THE BASIC ASSESSMENT FOR THE PROPOSED KOMAS WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE NEAR KLEINSEE IN THE NORTHERN CAPE PROVINCE.

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THE BASIC ASSESSMENT FOR THE PROPOSED KOMAS WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE NEAR KLEINSEE IN THE NORTHERN CAPE PROVINCE.

APPENDIX C.1

Terrestrial Biodiversity Assessment

Terrestrial Biodiversity Specialist Study: Fauna and Flora

Basic Assessment for the Proposed Development of the Komas Wind Energy Facility and associated infrastructure near Kleinsee, Northern Cape Province:

BASIC ASSESSMENT REPORT

Report prepared for:	*Report prepared by:*
CSIR – Environmental Management Services	Simon Todd
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3Foxes Biodiversity Solutions

First Draft March 2020

Revised November 2020

EXECUTIVE SUMMARY

Genesis ENERTRAG Komas (Pty) Ltd is proposing the development of the Komas Wind Energy Facility (WEF) 25 km south east of Kleinsee in the Northern Cape Province. It is anticipated that the Komas WEF will have a maximum output capacity of 300 MW from a maximum of 50 turbines. The development falls within the Springbok Renewable Energy Development Zone (REDZ) and as such a Basic Assessment process is required for authorisation of the development. CSIR is conducting the required Basic Assessment and has appointed 3Foxes Biodiversity Solutions to provide a Terrestrial Biodiversity (Fauna and Flora) specialist study as part of the BA process. The purpose of the study is to describe and detail the ecological features of the proposed site; provide an assessment of the ecological sensitivity of the site; identify and assess the likely impacts associated with the proposed development of the Komas WEF and to identify mitigation measures to avoid and/or reduce negative impacts on terrestrial ecology.

The vegetation of the Komas site consists of relatively homogenous Namaqualand Strandveld. The low-lying area in the west of the site, consisting of short strandveld on calcareous soils is considered to represent the most sensitive part of the site from an ecological perspective and is not considered suitable for development. There are also some areas of mobile dunes and rocky outcrops which should also be avoided as far as possible. The abundance of Species of Conservation Concern (SCC) across the site is however relatively low and a significant impact on features or SCC is unlikely. In terms of fauna, there are relatively few SCC that are likely to be present at the site. This is in part at least due to the low range of habitats present at the site, most notably the general lack of rocky outcrops. The major impact on fauna would be direct habitat loss of approximately 90 ha as well as some low-level operation phase disturbance resulting from maintenance activities and turbine noise. There are no local populations of fauna within the site that are likely to be compromised by the development as the total footprint is relatively low in proportion to the overall extent of the site and there are still extensive areas within and adjacent to the site that would not be affected.

The southern half of the site falls within a Critical Biodiversity Area (CBA 2) as well as a Northern Cape Protected Area Expansion Strategy (NC-PAES) Focus Area, which raises some concern regarding the potential impact of the development on ecological processes and options for future conservation expansion in the area. The field assessment suggests that the site is not likely to be of high significance for broad-scale ecological processes and as the site is already almost surrounded by other approved WEFs, it is not likely to be viewed as a current priority for formal conservation expansion. In addition, it has few features or SCC, its irreplaceability value is likely to be low. Given that the overall footprint of the wind farm represents less than 2-5% of the landscape, the development is considered to be broadly compatible with the aims of Ecological Support Areas (ESAs) provided that impacts such as erosion can be properly mitigated. The development footprint within the CBA 2 is 31 ha which represents less than 2% of the area of CBA within the Komas study area only and significantly less of the whole affected CBA. The parts of the

site that fall within the NC-PAES Focus Area do not contain any species or habitats that are not widely available in adjacent areas. A separate offset study indicates that an offset is not considered necessary for development of the site and the on-site mitigation and avoidance measures that have been recommended are considered sufficient to reduce the impacts of the development on the CBA and NC-PAES Focus Area to an acceptable level.

Ecological Impact Statement:

The Komas Wind Farm site is considered to represent a broadly suitable environment for wind farm development. There are no specific long-term impacts likely to be associated with the wind farm that cannot be reduced to an acceptable level through mitigation and avoidance. Although the development will impact on areas classified as ESAs, CBAs and NC-PAES focus areas, the value of the site is not considered exceptional and the location and context of the site, suggest that these impacts are likely to be acceptable and would not significantly restrict future conservation expansion in the greater Namaqualand area. As there are no high residual impacts or fatal flaws associated with the development, it can be supported from a terrestrial ecology perspective. It is therefore the reasoned opinion of the specialist that the proposed Komas Wind Farm should be authorised, subject to the implementation of the recommended mitigation measures.

Short CV/Summary of Expertise – Simon Todd

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Ecological Solutions for People & the Environment

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, but with a focus on the three Cape provinces. This includes input on the Wind and Solar 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 deputy chair of the Arid-Zone Ecology Forum. He is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Nama Karoo, Succulent Karoo, Thicket, Arid Grassland, Fynbos and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity.
- Vegetation surveys & degradation assessment & mapping.
- Long-term vegetation monitoring.
- Faunal surveys & assessment.
- GIS & remote sensing.

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 2009 – Present – Sole Proprietor of Simon Todd Consulting, providing specialist ecological services for development and research.
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town.

- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute.
- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute.

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

- Fauna and Flora Specialist Study for the proposed Kap Vley Wind Farm, near Kleinsee. CSIR, 2018.
- Fauna and Flora Specialist Study for the proposed Namas Wind Farm, near Kleinsee. Savannah Environmental, 2019.
- Fauna and Flora Specialist Study for the proposed Zonnequa Wind Farm, near Kleinsee. Savannah Environmental, 2019.
- Fauna Specialist Study for the proposed Eskom Kleinsee 300MW WEF. Savannah Environmental 2012.
- Fauna and Flora Specialist Study for the Project Blue Wind and Solar Energy Facility, Near Kleinsee. Savannah Environmental 2012.
- Fauna and Flora for the G7 Richtersveld Wind Farm. Environmental Resources Management 2011.
- Preconstruction Walk-Through of the Juno-Gromis 400kV Power Line. Nsovo Environmental 2016.
- Specialist Faunal Assessment of the West Coast Resources Mine Expansion. Myezo Environmental. 2016.
- Fauna and Flora specialist Scoping & EIA Study for the Tormin Mineral Sands Inland and Coastal Mining expansion. SRK. 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: ____10 November 2020_____

LIST OF ABBREVIATIONS

BA	Basic Assesment
CARA	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
NC-DENC	Northern Cape Department of Environment and Nature Conservation
NC-PAES	Northern Cape Protected Area Expansion Strategy
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Area Expansion Strategy
O&M	Operation and Maintenance
POSA	Plants of South Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SKEP	Succulent Karoo Ecosystem Programme
SS	Substation
WTG	Wind Turbine Generator

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

Requirements of Appendix 6 – GN R326 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- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page *iii*
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page *v*
c) an indication of the scope of, and the purpose for which, the report was prepared;	P5
(cA) an indication of the quality and age of base data used for the specialist report;	P9-10
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	P38-
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	P10
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.1
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	P39
g) an identification of any areas to be avoided, including buffers;	P39
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;	P39
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	P9
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 1.3
k) any mitigation measures for inclusion in the EMPr;	Section 1.6
l) any conditions for inclusion in the environmental authorisation;	
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 1.6
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities and ii. if the opinion is that the proposed activity, activities 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;	P56-57
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	See Main BA report
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See Main BA 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.	

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SPECIALIST FAUNA AND FLORA IMPACT STUDY

1.1. INTRODUCTION AND METHODOLOGY

1.1.1. Scope and Objectives

Genesis ENERTRAG Komas (Pty) Ltd has appointed CSIR to undertake the required Basic Assessment (BA) process for the proposed Komas Wind Energy Facility (WEF) located west of Springbok in the Northern Cape Province. It is anticipated that the Komas Wind Farm will have an output capacity of up to 300 MW from a maximum of 50 turbines. A grid connection is also required, but this is assessed as part of an independent BA process. The site falls within the Springbok Renewable Energy Development Zone (REDZ 8) with the result that a BA process is required for authorisation. CSIR has appointed 3Foxes Biodiversity Solutions to provide a specialist Terrestrial Biodiversity Impact Assessment Study of the development as part of the BA process.

The purpose of the Terrestrial Biodiversity Assessment Report is to describe and detail the ecological features of the proposed site; provide an assessment of the ecological sensitivity of the site and identify and assess the likely impacts associated with the proposed development of the site as a WEF. A detailed field assessment as well as a desktop review of the available ecological information for the area is used to identify and characterise the ecological features of the site. This information is used to derive an ecological sensitivity map that presents the ecological constraints for development at the site. Impacts are assessed for the construction, operation, and decommissioning phases of the development. Cumulative impacts on the broader area are also considered and assessed. 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 the study is detailed below and is in accordance with Appendix 6 - GN R982 of the NEMA EIA Regulations of 2014 as amended. New Protocols for Terrestrial Biodiversity Assessments were published and gazetted by the national Department of Environment, Forestry and Fisheries (DEFF) on 20 March 2020 and 30 October 2020. When the requirements of these protocols apply, the requirements of Appendix 6 of the EIA Regulations, 2014, as amended promulgated under sections 24(5) and 44 of NEMA, are replaced by these.

However, the current Terrestrial Biodiversity Assessment commenced in August 2018, i.e. way before the implementation of these latest Protocols, hence the Assessment was undertaken in accordance with Appendix 6 of the NEMA EIA Regulations, 2014, as amended. These Protocols are listed below:

- Government Gazette 43110, Government Notice 320, dated 20 March 2020. DEFF published procedures and/or Protocols for the assessment and minimum criteria for reporting on identified environmental themes (including Terrestrial Biodiversity) in terms of Sections 24(5)(a) and (h) and 44 of NEMA when applying for an Environmental Authorisation (EA); and
- Government Gazette 43855, Government Notice 1150, dated 30 October 2020. DEFF published Protocols in respect of specific environmental themes for the assessment of, as well as the minimum report content requirements on, the environmental impacts for activities requiring EA, as contained in the Schedule.

1.1.2. Terms of Reference

The study includes the following activities:

- a description of the environment that may be affected by a specific 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 (including assessment of 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 of the development;
- a description and comparative assessment of all alternatives including cumulative impacts;
- 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, limitations and gaps in knowledge; and
- 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; and
    - a comparative assessment of the positive and negative implications of identified alternatives.

General Considerations for the study included the following:

- Disclose any gaps in information (and limitations in the study) or assumptions made.
- Identify recommendations for mitigation measures to minimise impacts.
- Outline additional management guidelines.

- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the EMPr for faunal or flora related issues.
- The assessment of the potential impacts of the development and the recommended mitigation measures provided have been separated into the following project phases:
    - Planning and Construction
    - Operational
    - Decommissioning

1.1.3. Assessment Approach

This assessment is conducted according to Appendix 6 – GN R326 EIA Regulations, as amended 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).

In terms of NEMA, this assessment demonstrates how the proponent intends to comply with the principles contained in Section 2 of 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 (Figure 1);
- 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.

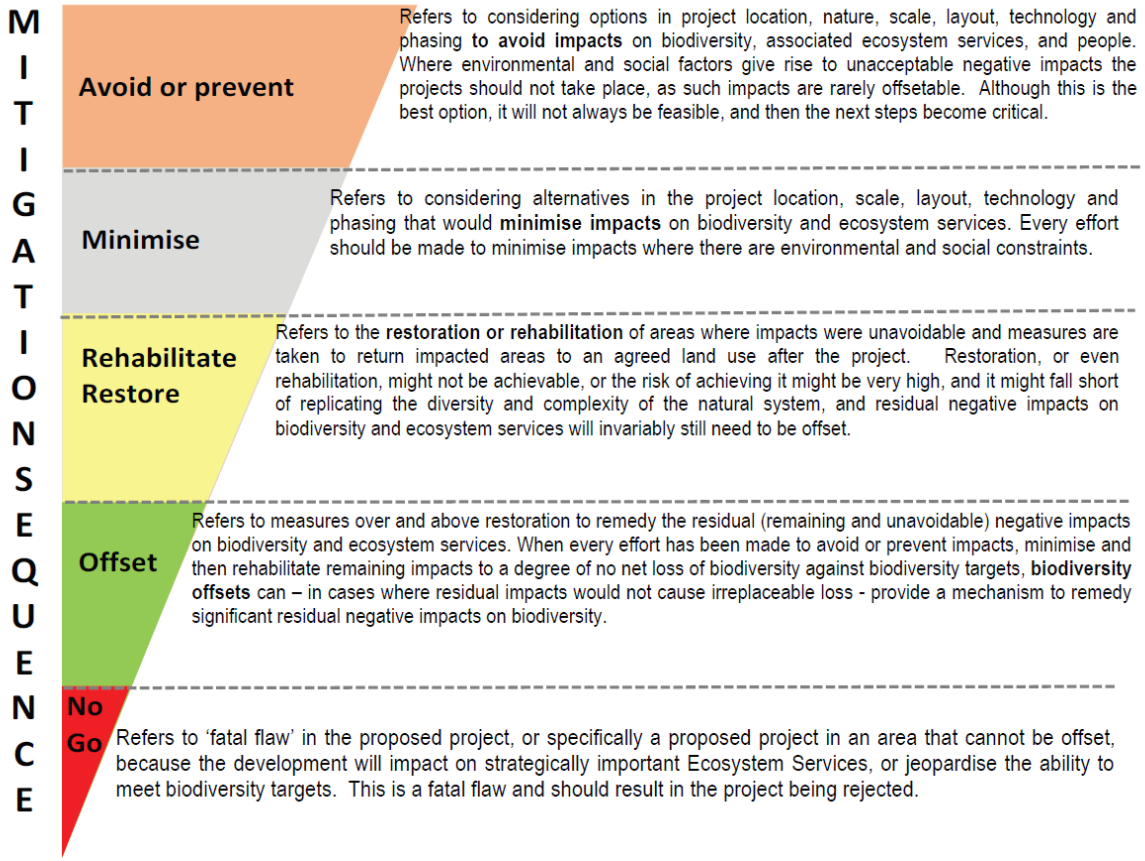

Figure 1. The mitigation hierarchy that is used to guide the study in terms of the priority of different mitigation and avoidance strategies.

Furthermore, in terms of best practice guidelines as outlined by Brownlie (2005) and De Villiers et al. (2005), a precautionary and risk-averse approach should be adopted for 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 (CBAs) (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas.

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 includes data searches, desktop studies, site walkovers / field survey of the properties to be affected by the proposed development and baseline data collection, including:
    - A description of 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 neighboring types, soils or topography; and
- Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, fine-scale systematic conservation plans, etc.*).

Species level

- Species of Conservation Concern (SCC) (giving location if possible using GPS);
- The viability of an estimated population size of the SCC that are present (including 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); and
- The likelihood of other RDB species, or SCC, 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 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 and/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 at the site or in 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.

1.1.4. Assumptions and Limitations

The current study is based on a detailed field study over several seasons as well as a desktop study, which serves to reduce the limitations and assumptions required for the study. The site was visited several times, from early summer (October) 2017 to spring (July) 2018. Although the area was dry in 2017 due to the prevailing drought the area experienced at the time, the area was wetter in 2018 despite the fact that this was also a lower-rainfall season, conditions at the time of the field assessment were adequate for the field assessment and there are no significant limitations resulting from conditions at the time of sampling.

In terms of fauna, sampling includes camera trapping for larger mammals, both within the Komas WEF study area as well as the adjacent proposed Namas, Zonnequa and Kap Vley wind farm areas. This provides a detailed and comprehensive picture of the larger fauna of the area. The presence of reptiles and amphibians at the site was informed by active searches for reptiles and amphibians within the site as well as information collected on adjacent projects. As this amounts to several years of experience in the area, this provides a comprehensive characterization of the faunal community of the site. Although some fauna are rare or difficult to observe in the field, their potential presence at the site was evaluated based on the literature, their habitat preferences and distribution in the wider area according to the available databases. In order to ensure a conservative approach in this regard, the species lists derived for the site from the literature were obtained from an area significantly larger than the study site.

1.1.5. Source of Information

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 and Rutherford 2006 and 2016 update) as well as the National List of Threatened Ecosystems (2011), where relevant.
- Information on plant and animal species recorded for the area was extracted from the new Plants of South Africa (POSA) database hosted by the South African National Biodiversity

Institute (SANBI). Data was extracted for a significantly larger area than the study area, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself 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).

Habitats & Ecosystems:

- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment (NFEPA) (Nel et al. 2011).
- Important protected areas expansion areas were extracted from the Northern Cape Protected Areas Expansion Strategy (NC-NPAES 2017) and spatial information provided by SANParks on proposed Namaqua Park's expansion plans (November 2020).
- Critical Biodiversity Areas in the study area were obtained from the Northern Cape Conservation Plan (Oosthuysen & Holness 2016).

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 the ADU databases (ReptileMap, Frogmap and MammalMap) http://vmus.adu.org.za.
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Endangered Wildlife Trust (EWT) & SANBI (2016) and Skinner and Chimimba (2005) for mammals.
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as an 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 (2017).

1.1.6. Field Assessment

The site visit for the current assessment was undertaken on the 23rd – 24th of August 2018. During the site visit, as much of the site as possible was investigated in the field by driving the roads of the site and observing and mapping the features present and their associated sensitivity. The vegetation at representative sites across the study area was sampled and detailed species lists collected. In addition to the current site visit, the area was also sampled previously in October 2017 as part of an investigation into the greater Komas, Namas and Zonnequa wind farms study area. This included camera trapping for fauna across the same study area. In addition, camera trapping was also conducted on the adjacent proposed Kap Vley WEF site as well as small mammal trapping and pitfall trapping for reptiles and amphibians. These results are incorporated into this study as relevant. This provides a comprehensive characterization of the typical and common species present in the area and significantly improves the baseline information available for the area.

