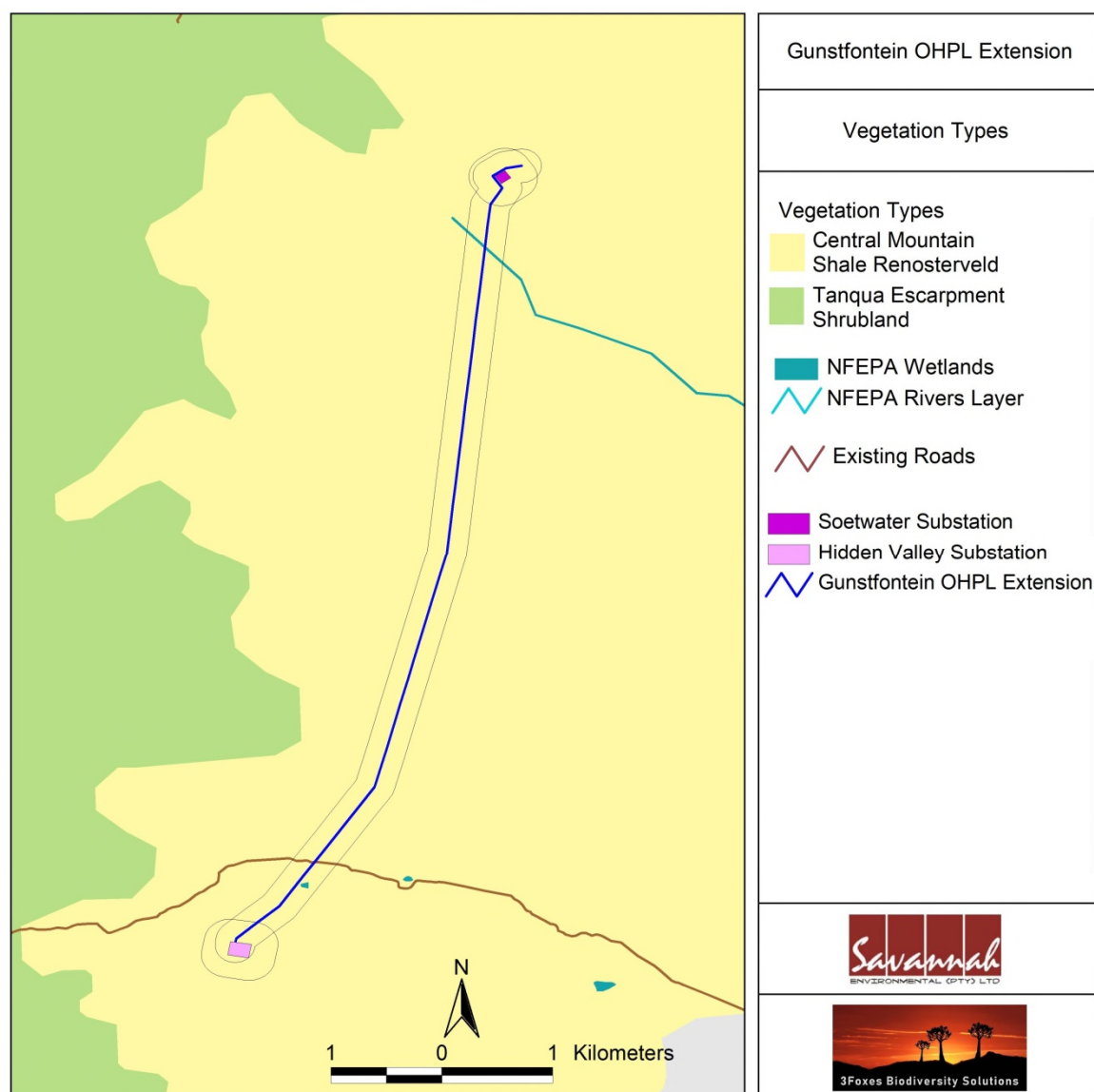


Figure 1. Broad-scale overview of the vegetation in and around the Gunstfontein WEF Grid Connection. The vegetation map is an extract of the national vegetation map (Mucina & Rutherford 2006 & 2016 update) and also includes drainage lines delineated by the NFEPA assessment (Nel et al. 2011).

3.2 FINE-SCALE VEGETATION DESCRIPTION

There are three main communities present within the Central Mountain Shale Renosterveld along the corridor with easily discernable plant communities present as well as a few localized specialized habitats. The recognizable plant communities which characterise the area include rocky hills and uplands, sandy lowlands and finally drainage lines and wetland communities. Typical and dominant species within the rocky uplands includes shrubs such as *Dicrothamnus rhinocerotis*, *Euryops lateriflorus*, *Oedera genistifolia*, *Montinia*

caryophyllacea, *Pteronia paniculata*, *Eriocephalus africanus* var. *paniculatus*, *Euryops multifidus*, *Pteronia aspalatha*, *Rosenia spinescens*, *Eriocephalus punctulatus*, *Hermannia cuneifolia* and *Ruschia centrocapsula*; grasses such as *Merxmüllera stricta*, *Ehrharta calycina* and *Pentastichistis eriostoma*. Succulents are common especially on north-facing rocky outcrops as well as on localised areas of exposed bedrock, which forms a specialised habitat within this community. Common succulents include *Tylecodon wallichii*, *T. ventricosus*, *Antimima pumila*, *Hammeria salteri*, *Cheiridopsis namaquensis*, *Crassula deltoidea*, *C. columnaris*, *Adromischus filicaulis* and *Pelargonium carnosum*. Geophytes are common in wetter areas and include *Romulea atrandra*, *Drimia altissima*, *Drimia uranthera*, *Romulea tortuosa*, *Hesperantha acuta*, *Moraea fugax* and *Haemanthus coccineus*. Relatively speaking the abundance of plant species of concern in these areas is relatively low, but still numerous red-listed species can be encountered including *Eriocephalus grandiflorus* (Rare), *Bulbine torta* (Rare), *Duvalia parviflora* (VU) and *Pelargonium torulosum* (Rare).



Figure 2. Looking down the corridor towards the Hidden Valley substation, which is the termination of the proposed Gunstfontein grid extension. The vegetation consists of typical Central Mountain Shale Renosterveld in the foreground, with an area of previously transformed croplands below the substation site.

The lower-lying areas on deeper soils generally have well-developed woody shrub layer consisting of species such as *Dicerothamnus rhinocerotis*, *Euryops lateriflorus*, *Oedera genistifolia*, *Pteronia glauca*, *Pteronia incana*, *Ruschia cradockensis*, *Pteronia sordida*, *Pentzia incana*, *Eriocephalus ericoides* var. *ericoides*, *Hermannia cuneifolia*, *Dimorphotheca*

cuneata, *Rosenia oppositifolia*, *Asparagus capensis* and *Chrysocoma ciliata*. Other common species include the grasses *Ehrharta calycina* and *Merxmüllera stricta* and the succulent *Ruschia centrocapsula*, *Euphorbia decussata* and *Euphorbia mauritanica*. Listed species present and which are confirmed present include *Cleretum lyratifolium* (Rare), *Ehrharta eburnea* (NT), *Drimia uranthera* (Rare) and *Drimia altissima* (Declining).



Figure 3. Looking south along the grid corridor from near the Soetwater substation. Showing the typical vegetation along the power line route, which is almost entirely associated with shallow stony soils.