1.1.7. Sensitivity Mapping and Assessment

An ecological sensitivity map of the site was produced by integrating the results of the site visits with the available ecological and biodiversity information in the literature and various spatial databases as described above. As a starting point, sensitive features such as wetlands, drainage lines, rocky hills and mobile dune systems were mapped and buffered where appropriate to comply with legislative requirements or ecological considerations. Additional sensitive areas were then identified and delineated based on the results of the field assessment and satellite imagery of the site. All the different layers created were then merged to create a single coverage. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the scale as indicated below.

- **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 potential 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 (such as specific consideration of the footprint within these areas and field verification of the acceptability of development within these potentially sensitive areas) 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.

Limits of Acceptable Change

Over and above the ecological sensitivity mapping, a further level of impact reduction is applied by using limits of acceptable change within each of these sensitivity ratings. Limits of acceptable change for each sensitivity category are indicated below and refer to the extent of on-site habitat loss within each sensitivity category that is considered acceptable before significant ecological impact that is difficult to mitigate and which may compromise the development is likely to occur. This provides a guide for the developer in terms of ensuring that the spatial distribution of impact associated with the development is appropriate with respect to the sensitivity of the site. In addition, it provides a benchmark

against which impacts can be assessed and represents an explicit threshold that when exceeded indicates that potentially unacceptable impacts may have occurred. In terms of this latter criterion, exceeding the limits of acceptable change for either High or Very High sensitivity areas is considered to represent an immediate fatal flaw, while the limits within either Low or Medium sensitivity areas could potentially be exceeded, provided that the total footprint in these two areas combined does not exceed the overall combined acceptable loss within these classes. However, in the latter case, this would raise significant concern regarding the suitability of the development and the exact spatial configuration of the development and the likely impacts on ecological processes would need to be considered.

It is important to note that irrespective of the limits of acceptable change and whether the development is within the limits, the specialist may still identify areas within the site that are unacceptable for development and will require the turbines and/or infrastructure to be moved outside these areas.

Table 1. Limits of acceptable change associated with the wind farm development, within each of the sensitivity categories as defined below.

Sensitivity	Acceptable Loss	Description
Low	5%	Units with a low sensitivity where there is likely to be a low impact on ecological processes and terrestrial biodiversity. This category represents transformed or natural areas where the impact of development is likely to be local in nature and of low significance with standard mitigation measures.
Medium	2.5%	Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impacts such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
High	1%	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. Development within these areas is undesirable and should only proceed with caution. Where roads are required through these areas, existing access roads should preferably be used as this reduces both the impact and the footprint of any access roads.
Very High/No Go	<0.5%	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. Where linear Very High sensitivity features need to be traversed, existing roads or disturbance footprints should be used as far as possible.

1.2. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO ECOLOGICAL IMPACTS

The project is described in full in the main BA report and this information is not repeated here, but rather a summary of the relevant components and footprint areas are described briefly below. The proposed Komas WEF and associated infrastructure includes the following components:

- Up to 50 wind turbine generators (WTGs) with a maximum capacity of up to 300MW.
- Turbines with a hub height of up to 200m and a rotor diameter of up to 200m.
- Hardstand areas of approximately 1 500m2 per turbine.
- Temporary construction laydown and storage area of approximately 4 500m2 per turbine.
- Medium voltage cabling connecting the turbines will be laid underground.
- A Lithium-ion Battery Energy Storage System (BESS) comprising of several utility scale battery modules within shipped containers or an applicable housing structure on a concrete foundation.
- Internal roads with a width of up to 10m providing access to each turbine, the BESS, on-site substation (SS) and laydown area. The roads will accommodate cable trenches and stormwater channels (as required) and will include turning circle/bypass areas of up to 20m at some sections during the construction phase. Existing roads will be upgraded wherever possible, although new roads will be constructed where necessary.
- A temporary construction laydown/staging area of approximately 4.5 hectares (ha) which will also accommodate the operation and maintenance (O&M) buildings.
- A 33/132kV on-site SS to feed electricity generated by the proposed Komas WEF into the national grid.

The BESS and 33/132kV on-site SS will be located within a 4ha battery and substation complex to allow for micro-siting of the BESS components and to a accommodate internal roads (as required), a temporary construction laydown area and a firebreak around the BESS footprint. Two site options have been identified for assessment as part of the BA process.

The proposed grid infrastructure including an Eskom Switching SS, 132kV gridline and collector SS will be assessed as part of a separate basic assessment (BA) process.

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1.3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

1.3.1. Vegetation Types

According to the national vegetation map (Mucina & Rutherford 2006/2018), there are only two vegetation types within the boundaries of the study area, Namaqualand Klipkoppe Shrubland and Namaqualand Strandveld (Figure 2).

The vast majority of the site is mapped as Namaqualand Strandveld. This vegetation type occurs in the Northern and Western Cape Provinces from the southern Richtersveld as far south as Donkins Bay. Especially in the north of this unit it penetrates up to 40km inland and approaches the coast only near the river mouths of the Buffels, Swartlintjies, Spoeg, Bitter and Groen Rivers. In the south of the unit it is variably narrow and approaches the coast more closely. It consists of flat to undulating coastal peneplains with vegetation being a low species richness shrubland dominated by a plethora of erect and creeping succulent shrubs as well as woody shrubs and in wet years annuals are also abundant. It is associated with deep red or yellowish-red Aeolian dunes and deep sand overlying marine sediments and granite gneisses. Mucina and Rutherford (2006 and 2018) list eight endemic species for this vegetation type. About 10% of this vegetation type has been lost mainly to coastal mining for heavy metals and it is not currently listed.

A very small area in the far south east of the site is mapped as Namaqualand Klipkoppe Shrubland. This vegetation unit occupies 10 936 km^2 of central Namaqualand from Steinkopf to Nuwerus in the south. Namaqualand Klipkoppe Shrubland is associated with the rocky hills, granite and gneiss domes of the mountains of central Namaqualand. Due to its' steep and rocky nature, Namaqualand Klipkoppe Shrubland has not been impacted by intensive agriculture. Approximately 6% is currently conserved, mainly within Goegap and the Namaqua National Park. As Namaqualand Klipkoppe Shrubland is still largely intact, it has been classified as Least Threatened. Mucina & Rutherford (2006 and 2018) list 15 endemic species for this vegetation type. At a coarse level, it is sensitive largely in terms of offering a diverse habitat for fauna such as reptiles but relatively speaking does not have a high abundance of listed plant species. The extent of this vegetation unit at the site is very low and it can be easily avoided and does not pose a significant constraint on development.

The vegetation units mapped within the VegMap are generally quite coarse and in many instances, it is possible to discern a variety of different plant communities present within a site. Komas is no exception and at least 3 different major plant communities can be recognised at the site. These are described in detail below and are considered to represent a more realistic representation of the vegetation of the area.

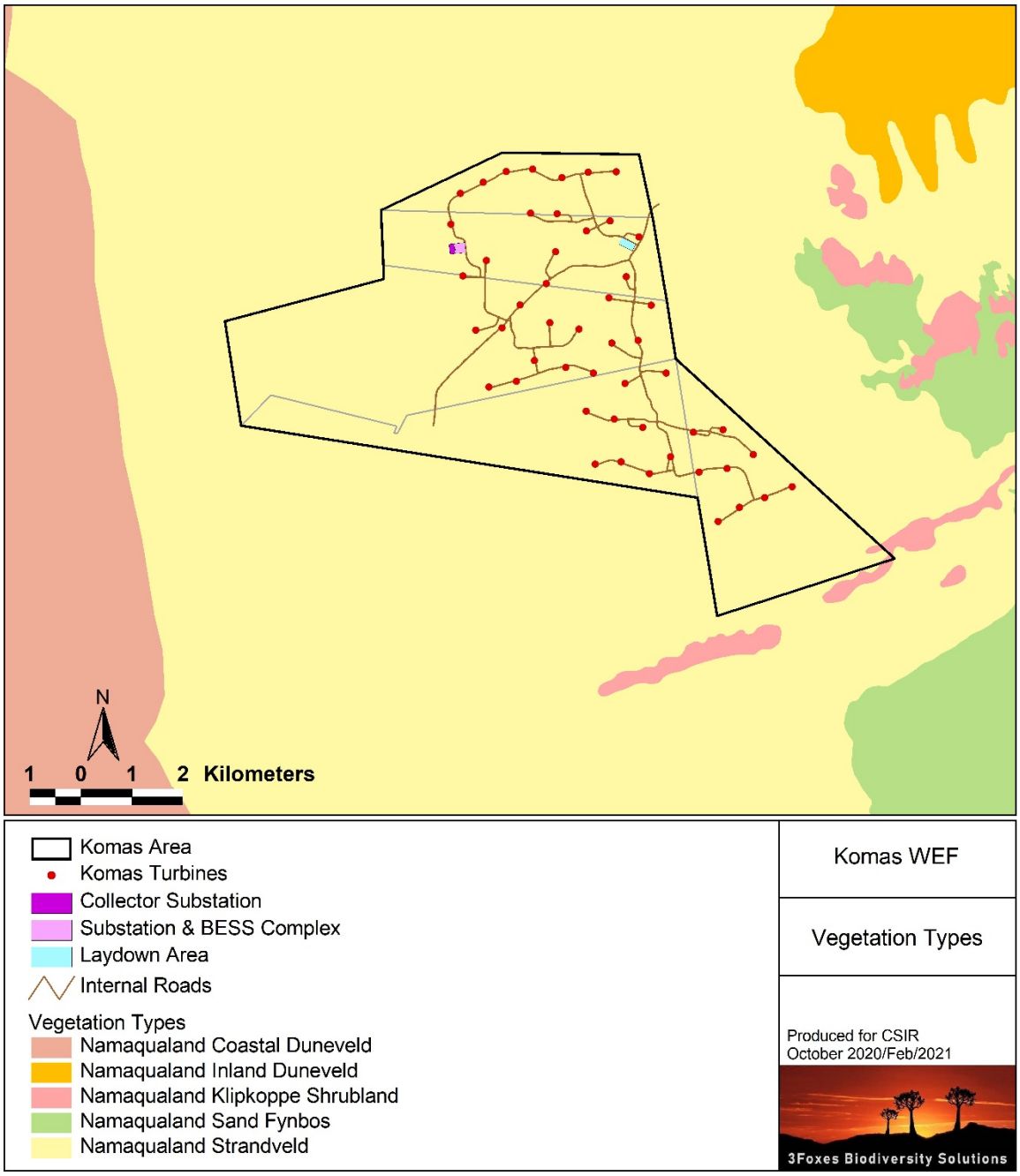

Figure 2. Vegetation map (Mucina and Rutherford 2006 and 2018 Update) of the Komas study area and surrounding area.

1.3.2. Fine-Scale Vegetation Description

The actual plant communities as observed at the site are detailed and described below. This information is considered to be of greater reliability and weight than the VegMap as it represents actual ground-truthed information from the site.

Community 1. Typical Namaqualand Strandveld

The majority of the site consists of typical Namaqualand Strandveld on flat to gently undulating plains. These areas are fairly homogenous but there are some shifts in the dominance of the different plant species present depending on soil texture, depth etc. Typical and dominant species include *Zygophyllum morgsana*, *Tripteris oppositifolia*, *Asparagus capensis*, *Othonna sedifolia*, *Hermannia sp.*, *Lebeckia spinescens*, *Eriocephalus racemosus*, *Searsia longispina*, *Leipoldtia sp.*, *Cladoraphis cyperoides*, *Salvia lanceolata*, *Anthospermum spathulatum*, *Tetragonia spicata*, *Ruschia sp.*, *Helichrysum hebelepis*, *Wahlenbergia asparagoides*, *Asparagus lignosus* and *Euphorbia burmannii*. This is the dominant habitat at the site and comprises more than half the study area. This is not considered to be a sensitive habitat and the majority of the development footprint should be accommodated within this habitat type.

Community 2. Namaqualand Dune Strandveld

There is a distinct plant community associated with the larger, more mobile dune fields of the site. These areas are more dynamic than the areas of flatter strandveld and have areas of alternating low cover associated with areas of greater sand movement and areas of taller vegetation occurring in the dune slacks and other more stable situations. Typical and dominant species include *Zygophyllum morgsana*, *Searsia longispina*, *Tripteris oppositifolia*, *Cladoraphis cyperoides*, *Othonna sedifolia*, *Conicosia pugioniformis*, *Asparagus lignosus*, *Hermannia sp.*, *Eriocephalus racemosus*, *Asparagus capensis*, *Lycium cinereum*, *Lebeckia spinescens*, *Tetragonia spicata* and *Diospyros ramulosa*. These areas are considered somewhat more sensitive than the typical surrounding Strandveld due to the large dunes which are vulnerable to disturbance. As this habitat is sensitive to disturbance, some avoidance of this habitat is recommended and additional mitigation to reduce wind erosion risk within these areas should be implemented.

Community 3. Low Strandveld on Calcareous Soils

The vegetation of the areas classified as Namaqualand Salt Pans under the 2012 VegMap have been reclassified as Namaqualand Strandveld under the 2018 VegMap. In reality, neither is correct and the vegetation of this area represents a short form of Strandveld that should be recognised as distinct from the typical surrounding Namaqualand Strandveld. Typical and dominant species include *Amphibolia rupis-arcuatae*, *Euphorbia brachiata*, *Othonna sedifolia*, *Asparagus capensis*, *Zygophyllum morgsana*, *Ruschia goodiae*, *Cheirodopsis denticulata*, *Aridaria nociflora*, *Othonna cylindrica* and *Ruschia sp.*. As this is a habitat of limited extent and offers features that are not found elsewhere in the area, it is considered more sensitive than the surrounding Strandveld and the overall development footprint in this habitat should be kept low.

1.3.3. Listed and Protected Plant Species

More than 500 plant species have been recorded from the broader area from Komaggas in the east to Kleinsee in the west. This includes 25 SCC of which three can be confirmed present at the site. This includes, *Leucoptera nodosa* (NT), *Wahlenbergia asparagoides* (VU) and *Babiana hirsuta* (NT). However, the abundance of these species is low across most of the site and the local populations would not be compromised by the development. The site is not considered to hold locally or regionally important populations of these species. The low relative abundance of plant SCC at the site can be explained by the typical homogenous nature of the Strandveld on the site and the lack of habitats which usually have a high abundance of SCC such as Sand Fynbos or rocky ridges.

1.3.4. Faunal Communities

1.3.5. Mammals

Approximately 40 mammal species potentially occur in the area. Mammals captured by the camera traps include, in order of decreasing abundance, Steenbok, Cape Hare, Cape Fox, Bat-eared fox, Striped Polecat, Suricate, Cape Porcupine, Common Duiker, Honey Badger, Small Spotted Genet, Grey Mongoose, Caracal, Yellow Mongoose, African Wild Cat and Slender Mongoose (Figure 3, Figure 4). More than half the observations are from Steenbok and Cape Hare, with Cape Fox, Bat-eared fox, Striped Polecat, Suricate and Cape Porcupine being moderately abundant and the remaining species uncommon. This represents a fairly typical mammalian community and is similar to that obtained at other sites along the West Coast. A notable absence is the Black-backed Jackal which occurs in the area but is likely absent as a result of persecution. Small mammals observed or caught in the area with Sherman traps include Hairy-footed Gerbil, Western Rock Elephant Shrew, Namaqua Rock Mouse, Four-striped Mouse, Karoo Bush Rats and Brants' Whistling Rat.

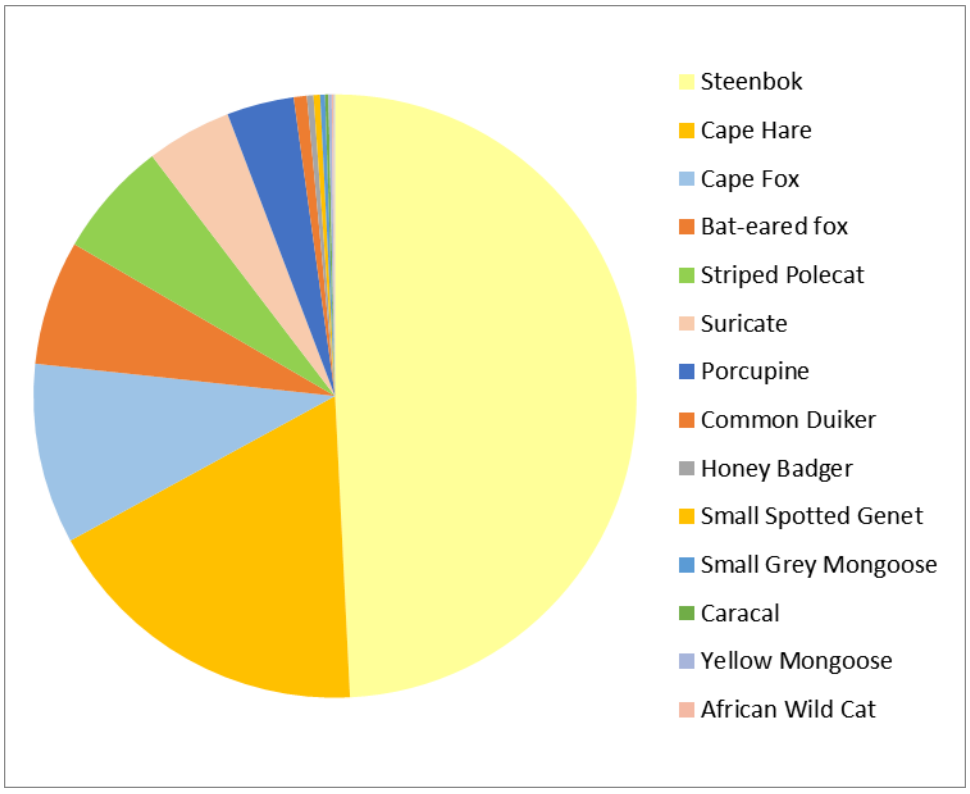

Figure 3. Pie chart showing the relative abundance of mammals in the Komas area site based on more than 1100 camera trap observations.

Apart from the species that were observed and can be confirmed present at the site, four red-listed SCC are known from the wider area. This includes the Leopard *Panthera pardus* (Vulnerable), Littledale's Whistling Rat *Parotomys littledalei* (Near Threatened), African Clawless Otter *Aonyx capensis* (Near Threatened) and Grants' Golden Mole *Eremitalpa granti grant* (Vulnerable). It is not likely that either the Leopard or Otter are present at the site on account of human disturbance

or lack of suitable habitat. Golden Moles are confirmed present at the site, but it is not clear if these are the more common Cape Golden Mole or Grants' Golden Mole. These subterranean animals 'swim' through the soft sand and hardened surfaces such as roads would pose a significant obstacle for movement. In addition, they also use subtle vibrations in the soil to detect their prey and it is possible that noise and vibration transferred from the turbines to the soil would have a negative impact on the local populations of golden moles. There have however been no studies to date on the impacts of vibration and noise on golden moles and so this remains an unknown.

The major impacts on mammals would occur during the construction phase when there would be significant noise and disturbance generated at the site. In the long-term, it is likely that the major impact of development on most mammals would be habitat loss equivalent to the footprint of the facility. Some species may however be wary of the turbines or negatively affected by the noise generated and may avoid them to the greater degree. It is however unlikely that the local or regional populations of any species would be compromised by the development and long-term impacts on mammals are likely to be of low to moderate significance after mitigation.

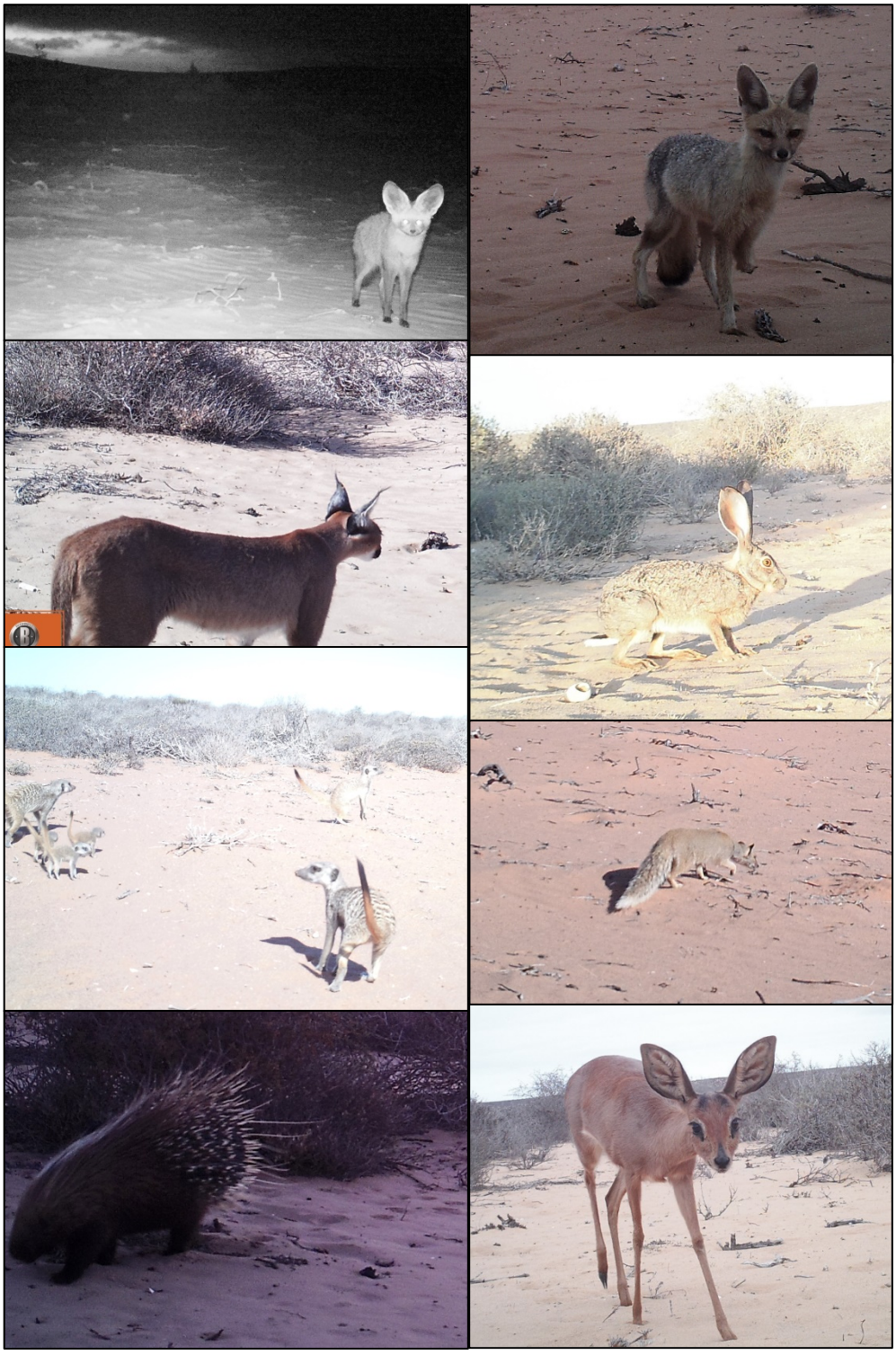

Figure 4. Examples of camera trap images from the site. Clockwise from bottom left, Cape Porcupine, Suricate, Caracal, Bat-eared Fox, Cape Fox, Cape Hare, Yellow Mongoose and Steenbok. The Cape Fox pictured top right has an amputated front leg, likely the result of being caught in a gin trap.

Table 2. List of mammals which can be confirmed present at the proposed Komas WEF site based on observations at the site. The list is not considered exhaustive and additional species are likely present and listed in Appendix 2.

Family	Genus	Species	Common name	Red list category
Bathyergidae	*Cryptomys*	*hottentotus*	Southern African Mole-rat	Least Concern
Bovidae	*Raphicerus*	*campestris*	Steenbok	Least Concern
Bovidae	*Sylvicapra*	*grimmia*	Bush Duiker	Least Concern
Canidae	*Canis*	*mesomelas*	Black-backed Jackal	Least Concern
Canidae	*Otocyon*	*megalotis*	Bat-eared Fox	Least Concern
Canidae	*Vulpes*	*chama*	Cape Fox	Least Concern
Cercopithecidae	*Papio*	*ursinus*	Chacma Baboon	Least Concern
Felidae	*Caracal*	*caracal*	Caracal	Least Concern
Felidae	*Felis*	*silvestris*	African Wildcat	Least Concern
Herpestidae	*Cynictis*	*penicillata*	Yellow Mongoose	Least Concern
Herpestidae	*Herpestes*	*pulverulentus*	Cape Gray Mongoose	Least Concern
Herpestidae	*Suricata*	*suricatta*	Meerkat	Least Concern
Hystricidae	*Hystrix*	*africaeaustralis*	Cape Porcupine	Least Concern
Leporidae	*Lepus*	*capensis*	Cape Hare	Least Concern
Leporidae	*Lepus*	*saxatilis*	Scrub Hare	Least Concern
Leporidae	*Pronolagus*	*rupestris*	Smith's Red Rock Hare	Least Concern
Macroscelididae	*Elephantulus*	*rupestris*	Western Rock Elephant Shrew	Least Concern
Muridae	*Aethomys*	*namaquensis*	Namaqua Rock Mouse	Least Concern
Muridae	*Desmodillus*	*auricularis*	Cape Short-tailed Gerbil	Least Concern
Muridae	*Gerbilliscus*	*paeba*	Paeba Hairy-footed Gerbil	Least Concern
Muridae	*Otomys*	*unisulcatus*	Karoo Bush Rat	Least Concern
Muridae	*Rhabdomys*	*pumilio*	Xeric Four-striped Grass Rat	Least Concern
Mustelidae	*Ictonyx*	*striatus*	Striped Polecat	Least Concern
Mustelidae	*Mellivora*	*capensis*	Honey Badger	Least Concern
Orycteropodidae	*Orycteropus*	*afer*	Aardvark	Least Concern
Procaviidae	*Procavia*	*capensis*	Rock Hyrax	Least Concern
Sciuridae	*Xerus*	*inauris*	South African Ground Squirrel	Least Concern

1.3.6. Reptiles

A list of Reptiles known from the vicinity of the Komas site, based on records from the ReptileMap database is provided in Appendix 3 of this report and indicates that as many as 45 species are known to occur in the wider area. No SCC have however been recorded from the area although it is possible that the Speckled Padloper *Chersobius signatus* (Vulnerable) is present at the site as it is widespread in Namaqualand and the Namaqualand Klipkoppe Shrubland in the far southeast of the site potentially offers suitable habitat for this species. Namaqualand is known as a centre of endemism and diversity for reptiles and the wider area has a high diversity and abundance of local endemics. This appears to be generated at least partly through the high habitat diversity of the area, which includes rocky hills, heuweltjie veld on fine-textured firm soils, loose sands and dunes, stable and vegetated dunes, well vegetated drainage lines etc. Within the proposed Komas WEF

site, habitat diversity is however low and restricted to various sandy substrates from firm sand lowlands to fairly loose dunes, with the result that species associated with rocky outcrops would be absent from the site.

Species observed at the site (Figure 5) include Angulate Tortoise, Giant Desert Lizard, Common Giant Ground Gecko, Knox's Desert Lizard, Common Sand Lizard, Cape Skink, Coastal Dwarf Legless Skink, Namaqua Sand Lizard, Pink Blind Legless Skink, Dwarf Beaked Snake and Many-horned Adder. For most species, the major impact of the development would be loss of habitat equivalent to the footprint of the development. For most species this is not considered highly significant as there are large intact tracts of similar habitat available in the area. Subterranean species associated with sandy substrates may be vulnerable to habitat disruption due to the construction of roads which may fragment the continuity of the sandy substrate. However, overall, the impacts of the development on reptiles are likely to be of local significance only as there are no species with a very narrow distribution range or of high conservation concern present at the site which may be compromised by the development.

Figure 5. Reptiles at the proposed Komas WEF site include the Angulate Tortoise, Giant Desert Lizard, Dwarf Beaked Snake and the Coastal Dwarf Legless Skink, a West Coast endemic.

1.3.7. Amphibians

The site lies within the known distribution range of seven frog and toad species. However as there is no perennial water in the area, many of these are not likely to occur at the site. A few species are however either largely independent of water (*Breviceps* spp) or well adapted to arid conditions (*Vandijkophrynus* spp.) and will occur at the site. The Desert Rain Frog *Breviceps macrops* occurs in Strandveld vegetation up to 10 km from the coastline and is listed as Vulnerable. As the proposed Komas WEF site is 16km from the coast, it is unlikely that this species is present, but this cannot be entirely discounted as a possibility. The only species confirmed present in the area is the Namaqua Rain Frog, *Breviceps namaquensis* which is common on coastal sands along the whole West Coast. There are no areas within the site that appear to be of above-average significance for amphibians and it is not likely that the development of the site would have a significant long-term impact on local amphibian populations.

1.3.8. Critical Biodiversity Areas

Based on the Northern Cape CBA map, the southern parts of the proposed Komas WEF site lie within a Tier 2 CBA with a small portion of Tier 1 CBA in the south-eastern corner of the site (Figure 6). This indicates that the site occurs within an area of recognised biodiversity significance. Development within such areas can have negative impacts on biodiversity pattern and process and is generally considered undesirable. Although the total footprint (ca. 80 ha) of the development is not very large, it must be considered in context of the currently intact and relatively undisturbed receiving environment and the implications that the development may have for future land use options in the area.

As the primary purpose of CBAs is to try and secure the broad-scale ecological functioning and resilience of landscapes, it is important to consider the impact that the development may have on ecological processes. As the area is relatively homogenous, it is not likely that there are any specific directional movement corridors within the area that is classified as a CBA. At a broader level, there are also still extensive tracts of similar intact habitat east and west as well as north and south of the site with the result that it is not likely that the development would result in significant disruption of ecological processes. There are however several other WEFs in the immediate area including the approved Kap Vley WEF east of the site and the Namas and Zonnequa WEFs west and north of the site. This would increase cumulative impacts in the area and also cumulative impacts on CBAs since both the proposed Kap Vley and Namas WEFs have some or all of their approved turbines within CBAs. Due to the impact of the proposed Kap Vley WEF development on CBAs and plant SCC, a biodiversity conservation offset was implemented as part of that project. However, it is clear that the sensitivity of the proposed Kap Vley WEF site and the current Komas WEF project area are equivalent in this regard and the species and features of concern which characterise the Kap Vley WEF site are not present within the Komas WEF site, which is much more similar in nature to the proposed Namas and Zonnequa WEF development areas. As such, this represents typical Strandveld with a relatively low abundance of SCC and no specific features of high biodiversity or ecological value. The CBA 1 which clips the site, is a CBA based on the area being identified as

being a Succulent Karoo Ecosystem Programme (SKEP) Expert Priority Area. The remainder of the CBA is earmarked for protected area expansion.

The major issue with development within the areas of CBA is the extent to which habitat loss would impact on ecological processes within the CBA and the potential irreplaceability of the affected area. As mentioned above, it is not likely that the affected area is irreplaceable as the site represents typical Strandveld that is relatively widely available in the area and is also fairly well represented within the Namaqua National Park. In terms of the footprint of the development, this is estimated as being approximately 27 ha within the ESA and 31 ha within the CBA 2. Under the final layout assessed, there are no turbines or other infrastructure within the CBA 1. The loss of 31 ha of habitat within the CBA 2 represents less than 2% of the area of CBA within the Komas study area only and significantly less of the whole affected CBA. As a result, this is highly unlikely to compromise the ecological functioning of the CBA, given that it has not been identified as being of particular significance for broad-scale ecological processes. Consequently, the overall impact of the development on CBAs and broader scale ecological processes is considered to be relatively low and no major impacts to dispersal ability or faunal movement patterns are likely to be generated by the development. As such, an offset to counter the potential impact of the development on the CBA 2 affected in the south of the site does not seem warranted as there is sufficient scope to reduce on-site impacts to an acceptable level and there are no features present in this area that are not widely available outside of the study area. However, it is important to note that this does not preclude the possibility of other impacts with high residual significance that may require offsetting.

Table 3. Extent (Ha) of the different CBA categories and NPAES extent within the Komas site as a whole and within the direct development footprint.

CBA Category	Total Within Komas	Within Footprint	Proportion within Site Impacted (%)
CBA 1	35.44	0	0
CBA 2	2100.40	31.0	1.48
ESA	1875.40	27.25	1.45
ONA	1043.25	20.09	1.93
Other	5	0.26	5.2
NPAES	1819.87	23.12	1.27

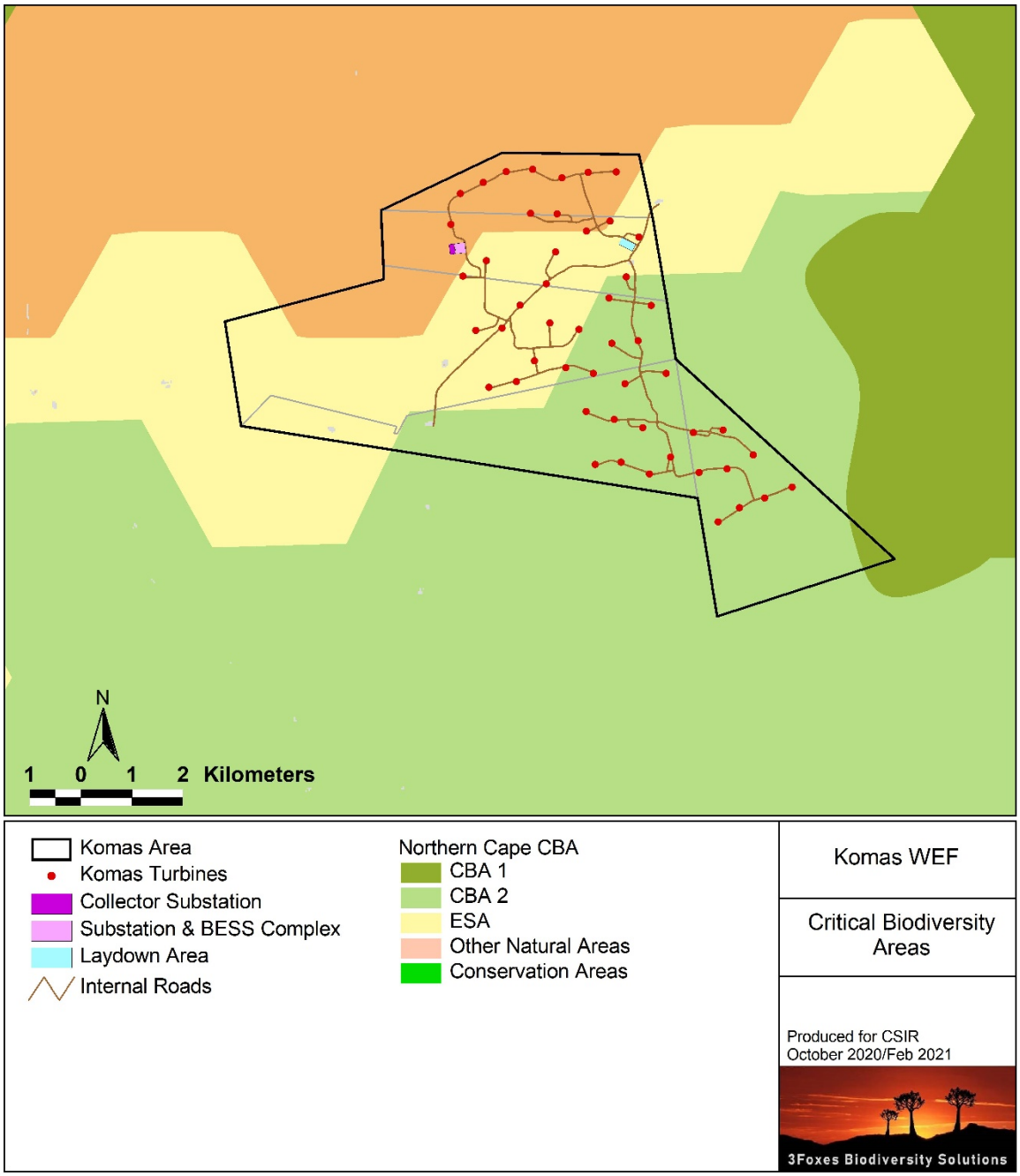

Figure 6. Critical Biodiversity Areas map for the study area, showing that the site lies within a Tier 1 and Tier 2 CBA.