The larger drainage lines of the area are dominated by low trees such as *Searsia lancea*, *S.longispina*, *Diospyros austroafricana* and *D.lycioides*. Common shrubs found along these drainage lines include *Galenia africana*, *Dimorphotheca cuneata* and *Euryops lateriflorus*. Geophytes are common in and around the drainage lines and wetlands and include species such as *Romulea atrandra*, *Romulea tortuosa*, *Colchicum coloratum*, *Colchicum cuspidatum*, *Brunsvigia bosmaniae*, *Haemanthus coccineus*, *Oxalis obtusa*, *Oxalis palmifrons*, *Spiloxene capensis* and *S.serrata*. Annuals such as *Heliophila cornuta*, *H.deserticola*, *Grielum humifusum*, *Sebaea pentandra*, *Hemimeris racemosa*, *Manulea latiloba*, *Lasiospermum pedunculare*, *L.brachyglossum*, *Cotula leptalea* and *C.burchellii* are abundant. Species of concern can be common in this habitat and includes *Brunsvigia josephinae* (VU) and *Romulea komsbergensis* (NT).



Figure 4. Minor drainage line along the power line route, north of the Hidden Valley substation. There is little specialised riparian vegetation as the soils are generally shallow and there is little accumulation of silt along the drainage lines.

3.3 LISTED AND PROTECTED PLANT SPECIES

It is important to note that the site falls within the Komsberg Centre of Diversity and Endemism and as such is an area with a known high abundance of species of concern and endemism. A list of species of conservation concern recorded from the wider area is provided in Annex 1. Species of concern observed at the site includes *Drimia altissima* (Declining), *Eriocephalus grandiflorus* (Rare), *Cleretum lyratifolium* (Rare) and *Ehrharta eburnea* (NT), which all tend to be quite widespread. Although it is likely that the development would generate some impact on these species, this would be minor as there are no parts of the route where there are particularly important or large populations of these species and it is highly unlikely that the local populations would be compromised in any way by the development. With micro-siting of the pylons and search and rescue of individuals of high conservation concern that cannot be avoided, the impact of the development on Species of Conservation Concern would be low.

In terms of the provincial legislation the following species and genera are protected and would require specific consideration during the pre-construction walk-through of the power line footprint. The example species provided are to illustrate the typical species present and is not intended as an exhaustive list.

Schedule 1 (Specially Protected Species):

- All species of the genus *Pelargonium* (Family: Geraniaceae) (e.g. *Pelargonium carnosum*)

Schedule 2 (Protected Species):

- All species of the family Mesembryanthemaceae: (e.g. *Antimima pumila*, *Hammeria salteri*, *Cheiridopsis namaquensis*, *Lampranthus* spp., *Cleretum papulosum* subsp. *papulosum*, *Drosanthemum* spp., *Ruschia centrocapsula*)
- All species of the family Amaryllidaceae: (e.g. *Brunsvigia* spp (*B. bosmaniae*), *Haemanthus coccineus*)
- All species of the genus *Colchicum* (Family Colchicaceae): e.g. (*Colchicum coloratum*, *C. Cuspidatum*).
- All species of the family Crassulaceae; e.g. (*Tylecodon wallichii*, *T. ventricosus*, *Crassula deltoidea*, *C. columnaris*, *C. muscosa*, *C. umbella*, *C. glomerata*, *Adromischus filicaulis*)
- All species of the family Iridaceae: (e.g. *Romulea atrandra*, *R. tortuosa*, *komsbergensis*, *Hesperantha acuta*, *Moraea fugax*)
- All species of the genus *Oxalis* (Family: Oxalidaceae): (e.g. *Oxalis obtusa*, *O. melanostica*, *O. palmifrons*)
- All species of the genus *Lachenalia* (Family: Hyacinthaceae): (e.g. *Lachenalia aurioliae*)

It is recommended that a Pre-construction Walk-Through Survey is conducted along the finalized power line route, to inform final micro-siting and search-and-rescue efforts. The location of the pylons and the service road is investigated for the presence of these protected species as well as sensitive micro-habitats. These species should be recorded and may only be removed, transplanted, destroyed (or any other form of disturbance) after the necessary approval (permits) has been obtained from the relevant authority, i.e. the Northern Cape Department of Environment and Nature Conservation. It is also important to note that species of ecological importance, local endemics and red-listed species should be translocated out of the development footprint, where these have a high probability of survival.

3.4 FAUNAL COMMUNITIES

Mammals

The Gunstfontein power line extension route is likely to have moderate mammalian species richness. The site falls within or near the edge of the distribution range of at least 44

terrestrial mammals. The ridges, hills and uplands of the area, with rocky outcrops, rocky bluffs and cliffs provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Hewitt's Red Rock Hare *Pronolagus saundersiae*, Namaqua Rock Mouse *Micaelamys namaquensis* and Rock Hyrax, *Procavia capensis*. Larger species commonly observed on high-lying ground of the area include Grey Rhebok, *Pelea capreolus* (Near Threatened) and Klipspringer, *Oreotragus oreotragus*. The introduced Fallow Deer, *Dama dama* is also common in the area and is likely to occur at the site. The lowlands of the area are home to species associated with more densely-vegetated lowland habitats on deeper soils and along drainage lines and floodplains, which includes Brants's Whistling Rat *Parotomys brantsii*, the Bush Vlei Rat *Otomys unisulcatus*, Hairy-footed Gerbil *Gerbillurus paeba* and Common Duiker *Sylvicapra grimmia*.

Listed species which do or may occur at the site include the, Grey Rhebok (Near Threatened) Black-footed Cat *Felis nigripes* (Vulnerable), Leopard *Panthera pardus* (Near Threatened) and Riverine Rabbit *Bunolagus monticularis* (Critically Endangered). Except for the Riverine Rabbit, all of these species have relatively large ranges across South Africa and the development of the power line would not result in a significant habitat loss for these species. Although the Riverine Rabbit *Bunolagus monticularis* is known to occur in the wider area, it is not currently known from the affected area and if present would likely be restricted to the larger drainage systems in the lowlands and it is highly unlikely that it is present in the area affected by the proposed power line extension. Due to the low footprint of the proposed power line within this area, it is not likely that there would be any significant degree of habitat loss for mammals as a result of the construction and operation of the power line.

Overall there do not appear to be any significant issues regarding mammals and the development of Gunstfontein WEF Grid Connection extension. In general, the major impact associated with the development of Gunstfontein WEF Grid Connection extension for mammals would be some minor habitat loss and disturbance during construction and operation.

Reptiles

According to the distribution maps available in the literature, as many as 52 reptiles could occur within the assessed powerline corridor or in the general vicinity of the site. However, according to the records within the SARCA database, only 34 have been recorded in the area. This is most likely the result of poor sampling in the area, which can be attributed to limited access possibilities in the area and the remote nature of this area. In terms of species of conservation concern, the only listed species recorded in the area is the Karoo Padloper *Homopus boulengeri* which is listed as Near Threatened.

Species commonly observed in the area on previous field assessments include the Karoo Tent Tortoise *Psammobates tentorius tentorius*, Angulate Tortoise *Chersina angulata*, Puff Adder *Bitis arietans*, Karoo Girdled Lizard *Cordylus polyzonus*, Southern Rock Agama *Agama atra*, Namaqua Plated Lizard *Gerrhosaurus typicus*, Cape Skink *Mabuya capensis*, Variegated Skink *Trachylepis variegata*, Common Sand Lizard *Pedioplanis lineocellata pulchella* and Cape Cobra *Naja nivea*. Although there are a variety of different habitats present, the generally intact nature of the area means that most habitats have associated reptiles. Habitats of specific sensitivity include drainage lines and vleis and the rocky bluffs and cliffs of the site.

In terms of impacts of the development on reptiles, the major impact is likely to come from disturbance during the construction phase which would be transient and localised and consequently of low long-term consequence.



Figure 5. Common reptiles observed at the site include from top left include the Variegated Skink, Common Sand Lizard, Ground Agama and Karoo Girdled Lizard.

Amphibians

Only seven amphibians are likely to occur in the area, indicating that the frog diversity of the site is likely to be low. No listed species are likely to occur in the area. All of the species recorded in the area are widespread species of low conservation concern.

Species such as the Cape River Frog *Amietia fuscigula* occur along the larger drainage lines in pools and in the farm dams of the area. Species such as Karoo Caco *Cacosternum karoicum*, Karoo Toad *Vandijkophrynus gariepensis* and Cape Sand Frog *Tomopterna delalandii* are less dependent on water and are likely to be more widespread across the site. Given the aridity or unsuitable steep nature of large parts of the corridor, the most important parts of the corridor for amphibians is the vicinity of the larger drainage lines and wetlands.

Given the low likely abundance of amphibians within the area, impacts on amphibians are likely to be localised and of a low significance.

3.5 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

An extract of the Northern Cape Critical Biodiversity Areas map for the broader study area is depicted below in Figure 6. The southern half of the power line extension falls within an area classified as CBA 1, while the northern half is classified as CBA 2. Development within CBAs is undesirable and can potentially lead to loss of biodiversity and negatively affect ecological processes. The impact of the current proposed power line would be mediated by the location of the line adjacent to an authorised power line currently under construction, which would minimise the extent of additional disturbance, while the low overall footprint of the power line would be very unlikely to compromise the ecological functioning of the CBAs in any way. The corridor does not lie within an area identified as a priority area for future conservation expansion under the Northern Cape PAES.

The extent of habitat loss within the CBA resulting directly from the current project would be low and is not expected to generate significant impacts on the affected CBAs. However, the site falls within the project area of the Karusa and Soetwater wind farms (part of the Hidden Valley wind farm cluster) which are both under construction, with the result that cumulative impacts on CBAs are a concern in the area. However, the grid connection extension itself would make a minimal/ negligible contribution to cumulative CBA impacts.

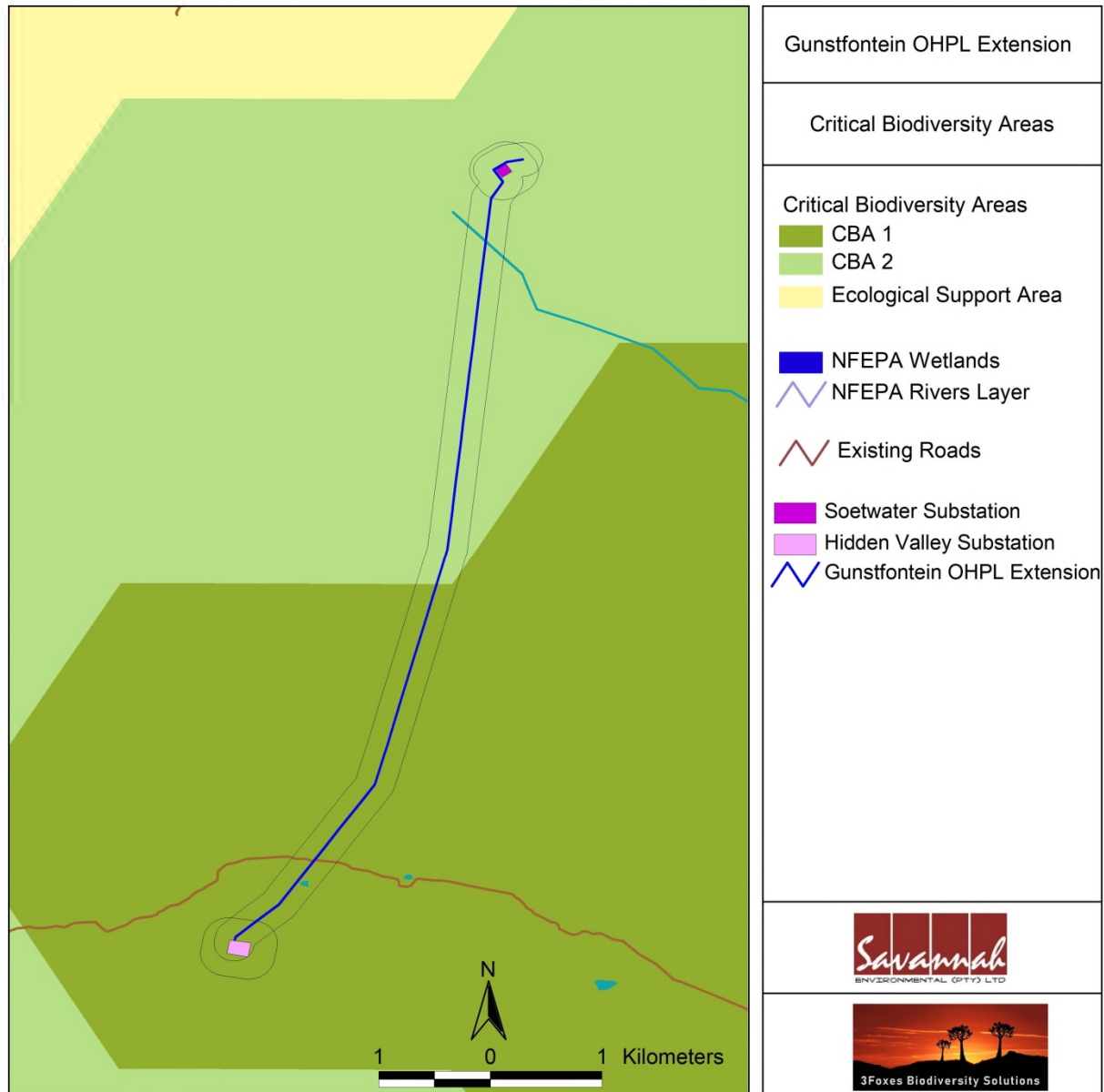


Figure 6. Extract of the Northern Cape Critical Biodiversity Areas map for the broader study area, showing that the power line extension occurs within areas classified as CBA 1 and CBA 2. Grey outlines represent the assessment footprint.

3.6 CURRENT BASELINE & CUMULATIVE IMPACT

There is a large amount of wind energy development in the area between Sutherland and Matjiesfontein. This is certainly likely to disproportionately affect the high-lying habitats of the area, which usually experience the majority of the footprint associated with wind energy development in the area. The site falls directly within the project areas of the Karusa and Soetwater wind farms which are currently under construction and is also immediately adjacent to the approved Great Karoo wind farm. As these are existing developments, they

are considered to represent part of the cumulative impact baseline for the area. The primary concern associated with the current development would be the additional contribution of the power line extension to cumulative impacts in the area. The footprint of the power line extension is estimated at approximately 7,5ha during construction, which would be significantly reduced once the pylon footprint areas have recovered. In context of the generally intact nature of the area, this is seen as a very low contribution. As a result, the contribution of the current proposed grid connection infrastructure to overall cumulative impact from wind farm and grid infrastructure development in the area is low and is considered acceptable.

3.7 SITE SENSITIVITY ASSESSMENT

The sensitivity map for the corridor and substation buffer areas is illustrated below in Figure 7. The majority of the corridor is typical Central Mountain Shale Renosterveld considered to be medium ecological sensitivity. There are numerous small wetlands and drainage lines along the route that are considered to be high ecological sensitivity. In the southern part of the grid corridor, the route traverses some steep terrain which is also considered high sensitivity on account of the vulnerability of this area to disturbance. Although there are several wetland features along the route, these would be easily avoided by the power line as they are narrow enough to be spanned. The ground over most of the route is rocky ground with shallow soils. These areas are quite resilient to disturbance with the result that the pylon disturbance footprints should recover well and the long-term extent of habitat loss would be low. There are no-go areas along the grid corridor, although no pylons should be located within the areas classified as Very High sensitivity.