The southern half of the site, including an area containing 18 turbines, fall within a Northern Cape Protected Area Expansion Strategy (NC-PAES) Focus Area (2017) (Figure 7, Table 3). The total extent of NPAES Focus Area within the site is 1820 ha of which 23 ha would be directly lost to the development. As wind farms can have indirect impacts on fauna in particular, largely through noise and disturbance, the footprint on the ground, does not represent the true zone of impact at least for some species. In addition, the avoidance of wind farm areas by raptors or other shy predators, can

lead to trophic effects on the ecosystem which may not be beneficial (Thaker et al. 2018). In order to account for these potential impacts and provide a worst-case scenario in terms of impact, each turbine was buffered by 500m to create an extended zone of impact. This essentially includes the vast majority of the interior of the wind farm as impacted as well as a 500m buffer around the outside of the turbines. Of the total extended footprint of 3564 ha, only 910 ha would actually be within the NPAES Focus Area. Although there are currently no clear guidelines or patterns in this regard that inform what the extent of this residual impact during operation are, and what an appropriate buffer would be, this varies from species to species and 500m is taken to represent a reasonable estimate based on the current literature on the extent turbine avoidance by terrestrial fauna. The fauna in the area are already those tolerant of or habituated to farming activities and as such are likely to become similarly habituated to the presence of the wind farm (Fydal et al. 2004).

Development of the site would place some limitations on the future expansion of traditional formalised conservation into the affected area (**Figure 7**). Although the southern portions of Komas have been identified as priority areas for expansion of the Namakwa National Park, it is not clear which features present within Komas would actually be the target of such expansion, especially as the typical Strandveld within the site has a low abundance of SCC and there are clearly better immediate targets in the area. However, in principle, there would not be any hindrance on other forms of conservation expansion into this area, such as through stewardship. In addition, assuming effective mitigation and avoidance, the site would retain significant biodiversity value and the development would not be likely to compromise the vast majority of biodiversity features and components represented by the site. The terrestrial footprint of the development would occupy a very small proportion of the landscape and the loss of 80 ha of direct habitat loss to the development and about 910 ha of indirect habitat loss within the NPAES FA (assuming a 500m radius from each turbine has reduced biodiversity value for some but not all species) is not considered to represent significant loss to the affected NC-PAES focus area. The total area of the affected Focus Area is 377 266 ha and the direct loss of 80 ha is minimal and indirect loss of up to 910 ha due to potential habitat degradation and fragmentation of this represents less than 0.3% of the Focus Area. As a result, this loss is, on its own not considered to represent a significant loss. There are however numerous other developments in the area and the impact of the current development on ecological processes as well as future conservation expansion should be considered in this context as well. The cumulative impact of the proposed Komas WEF development is considered in detail in the next section.

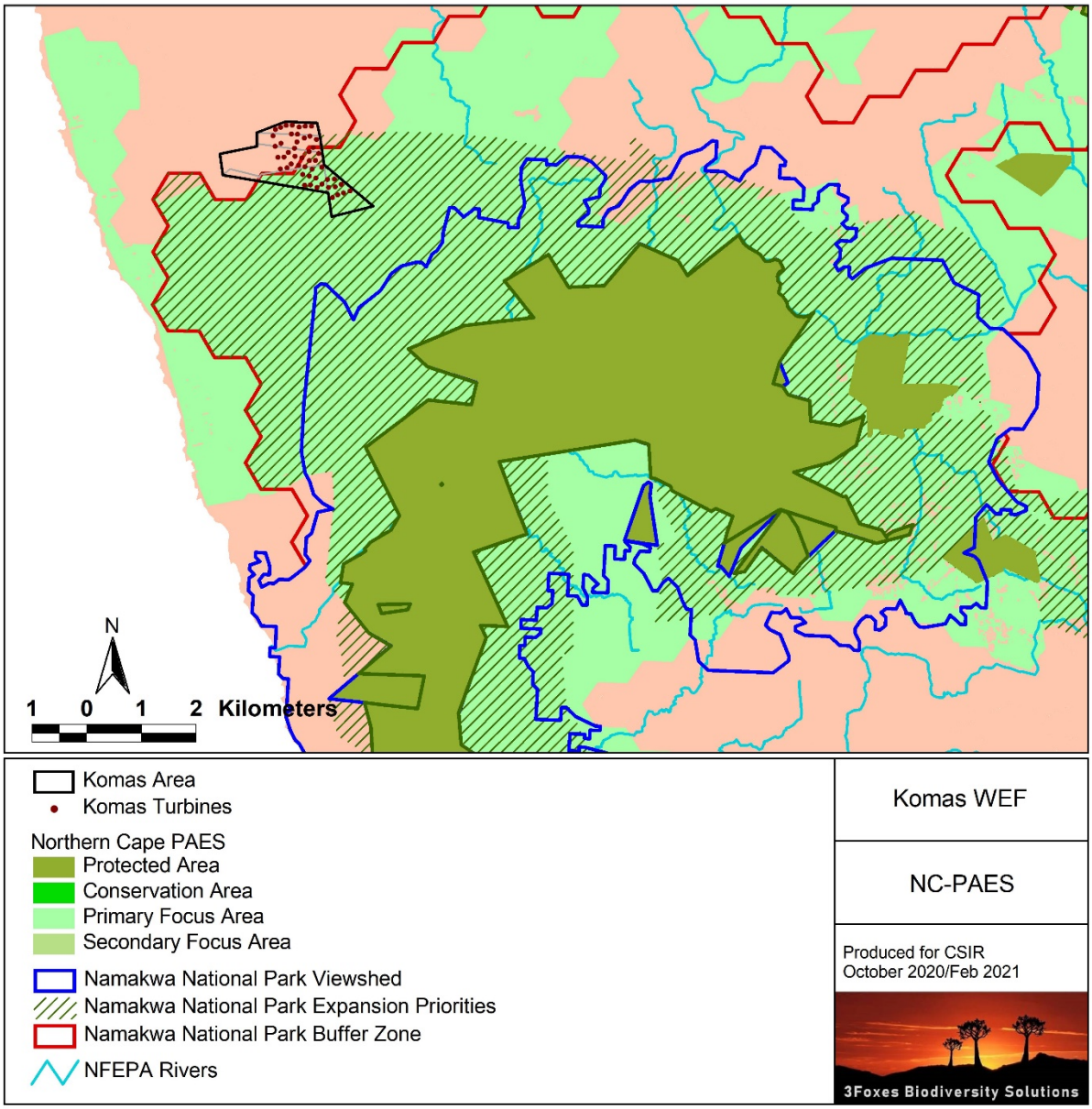

Figure 7. Northern Cape Protected Area Expansion Strategy Focus Area map for the area around the proposed Komas WEF site, showing that the southern half of the Komas site falls within a Primary Focus Area as well as within an area earmarked as a priority for expansion of the Namakw National Park.

1.3.9. Cumulative Impacts

As indicated above, there are several other approved developments proposed in the area around the proposed Komas WEF site (Figure 8). This includes the 300MW Kap Vley project east of the site, the 140MW Namas WEF west of the site and the 140MW Zonnequa WEF northwest of the site and the 300MW Eskom Kleinzee WEF towards the coast and the Project Blue WEF around Kleinsee. Those projects further afield are generally in a different environment and ecological

context from the Komas site and as such are of less relevance when considering the cumulative impacts of the Komas development and the surrounding projects. The footprint of these different facilities would be approximately 700ha and the Komas development would add an additional 11% to this, assuming that all these different developments go ahead, which is unlikely. However, this is a simplistic analysis and the real concern would be around the disruption of ecological processes and removal of important biodiversity features from possible future conservation expansion. The long-term potential impact of wind energy development should also be placed in context of other development impacts in the area, especially mining. The extent of habitat loss due to mining in the area around Kleinsee alone is more than 4000 ha and similar extents have been lost further afield both to the north and south of Kleinsee. The total extent of habitat loss from wind energy development would thus be less than 10% of that caused my mining. The primary ecological process that would potentially be affected is likely to be landscape connectivity for fauna. Not all species would be equally affected and species that may be particularly vulnerable to wind farm impacts include golden moles and Bat-eared Foxes, which may be sensitive to the noise turbines generate, while subterannean reptiles may experience fragmentation due to roads and noise. Bat-eared Foxes are however fairly mobile and would easily be able to move through wind farm areas if required. This would however not be the case for golden moles and subterranean reptiles, with the result that these groups can be idenitified as being most vulnerable to cumulative impact in the area. There is however currently no available information or research on this topic and long-term monitoring would be required to identify which species are impacted and the degree of impact. As such, the degree and nature of cumulative impacts on fauna in the area must be considered with a high degree of uncertainty.

The proposed Komas WEF site is not adjacent to any formal conservation areas and is also almost completely surrounded by other approved wind energy developments. As such, it is not likely that this area would represent a current priority for conservation expansion, especially given the lack of important biodiversity features within the Komas site itself. Although the concentration of wind energy development in the area is a potential concern, the area is a REDZ, which has the purpose of encouraging renewable energy development within these areas, with the result that high cumulative impacts are to be expected in these areas. In the broader Namaqualand Coastal-Plain context, the concentration of wind energy projects in this restricted area can be viewed as positive as it discourages the development of wind farms in other more important areas. In addition, the total remaining extent of Namaqualand Strandveld is more than 250 000 ha and the loss of less than 0.5% of this area to wind farm development would not constitute significant cumulative loss, especially given that large tracts of this vegetation type are protected within the Namakwa National Park. The contribution of the Komas WEF to cumulative impacts is this seen as being relatively low. Overall, it does not appear that cumulative impacts on fauna and flora resulting from the Komas wind farm development would warrant an offset as these are considered relatively low after mitigation.

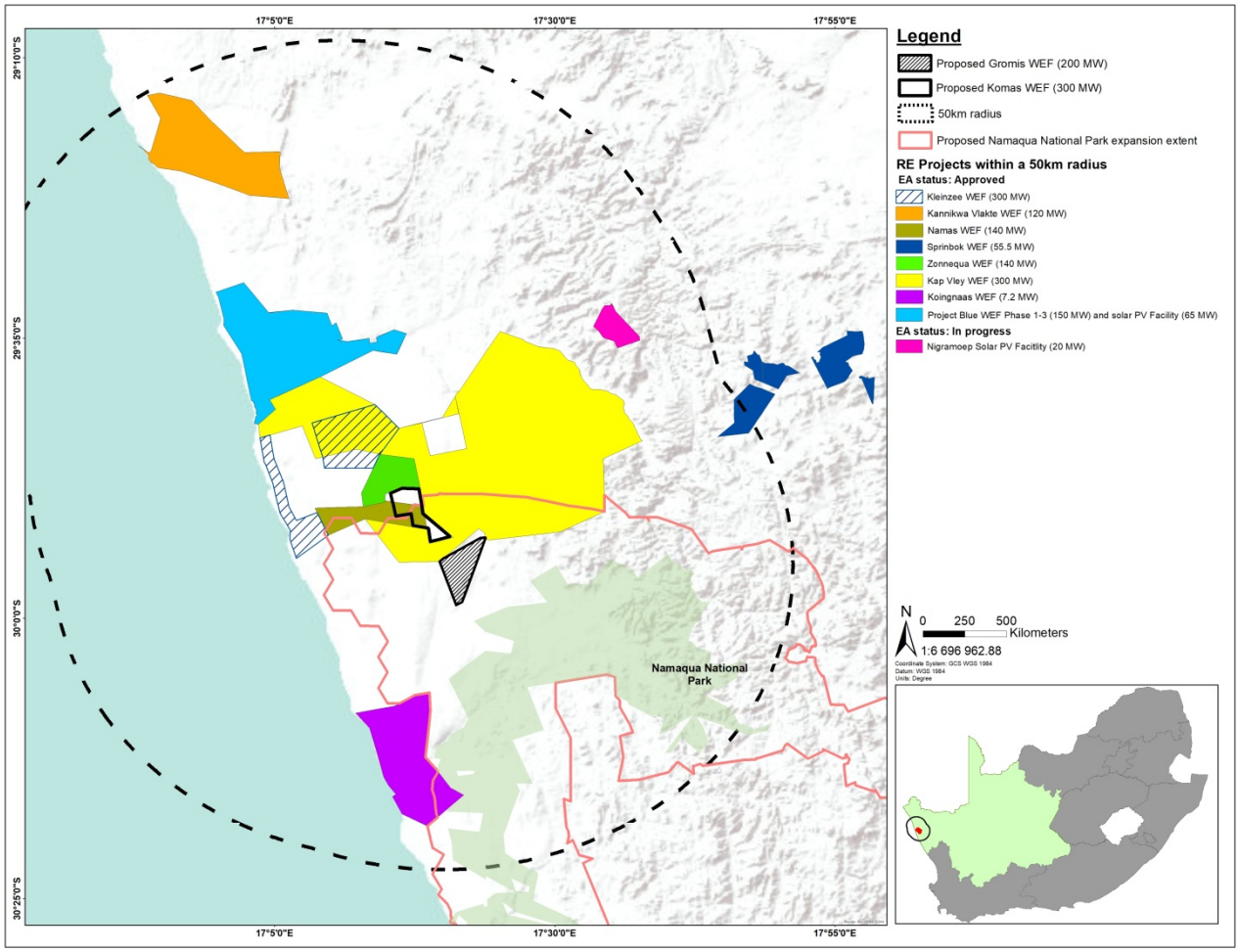

Figure 8. Map of other renewable energy developments in the wide area around the affected Komas properties indicated in blue. It is important to note that the actual developments would not occupy the whole of the indicated land portions and that some more recent approved developments are not shown in the above map.

DEA REFERENCE NUMBER	PROJECT TITLE	APPLICANT	EAP	TECHNOLOGY	MEGAWATT	STATUS
12/12/20/2331/1 12/12/20/2331/1/AM1 12/12/20/2331/2 12/12/20/2331/3	Project Blue Wind Energy Facility Nea Kleinsee within the Namakwa Magisteria District, Northern Cape Province. (Phase 1 3)	Diamond Wind (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind and Solar PV	150 MW Wind 65 MW Solar PV	Approved
12/12/20/2212	Proposed 300 MW Kleinzee WEF in the Northern Cape Province.	Eskom Holdings SOC Limited	Savannah Environmental Consultants (Pty) Ltd	Wind	300 MW	Approved
14/12/16/3/3/2/1046	The proposed Kap Vley WEF and its associated infrastructure near Kleinzee Nama Khoi Local Municipality, Northern Cape Province.	Kap Vley Wind Farm (Pty) Ltd	Council for Scientific and Industrial Research	Wind	300 MW	Approved
14/12/16/3/3/1/1971	Proposed Namas Wind Farm nea Kleinsee, Namakwaland Magisteria District, Northern Cape.	Genesis Namas Wind (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
14/12/16/3/3/1/1970	Proposed Zonnequa Wind Farm nea Kleinsee, Namakwaland Magisteria District, Northern Cape.	Genesis Zonnequa Wind (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind	140 MW	Approved
12/12/20/2154	Proposed construction of the 7.2 MW Koingnaas Wind Energy Facility Within The De Beers Mining Area on the Farm Koingnaas 745 near Koingnaas, Northern Cape Province.	Just PalmTree Powe Pty Ltd	Savannah Environmental Consultants (Pty) Ltd	Wind	7.2 MW	Approved
12/12/20/1807	Proposed establishment of the Kannikwa Vlakte wind farm.	Kannikwa Vlakte Wind Development Company Pty Ltd	Galago Environmental cc	Wind	120 MW	Approved
12/12/20/1721 12/12/20/1721/AM1 12/12/20/1721/AM2 12/12/20/1721/AM3 12/12/20/1721/AM4 12/12/20/1721/AM5	The proposed Springbok Wind Energy facility near Springbok, Northern Cape Province.	Mulilo Springbok Wind Power (Pty) Ltd	Holland & Associates Environmental Consultants	Wind	55.5 MW	Approved

DEA REFERENCE NUMBER	PROJECT TITLE	APPLICANT	EAP	TECHNOLOGY	MEGAWATT	STATUS
TBA	The proposed Gromis WEF and associated infrastructure near Kleinsee in the Northern Cape Province.	Genesis ENERTRAG Gromis Wind (Pty) Ltd	Council for Scientific and Industrial Research	Wind	200 MW	In process
14/12/16/3/3/1/416	Nigramoep Solar PV Solar Energy Facility on a site near Nababeep, Northern Cape.	South African Renewable Green Energy (Pty) Ltd	Savannah Environmental Consultants (Pty) Ltd	Solar PV	20 MW	In process

1.4. LEGISLATION AND PERMIT REQUIREMENTS

A summary of the environmental legislation and permitting requirements that would be triggered by the development of the site is outlined below.

Under Listing Notice 2 of NEMA EIA of 2014, as amended, the following activities are likely to be triggered:

Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.

Activity 15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-

(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

As previously noted, the proposed Komas WEF requires a BA as it falls within a REDZ (despite the fact that it triggers activities in Listing Notice 2).

And, under Listing Notice 3 of the NEMA EIA Regulations of 2014, as amended:

Activity 4. The development of a road wider than 4 metres with a reserve less than 13,5 metres.

g. Northern Cape

ii. Outside urban areas

(bb) National Protected Area Expansion Strategy Focus Areas
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
(gg) Areas within 10 kilometres from national parks.

Activity 12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

g. Northern Cape:

(ii) Within critical biodiversity areas identified in bioregional plans;

Activity 14. The development of –

(ii) infrastructure or structures with a physical footprint of 10 square metres or more;

where such development occurs –

(a) within a watercourse;

(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;

g. Northern Cape

(bb) National Protected Area Expansion Strategy Focus areas;

(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

(hh) Areas within 10 kilometres from national parks

Activity 18. The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.

g. Northern Cape

i.

ii. Outside urban areas:

(bb) National Protected Area Expansion Strategy Focus areas;

(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.;

(gg) Areas within 10 kilometres from national parks

(ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;

National Forest Act (No. 84 of 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: “no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated”.

Two protected tree species have been observed in the area, *Aloe dichotoma* and *Acacia erioloba*. However, neither of these has been observed present on the proposed Komas WEF site and no protected trees are likely to be affected by the proposed Komas WEF.

Conservation of Agricultural Resources Act (Act 43 of 1983):

The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA) provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. CARA defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 plants includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodline of water courses and wetlands.

The predominant alien of concern at the site is *Acacia cyclops*, which is listed as Category 1b.

1.5. IDENTIFICATION OF KEY ISSUES

1.5.1. Identification of Potential Impacts

The development would result in the loss of approximately 90 ha of currently intact habitat. This would impact some plant SCC as well as impact fauna directly though mortality and indirectly through habitat loss. Part of the site also falls within a CBA and NC-PAES Focus Area. The following potential impacts have been identified as being associated with the development of the proposed Komas WEF and associated infrastructure and which are assessed here:

1.5.2. Construction Phase

- Impacts on vegetation and plant SCC
- Direct and indirect faunal impacts

1.5.3. Operational Phase

- Increased soil erosion
- Increased alien plant invasion
- Impacts on Fauna due to Operation
- Impacts on Critical Biodiversity Areas

1.5.4. Decommissioning Phase

- Increased alien plant invasion
- Increased soil erosion
- Direct and indirect impacts on fauna

1.5.5. Cumulative impacts

- Cumulative impacts on habitat loss and broad-scale ecological processes
- Decreased ability to meet conservation targets

1.6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

1.6.1. Results of the Field Study

The ecological sensitivity map for the study area is illustrated below in Figure 9. From a purely ecological perspective, the majority of the site is considered to represent medium or low sensitivity habitat, with limited areas of high sensitivity areas. There are no turbines in the high sensitivity areas; 31 turbines in the medium sensitivity area (**Table 3**) which would amount to about 48ha of habitat loss, which is well below the 102 ha limit of acceptable change for this sensitivity category. The remaining 29 turbines are located within low sensitivity areas and would generate about 30 ha of habitat loss, which is also well within the limits of acceptable change. Overall, the development is considered acceptable and within or at the stated limits of acceptable change which are considered relatively conservative. Although the CBA and NPAES status of the southern parts of the site could be used to motivate for a higher sensitivity classification of this area, it is important to differentiate between broad-scale conservation planning outputs and actual biodiversity features as observed and verified on the ground. This is to ensure that impacts on each can be clearly differentiated and assessed. In addition, the required mitigation and avoidance for each type of sensitivity (ecological vs planning) are different and as such combining such different underlying causes can cause confusion.

Based on the layout provided for the assessment and the limits of acceptable change as identified by this study, the proposed Komas development is considered acceptable.

Table 4. Extent of the different sensitivity classes that occur within the overall site and within the development footprint.

Sensitivity	Total Extent	Acceptable Loss (%)	Acceptable Loss (Ha)	Actual Loss (Ha)
Very High	0	0	0	**0**
High	525	1	5.25	**0.30**
Medium	2461	2.5	61.53	**48.03**
Low	2073	5	103.65	**30.28**
	5059		**170.4**	**78.60**

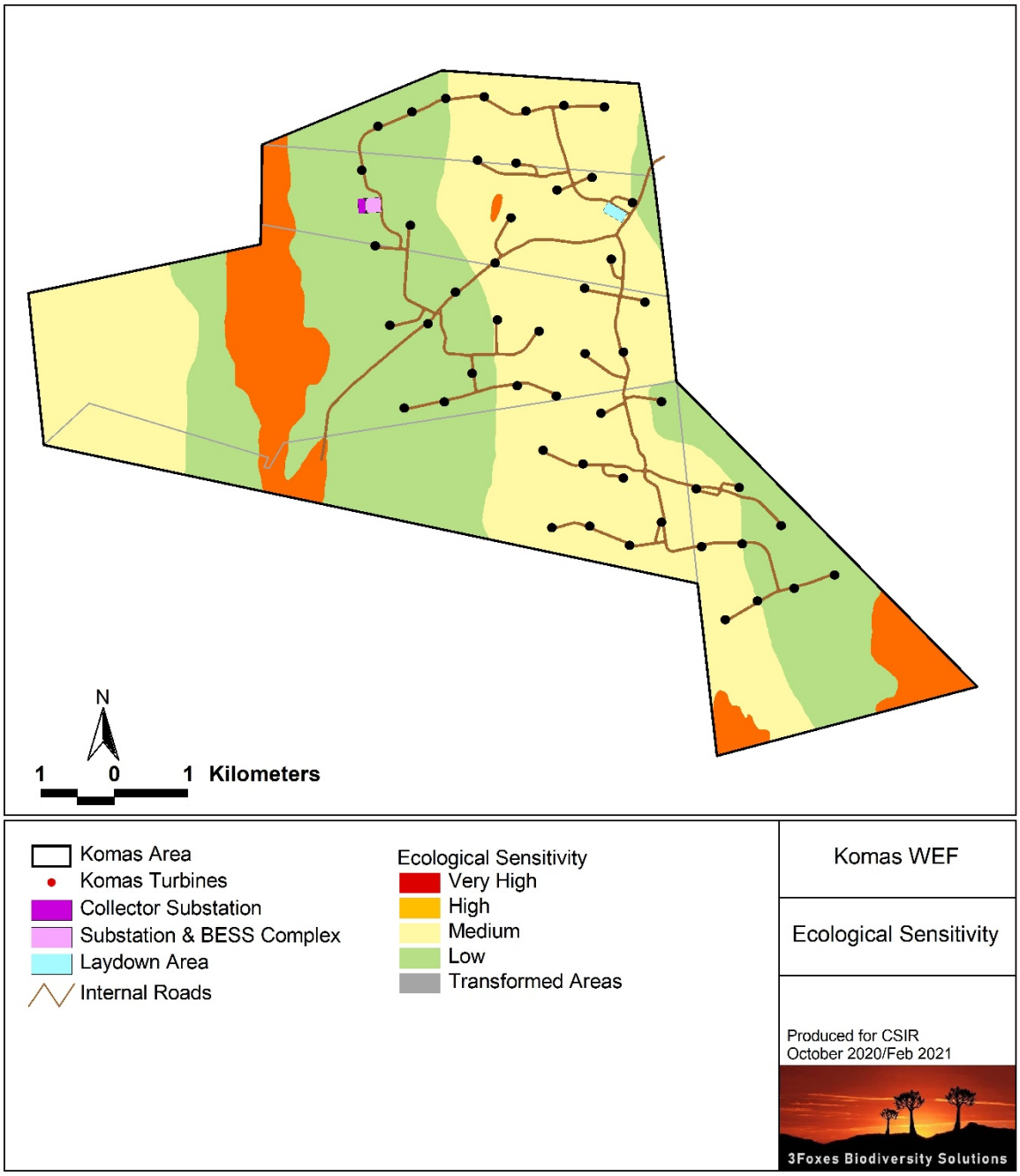

Figure 9. Ecological sensitivity map for the study area, showing that the Very High sensitivity areas have been entirely avoided by the proposed development.

1.6.2. Construction Phase Impact 1. Impacts on vegetation and plant species of conservation concern

- Although the abundance of plant SCC at the site is low, some individuals of such species are highly likely to be impacted by the development. However, the density of SCC is low

and there are no species of very high concern which would be particularly badly affected by the development. Aside from the impact on SCC, there would be a more general loss of intact vegetation within the development footprint. This impact would be generated by turbine foundations, turbine hard-stands as well as access roads and the on-site substation and lay-down areas. Additional avoidance of impact on plant SCC could be achieved through a preconstruction walk-through of the facility before construction to micro-site the roads and turbine positions where necessary.

Without mitigation this impact would be of **Moderate** potential significance.

Essential mitigation measures include:

- No development of turbines, roads of other infrastructure within identified no-go areas.
- All no-go areas should be demarcated at construction by a suitably qualified person able to identify the SCC present at the site.
- Pre-construction walk-through of the development footprint to further refine the layout and further reduce impacts on SCC through micro-siting of the turbines and access roads. Where necessary impacts on SCC can be further reduced through translocation or seed banking.
- Loose sand will need to be managed at construction and the use of wind barriers, geotextiles and other mitigation measures to reduce sand movement due to wind erosion will need to be implemented.
- All cleared areas that are not under hard infrastructure will need to be rehabilitated with locally occurring species.
- No fires should be allowed at the site as the vegetation can sustain an uncontrolled fire and this is likely to have negative effects on the fauna and flora of the site.

With the implementation of the suggested mitigation the impact on vegetation and SCC can likely be reduced to a **Low** significance.

1.6.3. Construction Phase Impact 2. Direct and indirect faunal impacts

The construction of the development will result in significant habitat loss, noise and disturbance on site. This will lead to direct and indirect disturbance of resident fauna. Some slow-moving or retiring species such as many reptiles would likely not be able to escape the construction machinery and would be killed. There are also several species present at the site which are vulnerable to poaching and there is a risk that these species may be targeted. This impact would be caused by the presence and operation of construction machinery and personnel on the site. This impact would however be transient and restricted to the construction phase, with significantly lower levels of disturbance during the operational phase.

Without mitigation this impact is likely to be of **Moderate** significance.

Essential mitigation measures would include:

- Avoidance of identified areas of high fauna importance and No-Go areas. All activity should be excluded from these areas.
- Search and rescue for reptiles and other vulnerable species during construction, before areas are cleared.
- Limiting access to the site and ensuring that construction staff and machinery remain within the demarcated construction areas during the construction phase.
- Environmental induction for all staff and contractors on-site.

With the implementation of the suggested mitigation the construction phase impact on fauna can likely be reduced to a **Low Significance**.

1.6.4. Operational Phase Impact 1. Increased Soil Erosion

The site has sandy soils that are vulnerable to erosion, especially in the face of the strong winds that the area experiences. Once mobilised, the sands can be very difficult to arrest as the moving sand smothers new vegetation as it goes. There are already several areas of mobile dunes at the site that are severely affected by wind erosion.

Without mitigation, this impact would potentially be of **Moderate significance**.

Essential mitigation measures would include:

- Avoiding areas of high wind erosion vulnerability as much as possible.
- Using net barriers, geotextiles, active rehabilitation and other measures during and after construction to minimise sand movement at the site. This should be monitored on a regular basis by the ECO and rectified by the developer as quickly as possible

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to an acceptable, **Low significance**.

1.6.5. Operational Phase Impact 2. Increased Alien Plant Invasion

There are already several alien species present on the site such as *Acacia cyclops* and disturbance created during construction would leave the site vulnerable to further alien plant invasion, especially along the access roads and other areas which receive additional run-off from the hardened surfaces of the development.

Without mitigation this impact would likely be of **Moderate Significance**.

Essential mitigation measures would include:

- Alien management plan to be implemented during the operational phase of the development, which makes provision for regular alien clearing and monitoring.
- Rehabilitation of disturbed areas that are not regularly used after construction.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.6.6. Operational Phase Impact 3. Operational Impacts on Fauna

Operational activities as well as the presence of the turbines and the noise they generate may deter some sensitive fauna from the area. In addition, the access roads may function to fragment the habitat for some fauna, which are either unable to or unwilling to traverse open areas. For some species this relates to predation risk as slow-moving species such as tortoises are vulnerable to predation by crows and other predators. In terms of habitat disruption, subterranean species such as Golden Moles and burrowing snakes and skinks are particularly vulnerable to this type of impact as they are unable to traverse the hardened roads or become very exposed to predation when doing so. This is a low-level continuous impact which could have significant cumulative impact on sensitive species.

Without mitigation this impact would likely be of **Moderate to Low Significance**.

Essential mitigation measures would include:

- Open space management plan for the development, which makes provision for favourable management of the facility and the surrounding area for fauna.
- Limiting access to the site to staff and contractors only.
- Appropriate design of roads and other infrastructure where appropriate to minimise faunal impacts and allow fauna to pass through or underneath these features.
- No electrical fencing within 20cm of the ground as tortoises become stuck against such fences and are electrocuted to death.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.6.7. Operational Phase Impact 4. Impacts on Critical Biodiversity Areas

A significant proportion of the development is located within an area that is a recognised area of biodiversity significance and has been classified as a Tier 2 CBA. The development will result in direct habitat loss equivalent to about 31 ha within the CBA as well as potentially affect broad-scale ecological processes operating in the area. The impact on the CBA would result from the transformation of currently intact habitat as well as the presence and operation of the facility.

Without mitigation this impact would likely be of **Moderate Significance**.

Essential mitigation measures would include:

- Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in previously disturbed areas.
- Avoid impact to restricted and specialised habitats such as mobile dunes or pans.
- Improve habitat management within the site to improve vegetation condition within the site.

With the effective implementation of the mitigation measures, it is likely that this impact will be reduced to a **Low Significance**.

1.6.8. Decommissioning Phase Impact 1. Increased Soil Erosion

As already described, the site has sandy soils that are vulnerable to erosion, especially in the face of the strong winds that the area experiences. Once mobilised, the sands can be very difficult to arrest as the moving sand smothers new vegetation as it goes. Decommissioning will remove the hard infrastructure from the site, generating disturbance and leaving areas that are unvegetated and vulnerable to erosion.

Without mitigation, this impact would potentially be of **Moderate Significance**.

Essential mitigation measures would include:

- Revegetation of cleared areas with monitoring and follow-up to ensure that rehabilitation is successful. Success must be measured against a predefined benchmark in terms of cover and species richness. Monitoring and rehabilitation must continue until such time as the benchmark has been attained. It is suggested that 40% of the natural vegetation for the affected habitat type represents a useful goal for rehabilitation. No goal for species richness is required, but the species used must be from the local environment and perennial in nature. These will have to be matched to their respective habitats.
- Using net barriers, geotextiles, active rehabilitation and other measures during and after decommissioning to minimise sand movement at the site.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to an acceptable, **Low significance**.

1.6.9. Decommissioning Phase Impact 2. Increased Alien Plant Invasion

There are already several alien species present on the site such as *Acacia cyclops* and disturbance created during decommissioning would leave the site vulnerable to further alien plant invasion.

Without mitigation this impact would likely be of **Moderate Significance**.

Essential mitigation measures would include:

- Alien management plan to be implemented during the decommissioning phase of the development, which makes provision for regular alien clearing and monitoring for up 3 years after decommissioning.
- Rehabilitation of disturbed areas that have been generated by decommissioning. Rehabilitation should restore ecological function to the affected areas, especially with regards to the return of vegetation cover to a predefined benchmark which is suggested as 40% of the natural of the vegetation cover for the habitat under consideration.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.6.10. Cumulative Impact 1. Cumulative habitat loss and impact on broad-scale ecological processes

There are several other renewable energy developments in the wider area and along with the current development, these would potentially generate significant cumulative impacts on habitat loss and fragmentation and negative impact on broad-scale ecological processes such as dispersal and climate change resilience. However, not all of the developments in the area would impact on the same features and environment and overall, the current levels of cumulative development impact within the affected areas of the current development are relatively low. Currently, the major impact in the broad area is from diamond mining along the coastline, however areas further inland such as around the proposed Komas WEF site have not been impacted to the same degree and are still largely intact. There may however be some species which are more vulnerable to cumulative impacts and habitat fragmentation from cumulative wind farm development in the area.

Without mitigation, this impact is likely to be of **Moderate Significance.**

Essential mitigation measures would include:

- Avoid impact to restricted and specialised and high biodiversity-value habitats such as pans and rocky outcrops.
- Minimise the current development footprint as much as possible and rehabilitate cleared areas after construction.
- Ensure that management of the facility occurs in a biodiversity-conscious manner in accordance with an open-space management plan for the facility.

With the effective implementation of the mitigation measures, it is likely that this impact will be reduced to a **Low Significance**.

1.6.11. Cumulative Impact 2. Decreased ability to meet conservation targets

Although the affected vegetation types at the site are all classified as Least Threatened, part of the footprint is within areas that have been identified as potentially suitable for future conservation expansion and is within a NPAES and Namakwa National Park expansion priority area. The presence of at least three other WEFs in the immediate vicinity of the current site, would however likely make the Komas site a relatively undesirable target for formal conservation expansion. In addition, as there are few features or SCC within the site, it is highly unlikely that it has a high irreplaceable value and as such, the potential loss of the site from formal conservation would likely have low significance.

Without mitigation, this impact is likely to be of **Moderate Significance.**

Essential mitigation measures would include:

- Engage with the provincial and national conservation authorities on the implications of the current development for future conservation expansion in the area.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.6.12. Assessment of the No-go Alternative

The No-Go alternative would result in the development not going ahead and the current land-use of extensive livestock grazing continuing at the site. Although extensive livestock grazing can be compatible with biodiversity maintenance, it can also result in a decline in plant and animal species richness if grazing pressure is too high. In the long-term the no-go alternative would result in the maintenance of the status quo, which can be considered to represent a low negative impact on biodiversity.

1.7. IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in Table 1-1 to 1-4 below. Impacts are assessed for the construction, operational and decommissioning phases of the development as well as for overall cumulative impacts.

Table 1-1 Impact assessment summary table for the Construction Phase

CONSTRUCTION PHASE													
Direct impacts													
Impact on vegetation and plant SCC													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**
Habitat Loss	**-**	**Local**	**Long-term**	**Substantial**	**Very Likely**	**Low**	**Moderate**	**Moderate Risk (3)**	**Partly**	**Partly**	**Low**	**4**	**High**
Suggested Mitigation: • No development of turbines, roads or other infrastructure within No-Go areas. • Preconstruction walk-through of the development footprint to further refine the layout and reduce impacts on SCC through micro-siting of the turbines and access roads. • Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However caution should be exercised to avoid using material that might entangle fauna.													
Faunal Impacts due to construction													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**
Habitat Loss	**-**	**Local**	**Long-term**	**Substantial**	**Very Likely**	**Moderate**	**Moderate**	**Moderate Risk (3)**	**Partly**	**Partly**	**Low**	**4**	**High**

Suggested Mitigation:

- Avoidance of identified areas of high faunal importance at the design stage.
- Ensure that lay-down and other temporary infrastructure is within medium- or low- sensitivity areas, preferably previously transformed areas if possible.
- Search and rescue for reptiles and other vulnerable species during construction, before areas are cleared.
- During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
- Limit access to the site and ensure that construction staff and machinery remain within the demarcated construction areas during the construction phase.
- Environmental induction for all staff and contractors on-site.
- All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site.
- If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs) as far as practically possible, which do not attract insects and which should be directed downwards.