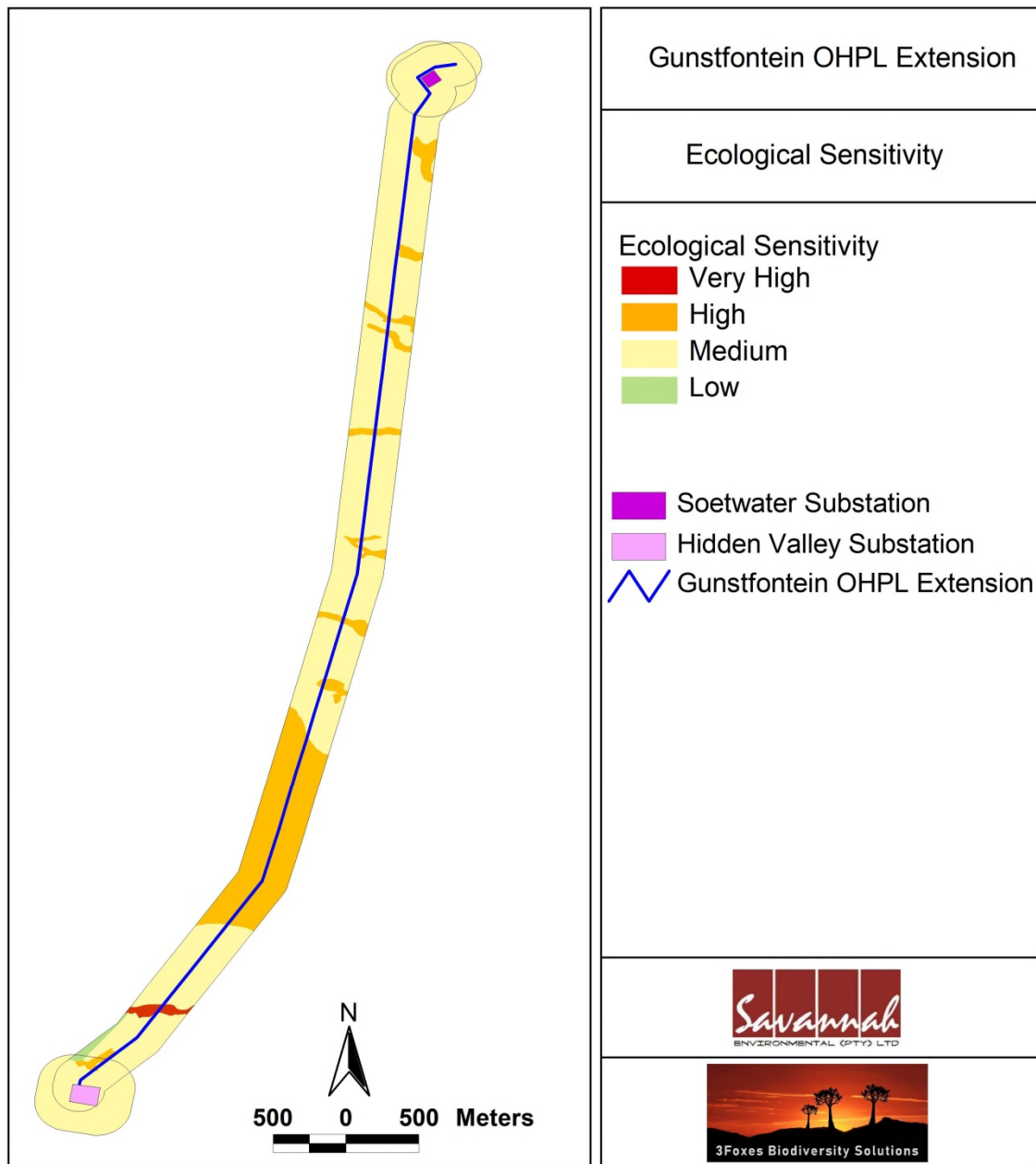


Figure 7. Sensitivity map for the Gunstfontein WEF Grid Connection extension corridor.

4 IDENTIFICATION & NATURE OF IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the development are identified and discussed before being assessed in the next section.

4.1 IDENTIFICATION OF IMPACTS

In this section the potential impacts associated with the establishment of the Gunstfontein WEF Grid Connection extension are explored in context of the features and characteristics of the development area, the likelihood and extent to which each impact would occur given the characteristics of the development area, and the extent and nature of the development.

Impacts on vegetation and protected plant species

Several protected species occur in the area and which are likely to be impacted by the development of the Gunstfontein WEF Grid Connection Extension. Vegetation clearing during the construction phase will lead to the loss of currently intact habitat within the corridor and is an inevitable consequence of the establishment of the Gunstfontein WEF Grid Connection Extension. As this impact is certain to occur during the construction phase, it is assessed for the construction phase only, as this is when the impact will occur, although the consequences will persist for some time after construction has been completed.

Direct faunal impacts

Increased levels of noise, pollution, disturbance and human presence during the construction phase will be detrimental to fauna. Sensitive and shy fauna would move away from the development area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during the construction phase and this impact is therefore assessed for the construction phase only.

Habitat Degradation due to Erosion and Alien Plant Invasion

Disturbance within the grid connection corridor generated during the construction phase will leave the area vulnerable to erosion and alien plant invasion, which would lead to degradation of the local environment. Although, the disturbance would be created during the construction phase, the major impacts would manifest during the operation phase.

Impact on CBAs and NPAES Focus Areas

The development would have an impact on an area classified as CBA 1 and CBA 2. However, the grid connection corridor is not within an NPAES Focus Area, indicating that it has not been identified as being of high significance for future conservation expansion. The impact on the CBAs is assessed as part of the cumulative impacts associated with the development.

5 ASSESSMENT OF IMPACTS

The various identified impacts are assessed below for the different phases of the development.

5.1 PLANNING & CONSTRUCTION PHASE

Impact 1. Impacts on vegetation and listed or protected plant species resulting from power line construction activities

Impact Nature: Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the power line and association infrastructure.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (3)	Medium-term (2)
Magnitude	Low (3)	Low (2)
Probability	Highly Likely (4)	Highly Likely (4)
Significance	Low (28)	Low (20)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	This impact cannot be well mitigated because some loss of vegetation is unavoidable and is a certain outcome of the development.	
Mitigation	<ul style="list-style-type: none"> • Pre-construction walk-through of the final layout and corridor in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions. • Search and rescue for identified species of concern before construction. • Vegetation clearing to commence only after walk-through has been conducted and necessary permits obtained. • Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc. • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near the drainage lines and wetlands. 	

	<ul style="list-style-type: none"> • Vegetation clearing along the power line route should be kept to a minimum. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. • Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.
Cumulative Impacts	The Gunstfontein WEF Grid Connection Extension will contribute to cumulative impacts on habitat loss and transformation in the area, but the contribution would be very low.
Residual Risks	The loss of currently intact vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would however be low.