Table 1-2 Impact assessment summary table for the Operational Phase

OPERATIONAL PHASE													
Direct impacts													
Increased soil erosion													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**
Disturbance	**-**	**Local**	**Long-term**	**Substantial**	**Very Likely**	**Moderate**	**Moderate**	**Moderate Risk (3)**	**Yes**	**Yes**	**Low**	**4**	**High**
Suggested Mitigation: • Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan. • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as 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. • All cleared areas should be revegetated with indigenous perennial species from the local area. • Avoid areas of high wind erosion vulnerability as much as possible. • Use net barriers, geotextiles, active rehabilitation and other measures during and after construction to minimise sand movement at the site.													
Increased alien plant invasion													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**

Disturbance	**-**	**Local**	**Medium-term**	**Substantial**	**Very Likely**	**Moderate**	**Moderate**	**Moderate Risk (3)**	**Yes**	**Yes**	**Low**	**4**	**High**
Suggested Mitigation: • Alien management plan to be implemented during the operational phase of the development, which makes provision for regular alien clearing and monitoring. • Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. • Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as *Acacia cyclops* are already present in the area and are likely to increase rapidly if not controlled. • Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems. • Regular alien clearing should be conducted, as needed, using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.													
Operational impacts on fauna													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**
Noise & Disturbance	**-**	**Local**	**Long-term**	**Moderate**	**Very Likely**	**Moderate**	**Moderate**	**Moderate Risk (3)**	**Partly**	**Partly**	**Low**	**4**	**High**

Suggested Mitigation:

- Open space management plan for the development, which makes provision for favourable management of the facility and the surrounding area for fauna.
- Limiting access to the site to staff and contractors only.
- Appropriate design of roads and other infrastructure where appropriate to minimise faunal impacts and allow fauna to pass through or underneath these features.
- No electrical fencing within 20cm of the ground as tortoises become stuck against such fences and are electrocuted to death.
- If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs) as far as possible, which do not attract insects.
- 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.
- All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises.

Impacts on Critical Biodiversity Areas

Impact pathway	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Significance o residual risk/impact (after mitigation)	Ranking o impact/ risk	Confidence level
Habitat loss and disturbance	**-**	**Local**	**Long-term**	**Moderate**	**Very Likely**	**Moderate**	**Moderate**	**Moderate Risk (3)**	**Partly**	**Partly**	**Low**	**4**	**High**

Suggested Mitigation:

- Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in previously disturbed areas.
- Avoid impact to restricted and specialised habitats such as pans or active dune fields.
- Implement a management plan for the site which takes cognisance of the ecological value of the area and is favourable for the maintenance of fauna and flora in the area.

Table 1-3 Impact assessment summary table for the Decommissioning Phase

DECOMMISSIONING PHASE													
Direct impacts													
Increased soil erosion													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**
Habitat loss and disturbance	**-**	**Local**	**Long-term**	**Severe**	**Very Likely**	**Low**	**Moderate**	**High Risk (2)**	**Yes**	**Yes**	**Low**	**4**	**High**
Suggested Mitigation: • All hard infrastructure should be removed and the footprint areas rehabilitated with locally-sourced perennial species. • The use of net barriers, geotextiles, active rehabilitation and other measures after decommissioning to minimise sand movement and enhance revegetation at the site. • Monitoring of rehabilitation success at the site for at least 3 years after decommissioning or until the rehabilitation benchmarks and criteria have been met. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.													
Increased alien plant invasion													
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Significance o residual risk/impact (after mitigation)**	**Ranking o impact/ risk**	**Confidence level**
Habitat loss and disturbance	**-**	**Local**	**Long-term**	**Severe**	**Very Likely**	**Low**	**Moderate**	**High Risk (2)**	**Yes**	**Yes**	**Low**	**4**	**High**

Suggested Mitigation:

- Alien management plan to be implemented during the decommissioning phase of the development, which makes provision for regular alien clearing and monitoring for at least 3 years after decommissioning.
- Active rehabilitation and revegetation of previously disturbed areas with indigenous species selected from the local environment.
- Wherever excavation is necessary for decommissioning, topsoil should be set aside and replaced after decommissioning activities are complete to encourage natural regeneration of the local indigenous species.
- Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned.
- Regular monitoring for alien plants within the disturbed areas for at least three years after decommissioning or until alien invasives are no longer a problem at the site.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.

Table 1-4 Impact assessment summary table for Cumulative Impacts

Cumulative Impacts														
Cumulative habitat loss and impact on broad scale ecological processes														
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk = consequence x probability (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**		**Significance of residual risk/impact (after mitigation)**	**Ranking of impact/ risk**	**Confidence level**
Habitat loss and disturbance	-	**Regional**	**Long-term**	**Substantial**	**Very Likely**	**Low**	**Moderate**	**Moderate Risk (3)**	**Partly**	**Partly**		**Low**	**4**	**High**
Suggested Mitigation: • Minimise the development footprint as far as possible. • The facility should be managed in a biodiversity-conscious manner in accordance with an open-space management plan for the facility. • Ensure that on-site impacts on plant SCC are maintained at acceptable levels through avoidance of significant populations of these species.														
Impaired ability to meet conservation targets														
Impact pathway	**Status**	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of impact**	**Irreplaceability of receiving environment/ resource**	**Significance of impact/risk = consequence x probability (before mitigation)**	**Can impact be avoided?**	**Can impact be managed or mitigated?**		**Significance of residual risk/impact (after mitigation)**	**Ranking of impact/ risk**	**Confidence level**
Habitat loss and disturbance	-	**Regional**	**Long-term**	**Substantial**	**Very Likely**	**Low**	**Moderate**	**Moderate Risk (3)**	**Partly**	**Partly**		**Low**	**4**	**High**
Suggested Mitigation: • Engage with the provincial and national conservation authorities on the implications of the current development for future conservation expansion in the area. • Develop an ecological offset study to evaluate the potential need for an offset to mitigate the impacts of the development on CBAs and NPAES focus areas.														

1.8. CONCLUSIONS AND RECOMMENDATIONS

The vegetation of the proposed Komas WEF site consists of relatively homogenous Namaqualand Strandveld. The low-lying area in the far west of the site consisting of short strandveld on calcareous soils is considered to represent the most sensitive part of the site from an ecological perspective and is not considered suitable for development. There are also some areas of mobile dunes and rocky outcrops which have also been avoided under the assessed layout. The abundance of SCC across the site is however relatively low and a significant impact on features or SCC is unlikely. In terms of fauna, there are relatively few SCC that are likely to be present at the site. This is in part at least due to the low range of habitats present at the site, most notably the general lack of rocky outcrops. The major impact on fauna would be direct habitat loss of approximately 80 ha as well as some low-level operation phase disturbance resulting from maintenance activities and turbine noise. There are no local populations of fauna within the site that are likely to be compromised by the development as the total footprint is relatively low in proportion to the overall extent of the site and there are still extensive areas within and adjacent to the site that would not be affected.

The southern half of the site falls within a CBA 2 as well as a NC-NPAES focus area and priority expansion area for the Namakwa National Park, which raises some concern regarding the potential impact of the development on ecological processes and options for future conservation expansion in the area. The field assessment suggests that the site is not likely to be of high significance for broad-scale ecological processes. In addition, as it has few features or species of particular significance, its irreplaceability value is likely to be low. Given that the overall footprint of the wind farm represents less than 5% of the landscape, the development is considered to be broadly compatible with the aims of ESAs provided that impacts such as erosion can be properly mitigated. The development footprint within the CBA 2 is 31 ha which represents less than 2% of the area of CBA within the proposed Komas WEF study area only and significantly less of the whole affected CBA. The parts of the site that fall within the NC-PAES Focus Area do not contain any species or habitats that are not widely available in adjacent areas. A detailed analysis of the potential need for an offset to mitigate the impacts of the development on CBAs and NPAES focus areas is provided in a separate study. The conclusion of that study is that a biodiversity offset cannot be motivated based solely on ecological considerations.

Ecological Impact Statement:
The proposed Komas Wind Farm site is considered to represent a broadly suitable environment for wind farm development. There are no specific long-term impacts likely to be associated with the wind farm that cannot be reduced to an acceptable level through mitigation and avoidance. Although the development will impact on areas classified as ESAs, CBAs and the NC-PAES Focus Area, the conservation value of the site is not considered exceptional and the location and context of the site, suggest that these impacts are likely to be acceptable and would not significantly restrict future conservation

expansion in the greater Namaqualand area. As there are no high residual impacts or fatal flaws associated with the development, it can be supported from a Terrestrial Biodiversity perspective. It is therefore the reasoned opinion of the specialist that the proposed Komas Wind Farm and associated infrastructure should therefore be authorised, subject to the implementation of the recommended mitigation measures.

1.9. REFERENCES

Alexander, G. & Marais, J. 2007. *A Guide to the Reptiles of Southern Africa*. Struik Nature, Cape Town.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & de Villiers, M. S. 2013. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Strelitzia 32. SANBI, Pretoria.

Branch W.R. 1998. *Field guide to snakes and other reptiles of southern Africa*. Struik, Cape Town.

Department of Environmental Affairs and Tourism, 2007. National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species. Government Gazette, Republic of South Africa.

Du Preez, L. & Carruthers, V. 2009. *A Complete Guide to the Frogs of Southern Africa*. Struik Nature., Cape Town.

EWT & SANBI, 2016. Red List of Mammals of South Africa, Lesotho and Swaziland. EWT, Johannesburg.

Ennen, J. R., Lovich, J. E., Meyer, K. P., Bjurlin, C., & Arundel, T. R. (2012). Nesting ecology of a population of Gopherus agassizii at a utility-scale wind energy facility in southern California. *Copeia*, *2012*(2), 222-228.

Flydal, K., Eftestøl, S., Reimers, E., & Colman, J. E. (2004). Effects of wind turbines on area use and behaviour of semi-domestic reindeer in enclosures. *Rangifer*, *24*(2), 55-66.

Lovich, J. E., Ennen, J. R., Madrak, S., Meyer, K., Loughran, C., Bjurlin, C. U. R. T. I. S., ... & Groenendaal, G. M. (2011). Effects of wind energy production on growth, demography and survivorship of a desert tortoise (Gopherus agassizii) population in southern California with comparisons to natural populations. *Herpetological Conservation and Biology*, *6*(2), 161-174.

Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

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

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Oosthuysen, E. & Holness, S. 2016. Northern Cape Critical Biodiversity Areas (CBA) Map. https://cirrus.nmmu.ac.za/index.php/s/20fe43905396fca0025948bc0d3b514d. Northern Cape Department of Environment and Nature Conservation & Nelson Mandela Metropolitan University.

Skinner, J.D. & Chimimba, C.T. 2005. The mammals of the Southern African Subregion. Cambridge University Press, Cambridge.

Thaker, M., Zambre, A., & Bhosale, H. (2018). Wind farms have cascading impacts on ecosystems across trophic levels. *Nature ecology & evolution*, 2(12), 1854-1858.

1.10. APPENDICES

1.10.1. Appendix 1. List of Plants

Species List of plants known from the broader area around the Komas Wind Farm.

Family	Genus	Sp1	IUCN	Family	Genus	Sp1	IUCN
Acanthaceae	*Acanthopsis*	*glabra*		Acanthaceae	*Justicia*	*cuneata*	
Acanthaceae	*Justicia*	*spartioides*		Acanthaceae	*Petalidium*	*parvifolium*	
Agavaceae	*Chlorophytum*	*undulatum*		Aizoaceae	*Amphibolia*	*rupis-arcuatae*	
Aizoaceae	*Amphibolia*	*succulenta*		Aizoaceae	*Antimima*	*alborubra*	LC
Aizoaceae	*Antimima*	*compacta*	LC	Aizoaceae	*Antimima*	*microphylla*	DD
Aizoaceae	*Antimima*	*oviformis*	DD	Aizoaceae	*Antimima*	*paripetala*	LC
Aizoaceae	*Antimima*	*schlechteri*	LC	Aizoaceae	*Arenifera*	*pungens*	LC
Aizoaceae	*Arenifera*	*stylosa*	LC	Aizoaceae	*Cephalophyllum*	*ebracteatum*	LC
Aizoaceae	*Cephalophyllum*	*herrei*	VU	Aizoaceae	*Cephalophyllum*	*inaequale*	LC
Aizoaceae	*Cephalophyllum*	*regale*	LC	Aizoaceae	*Cephalophyllum*	*rigidum*	LC
Aizoaceae	*Cheiridopsis*	*denticulata*	LC	Aizoaceae	*Cheiridopsis*	*robusta*	LC
Aizoaceae	*Cleretum*	*bellidiforme*	LC	Aizoaceae	*Cleretum*	*rourkei*	LC
Aizoaceae	*Conicosia*	*elongata*	LC	Aizoaceae	*Conicosia*	*pugioniformis*	LC
Aizoaceae	*Conophytum*	*auriflorum*	LC	Aizoaceae	*Conophytum*	*bilobum*	NE
Aizoaceae	*Conophytum*	*frutescens*	LC	Aizoaceae	*Conophytum*	*hians*	LC
Aizoaceae	*Conophytum*	*meyeri*	LC	Aizoaceae	*Conophytum*	*pageae*	LC
Aizoaceae	*Conophytum*	*saxetanum*	LC	Aizoaceae	*Conophytum*	*uviforme*	LC
Aizoaceae	*Drosanthemum*	*floribundum*	LC	Aizoaceae	*Drosanthemum*	*hispidum*	LC
Aizoaceae	*Drosanthemum*	*inornatum*	LC	Aizoaceae	*Drosanthemum*	*luederitzii*	LC
Aizoaceae	*Drosanthemum*	*oculatum*	LC	Aizoaceae	*Eberlanzia*	*cyathiformis*	LC
Aizoaceae	*Eberlanzia*	*dichotoma*	LC	Aizoaceae	*Eberlanzia*	*gravida*	LC
Aizoaceae	*Eberlanzia*	*schneideriana*	LC	Aizoaceae	*Galenia*	*collina*	LC
Aizoaceae	*Galenia*	*crystallina*		Aizoaceae	*Galenia*	*crystallina*	LC
Aizoaceae	*Galenia*	*fruticosa*	LC	Aizoaceae	*Galenia*	*meziana*	LC
Aizoaceae	*Galenia*	*namaensis*	LC	Aizoaceae	*Galenia*	*papulosa*	LC
Aizoaceae	*Galenia*	*pubescens*	LC	Aizoaceae	*Galenia*	*sarcophylla*	LC
Aizoaceae	*Galenia*	*secunda*	LC	Aizoaceae	*Hallianthus*	*planus*	LC
Aizoaceae	*Jordaaniella*	*cuprea*	LC	Aizoaceae	*Jordaaniella*	*dubia*	LC
Aizoaceae	*Jordaaniella*	*spongiosa*	LC	Aizoaceae	*Jordaaniella*	*uniflora*	NT
Aizoaceae	*Lampranthus*	*brachyandrus*	DD	Aizoaceae	*Lampranthus*	*densipetalus*	LC
Aizoaceae	*Lampranthus*	*otzenianus*	LC	Aizoaceae	*Lampranthus*	*suavissimus*	DD
Aizoaceae	*Leipoldtia*	*alborosea*	LC	Aizoaceae	*Leipoldtia*	*calandra*	LC
Aizoaceae	*Leipoldtia*	*frutescens*	VU	Aizoaceae	*Leipoldtia*	*laxa*	LC
Aizoaceae	*Leipoldtia*	*schultzei*	LC	Aizoaceae	*Leipoldtia*	*uniflora*	LC
Aizoaceae	*Malephora*	*framesii*	LC	Aizoaceae	*Malephora*	*purpureo-crocea*	LC
Aizoaceae	*Mesembryanthemum*	*amplectens*		Aizoaceae	*Mesembryanthemum*	*brevicarpum*	
Aizoaceae	*Mesembryanthemum*	*deciduum*		Aizoaceae	*Mesembryanthemum*	*dinteri*	
Aizoaceae	*Mesembryanthemum*	*hypertrophicum*		Aizoaceae	*Mesembryanthemum*	*junceum*	
Aizoaceae	*Mesembryanthemum*	*neglectum*		Aizoaceae	*Mesembryanthemum*	*neofoliosum*	
Aizoaceae	*Mesembryanthemum*	*oculatum*		Aizoaceae	*Mesembryanthemum*	*pellitum*	LC

Aizoaceae	*Mesembryanthemum*	*prasinum*		Aizoaceae	*Mesembryanthemum*	*quartziticola*	
Aizoaceae	*Mesembryanthemum*	*serotinum*		Aizoaceae	*Mesembryanthemum*	*sinuosum*	
Aizoaceae	*Mesembryanthemum*	*spinuliferum*		Aizoaceae	*Mesembryanthemum*	*subnodosum*	
Aizoaceae	*Mesembryanthemum*	*trichotomum*		Aizoaceae	*Meyerophytum*	*meyeri*	LC
Aizoaceae	*Mitrophyllum*	*clivorum*	LC	Aizoaceae	*Nelia*	*pillansii*	LC
Aizoaceae	*Ruschia*	*breekpoortensis*	LC	Aizoaceae	*Ruschia*	*brevibracteata*	DD
Aizoaceae	*Ruschia*	*caroli*	LC	Aizoaceae	*Ruschia*	*fugitans*	DD
Aizoaceae	*Ruschia*	*geminiflora*	VU	Aizoaceae	*Ruschia*	*goodiae*	LC
Aizoaceae	*Ruschia*	*lerouxiae*	LC	Aizoaceae	*Ruschia*	*leucosperma*	LC
Aizoaceae	*Ruschia*	*nieuwerustensis*	LC	Aizoaceae	*Ruschia*	*subpaniculata*	LC
Aizoaceae	*Ruschia*	*versicolor*	LC	Aizoaceae	*Stoeberia*	*beetzii*	LC
Aizoaceae	*Stoeberia*	*frutescens*	LC	Aizoaceae	*Stoeberia*	*utilis*	
Aizoaceae	*Tetragonia*	*distorta*	DD	Aizoaceae	*Tetragonia*	*echinata*	LC
Aizoaceae	*Tetragonia*	*fruticosa*	LC	Aizoaceae	*Tetragonia*	*microptera*	LC
Aizoaceae	*Tetragonia*	*pillansii*	VU	Aizoaceae	*Tetragonia*	*sarcophylla*	LC
Aizoaceae	*Tetragonia*	*spicata*	LC	Aizoaceae	*Tetragonia*	*verrucosa*	LC
Aizoaceae	*Tetragonia*	*virgata*	LC	Aizoaceae	*Wooleya*	*farinosa*	VU
Amaranthaceae	*Atriplex*	*cinerea*	NE	Amaranthaceae	*Atriplex*	*vestita*	LC
Amaranthaceae	*Hermbstaedtia*	*glauca*	LC	Amaranthaceae	*Manochlamys*	*albicans*	LC
Amaranthaceae	*Salsola*	*aphylla*	LC	Amaranthaceae	*Salsola*	*sericata*	LC
Amaranthaceae	*Salsola*	*zeyheri*	LC	Amaranthaceae	*Sarcocornia*	*natalensis*	LC
Amaranthaceae	*Sarcocornia*	*pillansii*	LC	Amaryllidaceae	*Brunsvigia*	*bosmaniae*	LC
Amaryllidaceae	*Gethyllis*	*britteniana*		Amaryllidaceae	*Gethyllis*	*britteniana*	DD
Amaryllidaceae	*Gethyllis*	*britteniana*	LC	Amaryllidaceae	*Gethyllis*	*grandiflora*	LC
Amaryllidaceae	*Haemanthus*	*coccineus*	LC	Amaryllidaceae	*Haemanthus*	*crispus*	LC
Amaryllidaceae	*Haemanthus*	*pubescens*	LC	Amaryllidaceae	*Haemanthus*	*unifoliatus*	LC
Amaryllidaceae	*Hessea*	*breviflora*	LC	Amaryllidaceae	*Strumaria*	*prolifera*	LC
Amaryllidaceae	*Strumaria*	*truncata*	LC	Anacampserotaceae	*Anacampseros*	*bayeriana*	
Anacampserotaceae	*Anacampseros*	*filamentosa*		Anacampserotaceae	*Anacampseros*	*lanceolata*	
Anacampserotaceae	*Avonia*	*albissima*		Anacardiaceae	*Searsia*	*glauca*	
Anacardiaceae	*Searsia*	*incisa*		Anacardiaceae	*Searsia*	*laevigata*	
Anacardiaceae	*Searsia*	*populifolia*		Anacardiaceae	*Searsia*	*undulata*	
Apiaceae	*Capnophyllum*	*africanum*	NT	Apiaceae	*Cynorhiza*	*typica*	LC
Apocynaceae	*Ceropegia*	*occidentalis*	NT	Apocynaceae	*Microloma*	*namaquense*	LC
Apocynaceae	*Microloma*	*sagittatum*	LC	Apocynaceae	*Microloma*	*tenuifolium*	LC
Apocynaceae	*Quaqua*	*armata*	LC	Apocynaceae	*Tromotriche*	*aperta*	LC
Asparagaceae	*Asparagus*	*capensis*	LC	Asparagaceae	*Asparagus*	*capensis*	LC
Asparagaceae	*Asparagus*	*fasciculatus*	LC	Asparagaceae	*Asparagus*	*juniperoides*	LC
Asphodelaceae	***Aloe***	***arenicola***	**NT**	Asphodelaceae	*Aloe*	*framesii*	NT
Asphodelaceae	*Bulbine*	*mesembryanthoides*	LC	Asphodelaceae	*Bulbine*	*praemorsa*	LC
Asphodelaceae	*Bulbinella*	*divaginata*	LC	Asphodelaceae	*Bulbinella*	*gracilis*	LC
Asphodelaceae	*Gasteria*	*pillansii*	LC	Asphodelaceae	*Trachyandra*	*bulbinifolia*	LC
Asphodelaceae	*Trachyandra*	*ciliata*	LC	Asphodelaceae	*Trachyandra*	*involucrata*	LC
Asphodelaceae	*Trachyandra*	*paniculata*	LC	Asphodelaceae	*Trachyandra*	*patens*	LC
Asphodelaceae	*Trachyandra*	*revoluta*	LC	Asphodelaceae	*Trachyandra*	*zebrina*	LC
Asteraceae	*Adenoglossa*	*decurrens*	LC	Asteraceae	*Amellus*	*alternifolius*	LC

Asteraceae	*Amellus*	*coilopodius*	LC	Asteraceae	*Amellus*	*flosculosus*	LC
Asteraceae	*Amellus*	*microglossus*	LC	Asteraceae	*Amellus*	*tenuifolius*	LC
Asteraceae	*Amphiglossa*	*tomentosa*	LC	Asteraceae	*Arctotheca*	*calendula*	LC
Asteraceae	*Arctotis*	*auriculata*	LC	Asteraceae	*Arctotis*	*decurrens*	DD
Asteraceae	*Arctotis*	*diffusa*	LC	Asteraceae	*Arctotis*	*fastuosa*	LC
Asteraceae	*Arctotis*	*leiocarpa*	LC	Asteraceae	*Arctotis*	*revoluta*	LC
Asteraceae	*Athanasia*	*flexuosa*	LC	Asteraceae	*Berkheya*	*fruticosa*	LC
Asteraceae	*Bolandia*	*elongata*	LC	Asteraceae	*Chrysocoma*	*longifolia*	LC
Asteraceae	*Chrysocoma*	*puberula*	LC	Asteraceae	*Chrysocoma*	*schlechteri*	LC
Asteraceae	*Cotula*	*barbata*	LC	Asteraceae	*Cotula*	*coronopifolia*	LC
Asteraceae	*Cotula*	*leptalea*	LC	Asteraceae	*Crassothonna*	*cacalioides*	LC
Asteraceae	*Crassothonna*	*cylindrica*	LC	Asteraceae	*Crassothonna*	*floribunda*	LC
Asteraceae	*Crassothonna*	*sedifolia*	LC	Asteraceae	*Didelta*	*carnosa*	LC
Asteraceae	*Dimorphotheca*	*pluvialis*	LC	Asteraceae	*Dimorphotheca*	*polyptera*	LC
Asteraceae	*Dimorphotheca*	*sinuata*	LC	Asteraceae	*Eriocephalus*	*microphyllus*	LC
Asteraceae	*Eriocephalus*	*racemosus*	LC	Asteraceae	*Eriocephalus*	*racemosus*	LC
Asteraceae	*Eriocephalus*	*scariosus*	LC	Asteraceae	*Euryops*	*dregeanus*	LC
Asteraceae	*Felicia*	*dregei*	LC	Asteraceae	*Felicia*	*dubia*	LC
Asteraceae	*Felicia*	*hyssopifolia*	LC	Asteraceae	*Felicia*	*merxmuelleri*	LC
Asteraceae	*Felicia*	*tenella*	LC	Asteraceae	*Gazania*	*heterochaeta*	LC
Asteraceae	*Gazania*	*leiopoda*	LC	Asteraceae	*Gazania*	*rigida*	LC
Asteraceae	*Gazania*	*splendidissima*	NT	Asteraceae	*Gorteria*	*diffusa*	
Asteraceae	*Gorteria*	*diffusa*	LC	Asteraceae	*Helichrysum*	*hebelepis*	LC
Asteraceae	*Helichrysum*	*leontonyx*	LC	Asteraceae	*Helichrysum*	*marmarolepis*	NT
Asteraceae	*Helichrysum*	*micropoides*	LC	Asteraceae	*Helichrysum*	*pumilio*	
Asteraceae	*Helichrysum*	*pumilio*	LC	Asteraceae	*Hirpicium*	*echinus*	LC
Asteraceae	*Kleinia*	*cephalophora*	LC	Asteraceae	*Lasiopogon*	*muscoides*	LC
Asteraceae	*Lasiospermum*	*brachyglossum*	LC	**Asteraceae**	***Leucoptera***	***nodosa***	**VU**
Asteraceae	*Leysera*	*gnaphalodes*	LC	Asteraceae	*Leysera*	*tenella*	LC
Asteraceae	*Lopholaena*	*cneorifolia*	LC	Asteraceae	*Oncosiphon*	*grandiflorus*	LC
Asteraceae	*Oncosiphon*	*suffruticosus*	LC	Asteraceae	*Osteospermum*	*amplectens*	LC
Asteraceae	*Osteospermum*	*grandiflorum*	LC	Asteraceae	*Osteospermum*	*hyoseroides*	LC
Asteraceae	*Osteospermum*	*incanum*	LC	Asteraceae	*Osteospermum*	*monstrosum*	LC
Asteraceae	*Osteospermum*	*oppositifolium*	LC	Asteraceae	*Othonna*	*coronopifolia*	LC
Asteraceae	*Othonna*	*perfoliata*	LC	Asteraceae	*Othonna*	*retrorsa*	LC
Asteraceae	*Pegolettia*	*retrofracta*	LC	Asteraceae	*Pentatrichia*	*petrosa*	LC
Asteraceae	*Pentzia*	*incana*	LC	Asteraceae	*Pteronia*	*ciliata*	LC
Asteraceae	*Pteronia*	*divaricata*	LC	Asteraceae	*Pteronia*	*glabrata*	LC
Asteraceae	*Pteronia*	*glauca*	LC	Asteraceae	*Pteronia*	*incana*	LC
Asteraceae	*Pteronia*	*onobromoides*	LC	Asteraceae	*Pteronia*	*undulata*	LC
Asteraceae	*Rhynchopsidium*	*pumilum*	LC	Asteraceae	*Senecio*	*abbreviatus*	LC
Asteraceae	*Senecio*	*aloides*	LC	Asteraceae	*Senecio*	*arenarius*	LC
Asteraceae	*Senecio*	*cinerascens*	LC	Asteraceae	*Senecio*	*niveus*	LC
Asteraceae	*Senecio*	*sarcoides*	LC	Asteraceae	*Stoebe*	*nervigera*	LC
Asteraceae	*Ursinia*	*cakilefolia*	LC	Asteraceae	*Ursinia*	*calenduliflora*	LC
Asteraceae	*Ursinia*	*chrysanthemoides*	LC	Boraginaceae	*Lobostemon*	*glaucophyllus*	LC

Brassicaceae	*Heliophila*	*arenaria*	LC	Brassicaceae	*Heliophila*	*juncea*	LC
Brassicaceae	*Heliophila*	*lactea*	LC	Brassicaceae	*Heliophila*	*seselifolia*	NE
Campanulaceae	*Wahlenbergia*	*annularis*	LC	**Campanulaceae**	***Wahlenbergia***	***asparagoides***	**VU**
Campanulaceae	*Wahlenbergia*	*buseriana*	DD	Campanulaceae	*Wahlenbergia*	*capensis*	LC
Campanulaceae	*Wahlenbergia*	*oxyphylla*	LC	Campanulaceae	*Wahlenbergia*	*prostrata*	LC
Campanulaceae	*Wahlenbergia*	*thunbergiana*	LC	Caryophyllaceae	*Dianthus*	*namaensis*	
Caryophyllaceae	*Dianthus*	*namaensis*		Caryophyllaceae	*Dianthus*	*namaensis*	
Caryophyllaceae	*Pollichia*	*campestris*		Caryophyllaceae	*Silene*	*burchellii*	
Celastraceae	*Gymnosporia*	*buxifolia*	LC	Crassulaceae	*Adromischus*	*alstonii*	
Crassulaceae	*Adromischus*	*filicaulis*		Crassulaceae	*Adromischus*	*marianiae*	
Crassulaceae	*Cotyledon*	*orbiculata*	LC	Crassulaceae	*Cotyledon*	*orbiculata*	LC
Crassulaceae	*Cotyledon*	*papillaris*	LC	Crassulaceae	*Crassula*	*atropurpurea*	LC
Crassulaceae	*Crassula*	*barklyi*		Crassulaceae	*Crassula*	*campestris*	
Crassulaceae	*Crassula*	*cotyledonis*		Crassulaceae	*Crassula*	*elegans*	
Crassulaceae	*Crassula*	*elegans*		Crassulaceae	*Crassula*	*expansa*	
Crassulaceae	*Crassula*	*expansa*		Crassulaceae	*Crassula*	*lanceolata*	
Crassulaceae	*Crassula*	*macowaniana*	LC	Crassulaceae	*Crassula*	*muscosa*	
Crassulaceae	*Crassula*	*muscosa*		Crassulaceae	*Crassula*	*nudicaulis*	
Crassulaceae	*Crassula*	*subaphylla*		Crassulaceae	*Crassula*	*subaphylla*	
Crassulaceae	*Crassula*	*tetragona*		Crassulaceae	*Crassula*	*tomentosa*	
Crassulaceae	*Crassula*	*whiteheadii*	LC	Crassulaceae	*Tylecodon*	*buchholzianus*	
Crassulaceae	*Tylecodon*	*buchholzianus*		Crassulaceae	*Tylecodon*	*decipiens*	
Crassulaceae	*Tylecodon*	*grandiflorus*		Crassulaceae	*Tylecodon*	*pearsonii*	LC
Crassulaceae	*Tylecodon*	*reticulatus*		Crassulaceae	*Tylecodon*	*reticulatus*	LC
Crassulaceae	*Tylecodon*	*similis*		Cyperaceae	*Ficinia*	*laevis*	LC
Ebenaceae	*Diospyros*	*austro-africana*		Ebenaceae	*Euclea*	*tomentosa*	
Euphorbiaceae	*Euphorbia*	*caput-medusae*	LC	Euphorbiaceae	*Euphorbia*	*dregeana*	LC
Euphorbiaceae	*Euphorbia*	*hamata*	LC	Euphorbiaceae	*Euphorbia*	*mauritanica*	LC
Euphorbiaceae	*Euphorbia*	*phylloclada*	LC	Euphorbiaceae	*Euphorbia*	*rhombifolia*	LC
Euphorbiaceae	*Euphorbia*	*spartaria*	LC	Fabaceae	*Argyrolobium*	*velutinum*	VU
Fabaceae	*Aspalathus*	*acocksii*	LC	Fabaceae	*Aspalathus*	*acuminata*	LC
Fabaceae	*Aspalathus*	*petersonii*	LC	Fabaceae	*Aspalathus*	*pulicifolia*	LC
Fabaceae	*Aspalathus*	*quinquefolia*	LC	Fabaceae	*Aspalathus*	*spinescens*	LC
Fabaceae	*Calobota*	*angustifolia*	LC	Fabaceae	*Calobota*	*halenbergensis*	LC
Fabaceae	*Calobota*	*lotononoides*	NT	Fabaceae	*Crotalaria*	*excisa*	LC
Fabaceae	*Cullen*	*tomentosum*	LC	Fabaceae	*Faidherbia*	*albida*	LC
Fabaceae	*Indigofera*	*nigromontana*	LC	Fabaceae	*Lebeckia*	*ambigua*	LC
Fabaceae	*Lessertia*	*diffusa*	LC	Fabaceae	*Lessertia*	*falciformis*	LC
Fabaceae	*Lessertia*	*frutescens*	LC	Fabaceae	*Lessertia*	*globosa*	DD
Fabaceae	*Lessertia*	*incana*	LC	Fabaceae	*Lotononis*	*densa*	DD
Fabaceae	*Lotononis*	*falcata*	LC	Fabaceae	*Lotononis*	*parviflora*	LC
Fabaceae	*Melolobium*	*adenodes*	LC	Fabaceae	*Vachellia*	*erioloba*	LC
Fabaceae	*Vachellia*	*karroo*	LC	Fabaceae	*Wiborgia*	*fusca*	LC
Fabaceae	*Wiborgia*	*monoptera*	LC	Fabaceae	*Wiborgia*	*obcordata*	LC
Fabaceae	*Wiborgia*	*sericea*	LC	Fabaceae	*Wiborgia*	*tetraptera*	LC
Frankeniaceae	*Frankenia*	*pulverulenta*	LC	Frankeniaceae	*Frankenia*	*repens*	LC