Impact 2. Direct Faunal Impacts Due to Construction Activities

Impact Nature: Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction. This will however be transient and restricted to the construction phase.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low to Medium (4)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (15)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Partly, although noise and disturbance cannot be well mitigated, impacts on fauna due to human presence such as poaching can be mitigated.	
Mitigation	<ul style="list-style-type: none"> • All personnel should undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition. • Any fauna threatened by the construction activities should be removed to safety by an appropriately qualified environmental officer. • All construction vehicles should adhere to a low speed limit on site (40km/h max) to avoid collisions with susceptible species such as 	

	<p>snakes and tortoises.</p> <ul style="list-style-type: none"> All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. If holes or trenches need to be dug for pylons or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Holes should only be dug when they are required and should be used and filled shortly thereafter.
Cumulative Impacts	During the construction phase the activity would contribute to cumulative fauna disturbance and disruption in the area, but this would be short lived and little long-term impact would be generated.
Residual Risks	It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

5.2 OPERATIONAL PHASE IMPACTS

Impact 1. Faunal Impacts due to Operation

Impact Nature: The operation and maintenance of the Gunstfontein WEF Grid Connection Extension may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (21)	Low (14)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To a large extent, but some low-level residual impact due to noise and human disturbance may occur during maintenance activities.	
Mitigation	<ul style="list-style-type: none"> Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel 	

	<p>and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.</p> <ul style="list-style-type: none"> All vehicles accessing the site should adhere to a low speed limit on site (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
Cumulative Impacts	The development would contribute to cumulative disturbance for fauna, but the contribution would be very low and is not considered significant.
Residual Risks	Disturbance from maintenance activities will occur at a low and infrequent level with the result that no long-term impacts are expected to occur.

Operational Impact 2. Habitat Degradation due to Erosion and Alien Plant Invasion

Impact Nature: Disturbance created during the construction phase will leave the development area vulnerable to erosion and alien plant invasion for several years into the operation phase.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Long-term (3)
Magnitude	Medium Low (3)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (12)
Status	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation	<ul style="list-style-type: none"> Erosion management within the development area should take place according to the Erosion Management Plan and Rehabilitation Plan. Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. Regular monitoring for erosion during operation to ensure that no erosion problems have developed as a result of the disturbance, as per the Erosion Management and Rehabilitation Plans for the project. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. There should be follow-up rehabilitation and re-vegetation of any remaining bare areas with indigenous perennial shrubs and succulents from the local area. Alien management at the site should take place in accordance with 	

	<p>the Alien Invasive Management Plan.</p> <ul style="list-style-type: none"> Regular monitoring for alien plant proliferation during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance, as per the Alien Invasive Management Plan for the project. Woody alien plant species should be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present.
Cumulative Impacts	Erosion and alien plant invasion would contribute to degradation in the area, but as this can be well-mitigated, the contribution can be minimised.
Residual Risks	Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact.

5.3 DECOMMISSIONING PHASE

Decommissioning Phase Impact 1. Habitat Degradation due to Erosion and Alien Plant Invasion

Impact Nature: Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (3)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (24)	Low (12)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation	<ul style="list-style-type: none"> Erosion management within the development area should take place in accordance with the Erosion Management and Rehabilitation Plan. This should make provision for monitoring of the development area for at least 3 years after the decommissioning phase. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and 	

	<p>trees from the local area, for at least 3 years after decommissioning.</p> <ul style="list-style-type: none"> Alien management at the site should take place according to the Alien Invasive Management Plan. This should make provision for alien monitoring and management annually for at least 3 years after decommissioning. Woody aliens should be controlled using the appropriate alien control techniques as determined by the species present. This might include use of herbicides where no practical manual means are feasible.
Cumulative Impacts	Erosion and alien plant invasion would contribute to degradation in the area, but as this can be well-mitigated, the contribution can be minimised.
Residual Risks	Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.

Decommissioning Phase Impact 2. Direct Faunal Impacts Due to Decommissioning Activities

<p>Impact Nature: Due to disturbance, noise and the operation of heavy machinery, faunal disturbance due to decommissioning will extend beyond the footprint and impact adjacent areas to some degree. This will however be transient and restricted to the period while machinery is operational. In the long term, decommissioning should restore the ecological functioning and at least some habitat value to the affected areas.</p>		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Minor (3)
Probability	Probable (3)	Probable (3)
Significance	Low (18)	Low (15)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	<p>Although the noise and disturbance generated at the site during decommissioning is probably largely unavoidable, this will be transient and ultimately the habitat should be restored to something useable by the local fauna.</p>	
Mitigation	<ul style="list-style-type: none"> All personnel should undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition. 	

	<ul style="list-style-type: none"> Any fauna threatened by the decommissioning activities should be removed to safety by an appropriately qualified environmental officer. All vehicles should adhere to a low speed limit on site (30km/h for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site and ultimately removed from the site as part of decommissioning. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. The site should be rehabilitated with locally occurring species to restore ecosystem structure and function.
Cumulative Impacts	During the decommissioning, the associated disturbance would contribute to cumulative fauna disturbance and disruption in the area, but this would be transient and not of long-term impact.
Residual Risks	Although some components of disturbance cannot be avoided, the site itself would have low faunal abundance at decommissioning and no significant residual impacts are likely.

5.4 CUMULATIVE IMPACTS

The following are the cumulative impacts assessed as being a likely consequence of the development of the Gunstfontein WEF Grid Connection Extension. This is assessed in context of the extent of the proposed development area, other developments in the area, as well as general habitat loss and transformation resulting from agriculture and other activities in the area.

Cumulative Impact 1. Impact on CBAs and broad-scale ecological processes

Nature: The development of Gunstfontein WEF Grid Connection Extension will contribute to cumulative habitat loss within CBAs and other broad-scale cumulative impacts on ecological processes in the wider Roggeveld area.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Moderate (6)
Probability	Improbable (2)	Probable (3)

Significance	Low (14)	Medium (36)
Status	Negative	Negative
Reversibility	High	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated	To some degree, but the majority of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation: <ul style="list-style-type: none">• Ensure that sensitive habitats such as drainage features, pans and quartz patches are not within the development footprint.• Ensure that an alien invasive management plan and erosion management plan compiled for each project are effectively implemented at the site.		

6 CONCLUSION & RECOMMENDATIONS

The vegetation within the Gunstfontein WEF Grid Connection Extension corridor consists of Central Mountains Shale Renosterveld which is considered to represent a moderately sensitive vegetation type due to its low total extent and relatively high abundance of plant SCC. Some impact on plant SCC would occur as a result of habitat loss associated with the development, but with the appropriate mitigation (pre-construction walk-through), this is highly unlikely to compromise the local populations of any species. In terms of fauna, there are few species of conservation concern that are likely to be present or abundant at the site and the primary impact of the development on fauna would be minor habitat loss for the more common resident species. As such, no high long-term post-mitigation impacts on fauna are expected to occur. Consequently, the impacts of the development on fauna and flora are considered acceptable and would be of low significance after mitigation.

Although direct impacts on fauna and flora are considered potentially acceptable, the whole power line route falls within areas that have been classified as CBA 1 and CBA 2. As these are areas that have been identified as being of significance for biodiversity maintenance and ecological processes, development in these areas is undesirable. The footprint of the development would be less than 8ha and would also run adjacent to an existing power line, with the result that the additional extent of disturbance and habitat loss would be low. As a result, the low overall footprint of the line would be very unlikely to compromise the ecological functioning of the affected CBAs in any way.

Cumulative impacts within the broader study area are of potential concern due to the proliferation of WEF energy development in the wider Roggeveld area. The contribution of the power line would however be very minor and is not considered to represent a significant

contributor to cumulative impact in the area. Cumulative impacts associated with the development of the power line are therefore considered acceptable.

Impact Statement

There are no impacts associated with the establishment of Gunstfontein WEF Grid Connection Extension that cannot be mitigated to a low significance. Although cumulative impacts in the area are a concern due to the high density of wind energy developments in the area, the contribution of the Gunstfontein Grid Connection Extension would be low and is not considered to be of significance. As such, there are no fatal flaws or high post-mitigation impacts that should prevent the development from proceeding. Based on the layout provided for the assessment, the Gunstfontein WEF Grid Connection Extension can be supported from a terrestrial ecology point of view.