Geraniaceae	*Monsonia*	*ciliata*	LC	Geraniaceae	*Pelargonium*	*adriaanii*	VU
Geraniaceae	*Pelargonium*	*echinatum*	LC	Geraniaceae	*Pelargonium*	*fulgidum*	LC
Geraniaceae	*Pelargonium*	*gibbosum*	LC	Geraniaceae	*Pelargonium*	*laxum*	
Geraniaceae	*Pelargonium*	*longiflorum*	LC	Geraniaceae	*Pelargonium*	*pulchellum*	LC
Hyacinthaceae	*Albuca*	*leucantha*		Hyacinthaceae	*Albuca*	*namaquensis*	
Hyacinthaceae	*Albuca*	*unifolia*		Hyacinthaceae	*Dipcadi*	*crispum*	
Hyacinthaceae	*Drimia*	*nana*		Hyacinthaceae	*Lachenalia*	*framesii*	
Hyacinthaceae	*Lachenalia*	*krugeri*		Hyacinthaceae	*Lachenalia*	*undulata*	
Hyacinthaceae	*Lachenalia*	*valeriae*		Hyacinthaceae	*Lachenalia*	*xerophila*	
Hyacinthaceae	*Ornithogalum*	*pruinosum*		Hyacinthaceae	*Veltheimia*	*capensis*	LC
Hypoxidaceae	*Pauridia*	*scullyi*	LC	Iridaceae	*Aristea*	*dichotoma*	LC
Iridaceae	*Babiana*	*curviscapa*	LC	Iridaceae	*Babiana*	*hirsuta*	NT
Iridaceae	*Babiana*	*lanata*	VU	Iridaceae	*Babiana*	*namaquensis*	VU
Iridaceae	*Babiana*	*pubescens*	LC	Iridaceae	*Babiana*	*striata*	LC
Iridaceae	*Babiana*	*tritonioides*	VU	Iridaceae	*Ferraria*	*ferrariola*	LC
Iridaceae	*Ferraria*	*macrochlamys*	LC	Iridaceae	*Ferraria*	*schaeferi*	LC
Iridaceae	*Ferraria*	*variabilis*	LC	Iridaceae	*Gladiolus*	*scullyi*	LC
Iridaceae	*Gladiolus*	*viridiflorus*	LC	Iridaceae	*Lapeirousia*	*fabricii*	LC
Iridaceae	*Lapeirousia*	*macrospatha*	LC	Iridaceae	*Lapeirousia*	*silenoides*	LC
Iridaceae	*Lapeirousia*	*spinosa*	LC	Iridaceae	*Lapeirousia*	*tenuis*	LC
Iridaceae	*Moraea*	*fugax*	LC	Iridaceae	*Moraea*	*gawleri*	LC
Iridaceae	*Moraea*	*margaretae*	LC	Iridaceae	*Moraea*	*miniata*	LC
Iridaceae	*Moraea*	*rivulicola*	LC	Iridaceae	*Moraea*	*saxicola*	LC
Iridaceae	*Moraea*	*schlechteri*	LC	Iridaceae	*Watsonia*	*meriana*	LC
Juncaceae	*Juncus*	*acutus*	LC	Lamiaceae	*Ballota*	*africana*	LC
Lamiaceae	*Salvia*	*africana-lutea*	LC	Lamiaceae	*Salvia*	*dentata*	LC
Lamiaceae	*Salvia*	*lanceolata*	LC	Lamiaceae	*Stachys*	*flavescens*	LC
Lamiaceae	*Stachys*	*rugosa*	LC	Limeaceae	*Limeum*	*africanum*	LC
Limeaceae	*Limeum*	*africanum*	LC	Limeaceae	*Limeum*	*fenestratum*	LC
Lobeliaceae	*Monopsis*	*debilis*	NE	Loranthaceae	*Tapinanthus*	*oleifolius*	LC
Malvaceae	*Hermannia*	*amoena*	LC	Malvaceae	*Hermannia*	*cuneifolia*	LC
Malvaceae	*Hermannia*	*disermifolia*	LC	Malvaceae	*Hermannia*	*incana*	LC
Malvaceae	*Hermannia*	*paucifolia*	LC	Malvaceae	*Hermannia*	*pfeilii*	LC
Malvaceae	*Hermannia*	*tomentosa*	LC	Malvaceae	*Hermannia*	*trifurca*	LC
Melianthaceae	*Melianthus*	*elongatus*	LC	Molluginaceae	*Adenogramma*	*glomerata*	LC
Molluginaceae	*Pharnaceum*	*albens*	LC	Molluginaceae	*Pharnaceum*	*confertum*	LC
Moraceae	*Ficus*	*ilicina*	LC	Neuradaceae	*Grielum*	*grandiflorum*	LC
Neuradaceae	*Grielum*	*humifusum*		Neuradaceae	*Grielum*	*humifusum*	LC
Neuradaceae	*Grielum*	*sinuatum*	LC	Oleaceae	*Menodora*	*juncea*	LC
Orchidaceae	*Holothrix*	*grandiflora*	DD	Orchidaceae	*Satyrium*	*erectum*	LC
Orobanchaceae	*Harveya*	*squamosa*	LC	Orobanchaceae	*Hyobanche*	*rubra*	LC
Orobanchaceae	*Hyobanche*	*sanguinea*	LC	Oxalidaceae	*Oxalis*	*crocea*	VU
Oxalidaceae	*Oxalis*	*exserta*	LC	Oxalidaceae	*Oxalis*	*flava*	
Oxalidaceae	*Oxalis*	*obtusa*	LC	Plumbaginaceae	*Dyerophytum*	*africanum*	LC
Plumbaginaceae	*Limonium*	*dregeanum*	LC	Poaceae	*Chaetobromus*	*involucratus*	LC
Poaceae	*Chaetobromus*	*involucratus*	LC	Poaceae	*Chaetobromus*	*involucratus*	LC

Poaceae	*Cladoraphis*	*cyperoides*	LC	Poaceae	*Cladoraphis*	*spinosa*	LC
Poaceae	*Ehrharta*	*barbinodis*	LC	Poaceae	*Ehrharta*	*brevifolia*	LC
Poaceae	*Ehrharta*	*calycina*	LC	Poaceae	*Ehrharta*	*delicatula*	LC
Poaceae	*Ehrharta*	*longiflora*	LC	Poaceae	*Ehrharta*	*longifolia*	LC
Poaceae	*Ehrharta*	*pusilla*	LC	Poaceae	*Eragrostis*	*curvula*	LC
Poaceae	*Fingerhuthia*	*africana*	LC	Poaceae	*Pentameris*	*patula*	LC
Poaceae	*Pentameris*	*tomentella*	LC	Poaceae	*Phragmites*	*australis*	LC
Poaceae	*Schismus*	*barbatus*	LC	Poaceae	*Schismus*	*schismoides*	LC
Poaceae	*Schmidtia*	*kalahariensis*	LC	Poaceae	*Sporobolus*	*ioclados*	LC
Poaceae	*Sporobolus*	*virginicus*	LC	Poaceae	*Stipagrostis*	*ciliata*	LC
Poaceae	*Stipagrostis*	*geminifolia*	NT	Poaceae	*Stipagrostis*	*obtusa*	LC
Poaceae	*Stipagrostis*	*zeyheri*	LC	Poaceae	*Tribolium*	*utriculosum*	LC
Poaceae	*Tricholaena*	*capensis*	LC	Polygalaceae	*Polygala*	*ephedroides*	LC
Polygalaceae	*Polygala*	*scabra*	LC	Polygonaceae	*Emex*	*australis*	LC
Proteaceae	*Leucadendron*	*brunioides*		Proteaceae	*Leucospermum*	*praemorsum*	VU
Ptychomitriaceae	*Ptychomitrium*	*crispatum*		Restionaceae	*Thamnochortus*	*bachmannii*	LC
Restionaceae	*Willdenowia*	*incurvata*	LC	Rubiaceae	*Galium*	*spurium-aparine*	NE
Rubiaceae	*Nenax*	*arenicola*	LC	Ruscaceae	*Eriospermum*	*aphyllum*	LC
Rutaceae	*Diosma*	*acmaeophylla*	LC	Santalaceae	*Lacomucinaea*	*lineata*	
Santalaceae	*Thesium*	*microcarpum*	DD	Santalaceae	*Viscum*	*capense*	
Sapindaceae	*Dodonaea*	*viscosa*		Scrophulariaceae	*Diascia*	*batteniana*	LC
Scrophulariaceae	*Diascia*	*namaquensis*	LC	Scrophulariaceae	*Hebenstretia*	*namaquensis*	LC
Scrophulariaceae	*Hebenstretia*	*repens*	LC	Scrophulariaceae	*Hebenstretia*	*robusta*	LC
Scrophulariaceae	*Jamesbrittenia*	*fruticosa*	LC	Scrophulariaceae	*Jamesbrittenia*	*merxmuelleri*	LC
Scrophulariaceae	*Jamesbrittenia*	*racemosa*	LC	Scrophulariaceae	*Lyperia*	*tristis*	LC
Scrophulariaceae	*Manulea*	*androsacea*	LC	Scrophulariaceae	*Manulea*	*nervosa*	LC
Scrophulariaceae	*Nemesia*	*bicornis*	LC	Scrophulariaceae	*Nemesia*	*lanceolata*	LC
Scrophulariaceae	*Nemesia*	*saccata*	VU	Scrophulariaceae	*Peliostomum*	*virgatum*	LC
Scrophulariaceae	*Phyllopodium*	*pumilum*	LC	Scrophulariaceae	*Zaluzianskya*	*affinis*	LC
Scrophulariaceae	*Zaluzianskya*	*benthamiana*	LC	Solanaceae	*Lycium*	*amoenum*	LC
Solanaceae	*Lycium*	*cinereum*	LC	Tecophilaeaceae	*Cyanella*	*hyacinthoides*	
Tecophilaeaceae	*Cyanella*	*orchidiformis*		Thymelaeaceae	*Passerina*	*truncata*	LC
Urticaceae	*Forsskaolea*	*candida*		Zygophyllaceae	*Roepera*	*cordifolia*	
Zygophyllaceae	*Roepera*	*morgsana*		Zygophyllaceae	*Roepera*	*spinosa*	
Zygophyllaceae	*Sisyndite*	*spartea*	LC				
Amaranthaceae	*Atriplex*	*eardleyae*		Boraginaceae	*Amsinckia*	*menziesii*	
Caryophyllaceae	*Spergularia*	*media*		Amaranthaceae	*Atriplex*	*cinerea*	
Fabaceae	*Medicago*	*laciniata*	NE	Geraniaceae	*Erodium*	*cicutarium*	
Poaceae	*Phalaris*	*minor*	NE	Poaceae	*Hordeum*	*murinum*	NE
Amaranthaceae	*Atriplex*	*lindleyi*		Amaranthaceae	*Atriplex*	*semibaccata*	
Geraniaceae	*Erodium*	*moschatum*		Brassicaceae	*Brassica*	*tournefortii*	

1.10.2. Appendix 2. List of Mammals

List of Mammals known from the broad area around the Komas site, based on the MammalMap Database (http://vmus.adu.org.za), with species confirmed present at the site indicated in **bold.**

Family	Genus	Species	Common name	Red list category
Bathyergidae	*Bathyergus*	*janetta*	Namaqua Dune Mole-rat	Least Concern
Bathyergidae	*Bathyergus*	*suillus*	Cape Dune Mole-rat	Least Concern
Bathyergidae	***Cryptomys***	***hottentotus***	**Southern African Mole-rat**	**Least Concern**
Bovidae	*Antidorcas*	*marsupialis*	Springbok	Least Concern
Bovidae	*Oreotragus*	*oreotragus*	Klipspringer	Least Concern
Bovidae	***Raphicerus***	***campestris***	**Steenbok**	**Least Concern**
Bovidae	***Sylvicapra***	***grimmia***	**Bush Duiker**	**Least Concern**
Canidae	***Canis***	***mesomelas***	**Black-backed Jackal**	**Least Concern**
Canidae	***Otocyon***	***megalotis***	**Bat-eared Fox**	**Least Concern**
Canidae	***Vulpes***	***chama***	**Cape Fox**	**Least Concern**
Cercopithecidae	*Papio*	*ursinus*	Chacma Baboon	Least Concern
Felidae	***Caracal***	***caracal***	**Caracal**	**Least Concern**
Felidae	***Felis***	***silvestris***	**African Wildcat**	**Least Concern**
Felidae	*Panthera*	*pardus*	Leopard	Vulnerable
Herpestidae	***Cynictis***	***penicillata***	**Yellow Mongoose**	**Least Concern**
Herpestidae	***Herpestes***	***pulverulentus***	**Cape Gray Mongoose**	**Least Concern**
Herpestidae	***Suricata***	***suricatta***	**Meerkat**	**Least Concern**
Hyaenidae	*Proteles*	*cristata*	Aardwolf	Least Concern
Hystricidae	***Hystrix***	***africaeaustralis***	**Cape Porcupine**	**Least Concern**
Leporidae	***Lepus***	***capensis***	**Cape Hare**	**Least Concern**
Leporidae	***Lepus***	***saxatilis***	**Scrub Hare**	**Least Concern**
Leporidae	*Pronolagus*	*rupestris*	Smith's Red Rock Hare	Least Concern
Macroscelididae	*Elephantulus*	*rupestris*	Western Rock Elephant Shrew	Least Concern
Macroscelididae	*Macroscelides*	*proboscideus*	Short-eared Elephant Shrew	Least Concern
Muridae	***Aethomys***	***namaquensis***	**Namaqua Rock Mouse**	**Least Concern**
Muridae	*Desmodillus*	*auricularis*	Cape Short-tailed Gerbil	Least Concern
Muridae	***Gerbilliscus***	***paeba***	**Paeba Hairy-footed Gerbil**	**Least Concern**
Muridae	*Otomys*	*auratus*	Southern African Vlei Rat	Least Concern
Muridae	*Otomys*	*unisulcatus*	Karoo Bush Rat	Least Concern
Muridae	*Parotomys*	*brantsii*	Brants's Whistling Rat	Least Concern
Muridae	*Parotomys*	*littledalei*	Littledale's Whistling Rat	Near Threatened
Muridae	***Rhabdomys***	***pumilio***	**Xeric Four-striped Grass Rat**	**Least Concern**
Mustelidae	*Aonyx*	*capensis*	African Clawless Otter	Near Threatened
Mustelidae	***Ictonyx***	***striatus***	**Striped Polecat**	**Least Concern**
Mustelidae	***Mellivora***	***capensis***	**Honey Badger**	**Least Concern**
Orycteropodidae	*Orycteropus*	*afer*	Aardvark	Least Concern
Petromuridae	*Petromus*	*typicus*	Dassie Rat	Least Concern
Procaviidae	*Procavia*	*capensis*	Rock Hyrax	Least Concern

Sciuridae	***Xerus***	***inauris***	**South African Ground Squirrel**	**Least Concern**
Soricidae	*Crocidura*	*cyanea*	Reddish-gray Musk Shrew	Least Concern
Soricidae	*Suncus*	*varilla*	Lesser Dwarf Shrew	Least Concern
Viverridae	*Genetta*	*genetta*	Common Genet	Least Concern

1.10.3. Appendix 3. List of Reptiles

List of Reptiles known from the vicinity of the Komas site, based on records from the ReptileMap database. Conservation status is from Bates *et al*. 2013.

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
Chamaeleonidae	*Bradypodion*	*occidentale*		Western Dwarf Chameleon	Least Concern
Chamaeleonidae	*Chamaeleo*	*namaquensis*		Namaqua Chameleon	Least Concern
Colubridae	*Dipsina*	*multimaculata*		Dwarf Beaked Snake	Least Concern
Colubridae	*Telescopus*	*beetzii*		Beetz's Tiger Snake	Least Concern
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern
Elapidae	*Aspidelaps*	*lubricus*	*lubricus*	Coral Shield Cobra	Not listed
Elapidae	*Naja*	*nivea*		Cape Cobra	Least Concern
Gekkonidae	*Chondrodactylus*	*angulifer*	*angulifer*	Common Giant Ground Gecko	Least Concern
Gekkonidae	*Chondrodactylus*	*bibronii*		Bibron's Gecko	Least Concern
Gekkonidae	*Goggia*	*lineata*		Northern Striped Pygmy Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*austeni*		Austen's Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*barnardi*		Barnard's Rough Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*labialis*		Western Cape Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*weberi*		Weber's Gecko	Least Concern
Gekkonidae	*Phelsuma*	*ocellata*		Namaqua Day Gecko	Least Concern
Gekkonidae	*Ptenopus*	*garrulus*	*maculatus*	Spotted Barking Gecko	Least Concern
Gerrhosauridae	*Cordylosaurus*	*subtessellatus*		Dwarf Plated Lizard	Least Concern
Gerrhosauridae	*Gerrhosaurus*	*typicus*		Karoo Plated Lizard	Least Concern
Lacertidae	*Meroles*	*ctenodactylus*		Giant Desert Lizard	Least Concern
Lacertidae	*Meroles*	*knoxii*		Knox's Desert Lizard	Least Concern
Lacertidae	*Meroles*	*suborbitalis*		Spotted Desert Lizard	Least Concern
Lacertidae	*Nucras*	*tessellata*		Western Sandveld Lizard	Least Concern
Lamprophiidae	*Lamprophis*	*guttatus*		Spotted House Snake	Least Concern
Lamprophiidae	*Prosymna*	*frontalis*		Southwestern Shovel-snout	Least Concern
Lamprophiidae	*Psammophis*	*crucifer*		Cross-marked Grass Snake	Least Concern
Lamprophiidae	*Psammophis*	*namibensis*		Namib Sand Snake	Least Concern
Lamprophiidae	*Psammophis*	*notostictus*		Karoo Sand Snake	Least Concern
Lamprophiidae	*Psammophylax*	*rhombeatus*	*rhombeatus*	Spotted Grass Snake	Least Concern
Lamprophiidae	*Pseudaspis*	*cana*		Mole Snake	Least Concern
Scincidae	*Acontias*	*litoralis*		Coastal Dwarf Legless Skink	Least Concern
Scincidae	*Acontias*	*tristis*		Namaqua Dwarf Legless Skink	Least Concern
Scincidae	*Scelotes*	*caffer*		Cape Dwarf Burrowing Skink	Least Concern
Scincidae	*Scelotes*	*sexlineatus*		Striped Dwarf Burrowing Skink	Least Concern
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern

Scincidae	*Trachylepis*	*variegata*		Variegated Skink	Least Concern
Scincidae	*Typhlosaurus*	*vermis*		Pink Blind Legless Skink	Least Concern
Testudinidae	*Chersina*	*angulata*		Angulate Tortoise	Least Concern
Testudinidae	*Psammobates*	*tentorius*	*trimeni*	Namaqua Tent Tortoise	Not listed
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern

1.10.4. Appendix 4. List of Amphibians

List of Amphibians known from the vicinity of the Komas site, based on records from the FrogMap database. Conservation status is from Minter et al. 2004.

Family	Genus	Species	Subspecies	Common name	Red list category
Brevicepitidae	*Breviceps*	*macrops*		Desert Rain Frog	Vulnerable
Brevicepitidae	*Breviceps*	*namaquensis*		Namaqua Rain Frog	Least Concern
Bufonidae	*Vandijkophrynus*	*gariepensis*	*gariepensis*	Karoo Toad (subsp. gariepensis)	Not listed
Bufonidae	*Vandijkophrynus*	*robinsoni*		Paradise Toad	Least Concern
Pipidae	*Xenopus*	*laevis*		Common Platanna	Least Concern
Pyxicephalidae	*Amietia*	*fuscigula*		Cape River Frog	Least Concern
Pyxicephalidae	*Tomopterna*	*delalandii*		Cape Sand Frog	Least Concern