7 Activities for Inclusion into the EMPr

An Environmental Management Programme (EMPr) provides a link between the predicted impacts and mitigation measures recommended within the BA and the implementation and operational activities of a project. As the construction and operation of the Gunstfontein WEF Grid Connection Extension may impact the environment, activities that pose a threat should be managed and mitigated so that unnecessary or preventable environmental impacts do not result. The primary objective of the EMPr is to detail actions required to address the impacts identified in the BA during the establishment, operation and rehabilitation of the proposed infrastructure. The EMPr provides an elaboration of how to implement the mitigation measures documented in the BA. As such the purpose of the EMPr can be outlined as follows:

- To outline mitigation measures and environmental specifications which are required to be implemented for the planning, establishment, rehabilitation and operation/maintenance phases of the project in order to minimise and manage the extent of environmental impacts.
- To ensure that the establishment and operation phases of the grid connection do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- To propose mechanisms for monitoring compliance, and preventing long-term or permanent environmental degradation.
- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the BA process

Below are the ecologically-orientated measures that should be implemented as part of the EMPr for the development to reduce the significance or extent of the above impacts. The measures below do not exactly match with the impacts that have been identified, as certain mitigation measures, such as limiting the loss of vegetation may be effective at combating several different impacts, such as erosion, faunal impact etc.

Construction Phase Activities

Objective: Limit disturbance of vegetation and loss of protected flora during construction		
Potential Impact	Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants.	
Activity/risk source	Vegetation clearing for the following <ul style="list-style-type: none"> » Clearing for infrastructure establishment. » Access roads. » Laydown areas. » Construction Camps. 	
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Low footprint and low impact on terrestrial environment. » Low impact on protected plant species. 	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> » Preconstruction walk-through of powerline routing must inform final micro-siting and search-and-rescue efforts. » Obtain relevant permits from the Department of Agriculture, Forestry and Fisheries (DAFF) and the Northern Cape Department of Environment and Nature Conservation (DENC) prior to any construction activities at the site. » Affected individuals of selected protected species which cannot be avoided should be translocated to a safe area on the site prior to construction. This does not include woody species which cannot be translocated and where these are protected by DAFF and a permit for their destruction would be required. » Erosion control measures should be implemented in areas where slopes have been disturbed. » Revegetation of cleared areas or monitoring to ensure that recovery is taking place. » Alien plant clearing where necessary. 	Management/ECO	Construction & Operation
Performance Indicator	<ul style="list-style-type: none"> » Vegetation loss restricted to infrastructure footprint. » Low impact on protected plant species. » Permit obtained to destroy or translocate affected individuals of protected species. 	

Monitoring	<p>ECO to monitor construction to ensure that:</p> <ul style="list-style-type: none"> » Vegetation is cleared only within essential areas. » Erosion risk is maintained at an acceptable level through flow regulation structures where appropriate and the maintenance of plant cover wherever possible.
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Objective: Limit direct and indirect terrestrial faunal impacts during construction

Project component/s	<p>Construction activities especially the following:</p> <ul style="list-style-type: none"> » Vegetation clearing. » Human presence. » Operation of heavy machinery. 		
Potential Impact	Disturbance of faunal communities due to construction as well as poaching and hunting risk from construction staff.		
Activity/risk source	<ul style="list-style-type: none"> » Habitat transformation during construction. » Presence of construction crews. » Operation of heavy vehicles. 		
Mitigation: Target/Objective	Low faunal impact during construction.		
Mitigation: Action/control		Responsibility	Timeframe
<ul style="list-style-type: none"> » Environmental induction for all construction staff » ECO to monitor and enforce a ban on hunting, collecting etc. of all plants and animals or their products. » Any fauna encountered during construction should be removed to safety by the ECO or other suitably qualified person, or allowed to passively vacate the area. » All vehicles to adhere to low speed limits (40km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust. » All night-lighting should use low-UV type lights (such as HPS bulbs), which do not attract insects. The lights should also be directed downward to ensure they do not result in large amounts of light pollution. 		Management/ECO	Construction
Performance Indicator	<ul style="list-style-type: none"> » Low mortality of fauna due to construction machinery and activities. » No poaching etc of fauna by construction personnel during construction. » Removal to safety of fauna encountered during construction. 		
Monitoring	Monitoring for compliance during the construction phase. All incidents to be noted.		

Operational Phase Activities

OBJECTIVE: Limit the ecological footprint of the Gunstfontein WEF Grid Connection Extension			
Project component/s	Presence and operation of the facility including » Movement of vehicles to and from the site.		
Potential Impact	» Alien plant invasion » Erosion » Pollution » Faunal Impacts		
Activity/risk source	» Alien plant invasion in and around the road. » Unregulated runoff from the access road. » Human presence during road maintenance activities » Pollution from maintenance vehicles due to oil or fuel leaks etc. » Maintenance activities which may lead to negative impacts such as pollution, herbicide drift etc.		
Mitigation: Target/Objective	Low ecological footprint of the grid connection infrastructure during operation.		
Mitigation: Action/control		Responsibility	Timeframe
Vegetation control should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner.		Management/ Contractor	Operation
Annual monitoring for alien plant species - with follow up clearing as needed – or as per the frequency stated in the alien invasive management plan to be developed for the site.		Management/ Contractor	Operation
Annual site inspection for erosion or water flow regulation problems – with follow up remedial action where problems are identified.		Management/ Contractor	Operation
Performance Indicator	» No erosion problems experience on the site » Low abundance of alien plants.		
Monitoring	» Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken with photographs.		

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Appendix 1. Listed Plant Species

List of plant species of conservation concern which are known to occur in the broad vicinity of the Gunstfontein Wind Farm Grid Extension Corridor. The list is derived from the SIBIS:SABIF website.

Family	Species	Threat status
AMARYLLIDACEAE	<i>Brunsvigia josephinae</i> (Redouté) Ker Gawl.	VU
	<i>Strumaria karooica</i> (W.F.Barker) Snijman	Rare
	<i>Strumaria pubescens</i> W.F.Barker	Rare
ANTHERICACEAE	<i>Chlorophytum lewisiae</i> Oberm.	Rare
APOCYNACEAE	<i>Duvalia parviflora</i> N.E.Br.	VU
	<i>Hoodia pilifera</i> (L.f.) Plowes subsp. <i>pilifera</i>	NT
ASPHODELACEAE	<i>Astroloba herrei</i> Uitewaal	VU
	<i>Bulbine torta</i> N.E.Br.	Rare
	<i>Haworthia fasciata</i> (Willd.) Haw.	NT
	<i>Gasteria disticha</i>	CR
	<i>Haworthia serrata</i>	CR
	<i>Haworthia pulchella</i> M.B.Bayer var. <i>pulchella</i>	Rare
ASTERACEAE	<i>Cineraria lobata</i> L'Hér. subsp. <i>lasiocaulis</i> Cron	Rare
	<i>Antithrixia flavicoma</i>	VU
	<i>Euryops namaquensis</i>	VU
	<i>Eriocephalus grandiflorus</i> M.A.N.Müll.	Rare
	<i>Phymaspermum thymelaeoides</i>	LC
	<i>Pteronia hutchinsoniana</i> Compton	Rare
	<i>Relhania tricephala</i> (DC.) K.Bremer	NT
COLCHICACEA	<i>Wurmbea capensis</i>	VU
CRASSULACEAE	<i>Adromischus humilis</i> (Marloth) Poelln.	Rare
	<i>Adromischus phillipsiae</i> (Marloth) Poelln.	Rare
	<i>Adromischus mammillaris</i>	EN
	<i>Crassula alpestris</i> Thunb. subsp. <i>massonii</i> (Britten & Baker f.) Toelken	Rare
EUPHORBIACEAE	<i>Euphorbia nesemannii</i> R.A.Dyer	NT
FABACEAE	<i>Amphithalea spinosa</i> (Harv.) A.L.Schutte	VU
	<i>Amphithalea villosa</i> Schltr.	VU
	<i>Lotononis comptonii</i> B.-E.van Wyk	EN
	<i>Lotononis gracilifolia</i> B.-E.van Wyk	EN
	<i>Lotononis venosa</i> B.-E.van Wyk	VU
GERANIACEAE	<i>Pelargonium denticulatum</i> Jacq.	Rare
	<i>Pelargonium torulosum</i> E.M.Marais	Rare
HYACINTHACEAE	<i>Lachenalia maximiliani</i> Schltr. ex W.F.Barker	Rare
IRIDACEAE	<i>Geissorhiza inaequalis</i> L.Bolus	Rare
	<i>Geissorhiza karooica</i> Goldblatt	NT
	<i>Ixia linearifolia</i> Goldblatt & J.C.Manning	Rare

	<i>Ixia parva</i> Goldblatt & J.C.Manning	VU
	<i>Moraea aspera</i> Goldblatt	VU
	<i>Romulea eburnea</i> J.C.Manning & Goldblatt	VU
	<i>Romulea syringodeoflora</i> M.P.de Vos	VU
MESEMBRYANTHEMACEAE	<i>Cleretum lyratifolium</i> Ihlenf. & Struck	Rare
	<i>Lampranthus amoenus</i> (Salm-Dyck ex DC.) N.E.Br.	EN
OXALIDACEAE	<i>Oxalis tenuipes</i> T.M.Salter var. <i>tenuipes</i>	Rare
POACEAE	<i>Ehrharta eburnea</i> Gibbs Russ.	NT
POLYGALACEAE	<i>Muraltia karroica</i> Levyns	VU
RUTACEAE	<i>Acmadenia argillophila</i> I.Williams	NT
SCROPHULARIACEAE	<i>Globulariopsis wittebergensis</i> Compton	Rare
	<i>Oftia glabra</i> Compton	Rare
	<i>Selago albomontana</i> Hilliard	Rare

Appendix 2. List of Mammals

List of Mammals which potentially occur in or near the Gunstfontein Grid extension Corridor site. Taxonomy and habitat notes are derived from Skinner & Chimimba (2005), while conservation status is according to the EWT/SANBI 2016 listing. Confirmed sightings are those for the area and not the site *per se*.

Scientific Name	Common Name	Status	Habitat	Likelihood
Afrosoricida (Golden Moles):				
<i>Chlorotalpa sclateri</i>	Sclater's Golden Mole	LC	Montane grasslands, scrub and forested kloofs of the Nama Karoo and grassland biomes	High
<i>Chrysochloris asiatica</i>	Cape Golden Mole	LC	Coastal parts of the Northern and Western Cape	High
Macroscledidea (Elephant Shrews):				
<i>Macroscelides proboscideus</i>	Round-eared Shrew	Elephant LC	Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover	High
<i>Elephantulus edwardii</i>	Cape Rock Elephant Shrew	LC	From rocky slopes, with or without vegetation, from hard sandy ground bearing little vegetation, quite small rocky outcrops	Confirmed
Tubulentata:				
<i>Orycteropus afer</i>	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	Confirmed
Hyracoidea (Hyraxes)				
<i>Procavia capensis</i>	Rock Hyrax	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies	Confirmed
Lagomorpha (Hares and Rabbits):				
<i>Bunolagus monticularis</i>	Riverine Rabbit	CR	Confined to riparian bush on the narrow alluvial fringe of seasonally dry watercourses in the Central Karoo.	V.Low
<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Hare	LC	Confined to areas of krantzes, rocky hillsides, boulder-strewn koppies and rocky ravines	Confirmed
<i>Lepus capensis</i>	Cape Hare	LC	Dry, open regions, with palatable bush and grass	Confirmed
<i>Lepus saxatilis</i>	Scrub Hare	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	High
Rodentia (Rodents):				
<i>Cryptomys hottentotus</i>	African Mole Rat	LC	Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils	Confirmed
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	Catholic in habitat requirements.	Confirmed

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<i>Graphiurus ocularis</i>	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	High
<i>Acomys subspinosus</i>	Cape Spiny Mouse	LC	Associated with rocky areas on mountain slopes in Fynbos	Low
<i>Rhabdomys pumilio</i>	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
<i>Mus minutoides</i>	Pygmy Mouse	LC	Wide habitat tolerance	High
<i>Steatomys krebsii</i>	Kreb's African Fat Mouse	LC		
<i>Micaelamys namaquensis</i>	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially	Confirmed
<i>Micaelamys granti</i>	Grant's Rock Mouse	LC	Restricted to the karoo where they are associated with rocky terrain.	High
<i>Parotomys brantsii</i>	Brants's Whistling Rat	LC	Associated with a dry sandy substrate in more arid parts of the Nama-karoo and Succulent Karoo. Species selects areas of low percentage of plant cover and areas with deep sands.	High
<i>Parotomys littledalei</i>	Littledale's Whistling Rat	LC	Riverine associations or associated with Lycium bushes or Psilocaulon absimile	Low
<i>Otomys unisulcatus</i>	Bush Vlei Rat	LC	Shrub and fynbos associations in areas with rocky outcrops Tend to avoid damp situations but exploit the semi-arid Karoo through behavioural adaptation.	Confirmed
<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush	High
<i>Gerbillurus paebe</i>	Hairy-footed Gerbil	LC	Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover	High
<i>Tatera afra</i>	Cape Gerbil	LC	Confined to areas of loose, sandy soils of sandy alluvium. Common on cultivated lands.	Low
<i>Malacothrix typica</i>	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
<i>Dendromus melanotis</i>	Grey Climbing Mouse	LC	Often associated with stands of tall grass especially if thickened with bushes and other vegetation	High
Primates:				
<i>Papio hamadryas</i>	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	Confirmed
Eulipotyphla (Shrews):				
<i>Myosorex varius</i>	Forest Shrew	LC	Prefers moist, densely vegetated habitat	High

<i>Crocidura cyanea</i>	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
Carnivora:				
<i>Proteles cristatus</i>	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	Confirmed
<i>Caracal caracal</i>	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	Confirmed
<i>Felis silvestris</i>	African Wild Cat	LC	Wide habitat tolerance.	Confirmed
<i>Panthera pardus</i>	Leopard	VU	Wide habitat tolerance, associated with areas of rocky koppies and hills, mountain ranges and forest	Low/Moderate
<i>Felis nigripes</i>	Black-footed cat	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub.	High
<i>Genetta genetta</i>	Small-spotted genet	LC	Occur in open arid associations	High
<i>Genetta tigrina</i>	Large-spotted genet	LC	Fynbos and savanna particularly along riverine areas	Low
<i>Suricata suricatta</i>	Meerkat	LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	Confirmed
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Confirmed
<i>Galerella pulverulenta</i>	Cape Grey Mongoose	LC	Wide habitat tolerance	Confirmed
<i>Vulpes chama</i>	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	High
<i>Canis mesomelas</i>	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	Confirmed
<i>Otocyon megalotis</i>	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	Confirmed
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	Predominantly aquatic and do not occur far from permanent water	Medium
<i>Ictonyx striatus</i>	Striped Polecat	LC	Widely distributed throughout the sub-region	Confirmed
<i>Mellivora capensis</i>	Ratel/Honey Badger	LC	Catholic habitat requirements	High
Rumanantia (Antelope):				
<i>Sylvicapra grimmia</i>	Common Duiker	LC	Presence of bushes is essential	Confirmed
<i>Pelea capreolus</i>	Grey Rhebok	NT	Associated with rocky hills, rocky mountainsides, mountain plateaux with good grass cover.	Confirmed
<i>Antidorcas marsupialis</i>	Springbok	LC	Arid regions and open grassland.	Confirmed
<i>Raphicerus campestris</i>	Steenbok	LC	Inhabits open country,	Confirmed

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<i>Raphicerus melanotis</i>	Cape Grysbok	LC	Thick scrub bush, particularly along the lower levels of hills	Medium
<i>Oreotragus oreotragus</i>	Klipspringer	LC	Closely confined to rocky habitat.	Confirmed

Appendix 3. List of Reptiles.

List of reptiles which are known from the broad area around the Gunstfontein grid corridor extension site, according to the SARCA database. Species in bold are those observed at or near the site.

Family	Genus	Species	Subspecies	Common name	Red list category
Agamidae	Agama	atra		Southern Rock Agama	Least Concern
Agamidae	Agama	hispida		Spiny Ground Agama	Least Concern
Atractaspididae	Homoroselaps	lacteus		Spotted Harlequin Snake	Least Concern
Chamaeleonidae	Bradypodion	gutturale		Little Karoo Dwarf Chameleon	Least Concern
Chamaeleonidae	Chamaeleo	namaquensis		Namaqua Chameleon	Least Concern
Colubridae	Psammophis	crucifer		Cross-marked Grass Snake	Least Concern
Colubridae	Pseudaspis	cana		Mole Snake	Least Concern
Colubridae	Dasypeltis	scabra		Rhombic Egg-eater	Least Concern
Colubridae	Dipsina	multimaculata		Dwarf Beaked Snake	Least Concern
Cordylidae	Cordylus	minor		Western Dwarf Girdled Lizard	Least Concern
Cordylidae	Hemicordylus	capensis		Graceful Crag Lizard	Least Concern
Cordylidae	Karusasaurus	polyzonus		Karoo Girdled Lizard	Least Concern
Cordylidae	Pseudocordylus	microlepidotus	namaquensis	Nuweveldberg Crag Lizard	Least Concern
Elapidae	Hemachatus	haemachatus		Rinkhals	Least Concern
Elapidae	Naja	nigricincta	woodi	Black Spitting Cobra	Least Concern
Elapidae	Aspidelaps	lubricus	lubricus	Coral Shield Cobra	Not Listed
Gekkonidae	Chondrodactylus	angulifer	angulifer	Common Giant Ground Gecko	Least Concern
Gekkonidae	Chondrodactylus	bibronii		Bibron's Gecko	Least Concern
Gekkonidae	Pachydactylus	capensis		Cape Gecko	Least Concern
Gekkonidae	Pachydactylus	formosus		Southern Rough Gecko	Least Concern
Gekkonidae	Pachydactylus	geitje		Ocellated Gecko	Least Concern
Gekkonidae	Pachydactylus	kladaroderma		Thin-skinned Gecko	Least Concern
Gekkonidae	Pachydactylus	maculatus		Spotted Gecko	Least Concern
Gekkonidae	Pachydactylus	mariquensis		Marico Gecko	Least Concern
Gekkonidae	Pachydactylus	oculatus		Golden Spotted Gecko	Least Concern
Gekkonidae	Pachydactylus	purcelli		Purcell's Gecko	Least Concern
Gekkonidae	Pachydactylus	weberi		Weber's Gecko	Least Concern

Gerrhosauridae	<i>Cordylus</i>	<i>subtessellatus</i>		Dwarf Plated Lizard	Least Concern
Gerrhosauridae	<i>Tetradactylus</i>	<i>tetradactylus</i>		Cape Long-tailed Seps	Least Concern
Lacertidae	<i>Nucras</i>	<i>tessellata</i>		Western Sandveld Lizard	Least Concern
Lacertidae	<i>Pedioplanis</i>	<i>burchelli</i>		Burchell's Sand Lizard	Least Concern
Lacertidae	<i>Pedioplanis</i>	<i>laticeps</i>		Karoo Sand Lizard	Least Concern
Lacertidae	<i>Pedioplanis</i>	<i>lineoocellata</i>	<i>pulchella</i>	Common Sand Lizard	Least Concern
Leptotyphlopidae	<i>Namibiana</i>	<i>gracilior</i>		Slender Thread Snake	Least Concern
Lamprophiidae	<i>Boaedon</i>	<i>capensis</i>		Brown House Snake	Least Concern
Lamprophiidae	<i>Prosymna</i>	<i>sundevallii</i>		Sundevall's Shovel-snout	Least Concern
Lamprophiidae	<i>Psammophis</i>	<i>notostictus</i>		Karoo Sand Snake	Least Concern
Lamprophiidae	<i>Psammophylax</i>	<i>rhombeatus</i>	<i>rhombeatus</i>	Spotted Grass Snake	Least Concern
Scincidae	<i>Trachylepis</i>	<i>capensis</i>		Cape Skink	Least Concern
Scincidae	<i>Trachylepis</i>	<i>sulcata</i>	<i>sulcata</i>	Western Rock Skink	Least Concern
Scincidae	<i>Trachylepis</i>	<i>variegata</i>		Variegated Skink	Least Concern
Testudinidae	<i>Chersina</i>	<i>angulata</i>		Angulate Tortoise	Least Concern
Testudinidae	<i>Homopus</i>	<i>areolatus</i>		Parrot-beaked Tortoise	Least Concern
Testudinidae	<i>Homopus</i>	<i>boulengeri</i>		Karoo Padloper	Near Threatened
Testudinidae	<i>Homopus</i>	<i>femoralis</i>		Greater Padloper	Least Concern
Testudinidae	<i>Psammobates</i>	<i>tentorius</i>	<i>tentorius</i>	Karoo Tent Tortoise	Not listed
Testudinidae	<i>Psammobates</i>	<i>tentorius</i>	<i>verroxii</i>	Verrox's Tent Tortoise	Not listed
Typhlopidae	<i>Rhinotyphlops</i>	<i>lalandei</i>		Delalande's Beaked Blind Snake	Least Concern
Viperidae	<i>Bitis</i>	<i>arietans</i>	<i>arietans</i>	Puff Adder	Least Concern

Appendix 4. List of Amphibians

List of amphibians which potentially occur in or near the Gunstfontein Grid Corridor extension site. Taxonomy and habitat notes are from du Preez and Carruthers (2009) and conservation status from the IUCN 2020. (Status: LC = Least Concern, DD = Data Deficient).

Scientific Name	Common Name	Status	Habitat	Distribution	Likelihood
<i>Amietophrynus rangeri</i>	Raucous Toad	Not Threatened	Rivers and stream in grassland and fynbos	Endemic	High
<i>Vandijkophrynus gariensis</i>	Karoo Toad	Not Threatened	Karoo Scrub	Widespread	High
<i>Xenopus laevis</i>	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	High
<i>Cacosternum boettgeri</i>	Common Caco	Not Threatened	Marshy areas, vleis and shallow pans	Widespread	High
<i>Amietia fuscigula</i>	Cape River Frog	Not Threatened	Large still bodies of water or permanent streams and rivers.	Widespread	Confirmed
<i>Cacosternum karooicum</i>	Karoo Caco	DD	Dry kloofs and valleys in the Karoo	Endemic	High
<i>Cacosternum karooicum</i>	Karoo Dainty Frog	DD	Arid areas with unpredictable rainfall. Breeds in small streams as well as man-made dams.	Karoo Endemic	High
<i>Tomopterna delalandii</i>	Cape Sand Frog	Not Threatened	Lowlands in fynbos and Succulent Karoo	Endemic	High
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	Not Threatened	Nama karoo grassland and savanna	Widespread	High