RIPPONNN WIND FARM NEAR COOKHOUSE:

FAUNA & FLORA SPECIALIST IMPACT ASSESSMENT REPORT

PRODUCED FOR SAVANNAH ENVIRONMENTAL

3Foxes Biodiversity Solutions

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

Requirements of Appendix 6 – GN R326 2014 EIA Regulations, 7 April 2017	**Addressed in the Specialist Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- b) 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;	6
c) a declaration that the specialist is independent in a form as may be specified by the competent authority;	7
d) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3
e) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.3
f) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
g) 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;	Section 3
h) an identification of any areas to be avoided, including buffers;	Section 3
i) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3
j) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.3
k) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 3
l) any mitigation measures for inclusion in the EMPr;	Section 7
m) any conditions for inclusion in the environmental authorisation;	Section 5
n) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7
o) 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	Section 6

mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
p) a description of any consultation process that was undertaken during the course of preparing the specialist report;	See Main Report
q) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See Main Report
r) any other information requested by the competent authority.	
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

Short CV/Summary of Expertise – Simon Todd

ECOLOGICAL SPECIALIST SERVICES

Assessment/Management/Research

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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 current 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

Environmental Impact Assessment for the Proposed Komsberg East and Komsberg West Wind Farms and Associated Grid Connection Infrastructure: Fauna & Flora Specialist Impact Assessment. Arcus Consulting 2014.

Proposed Rietkloof & Brandvallei Wind Farms and Associated Grid Connection Infrastructure: Fauna & Flora Specialist Impact Assessment Report. EOH 2016.

Proposed Gunstfontein Wind Farm and Associated Grid Connection Infrastructure: Fauna & Flora Specialist Impact Assessment Report. Savannah Environmental 2016.

Mainstream South Africa Dwarsrug Wind Energy Facility: Fauna & Flora Specialist Impact Assessment Report. Sivest 2014.

Phezukomoya and San Kraal Wind Energy Facilities and associated grid connection. Fauna and Flora specialist studies. Arcus Consulting 2018.

Kokerboom Wind Energy Facilities (1-4) and associated grid connections. Fauna and Flora specialist studies. Aurecon 2017.

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 as amended 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: ____26 July 2021_____

EXECUTIVE SUMMARY

Ripponnn (Pty) Ltd is proposing the development of a commercial wind farm and associated infrastructure on a site located approximately 28km south of Cookhouse. A preferred project site with an extent of ~5418 ha has been identified by Ripponn (Pty) Ltd as a technically suitable area for the development of the Ripponnn Wind Farm with a contracted capacity of up to 324MW that can accommodate up to 36 turbines. As part of the required BA process, this ecological specialist study details the ecological characteristics of the site and provides an assessment of the likely ecological impacts associated with the development of the Ripponn Wind Farm (a wind energy facility (WEF)). Impacts are assessed for the construction, operation, and decommissioning phases of the development and a variety of mitigation and avoidance measures are recommended to reduce the impact of the development on the receiving environment.

A site visit and desktop review of the available ecological information for the area was conducted in order to identify and characterise the ecological features of the site and inform an ecological sensitivity map for the site, which has been used to guide development at the site. The Ripponn Wind Farm site falls largely within the Great Fish Thicket vegetation type. Based on the field assessment, there are no clear boundaries between the areas of Great Fish Thicket, Albany Broken Veld and Bedford Dry Grassland, suggesting that the area represents a broad transitional area between these vegetation types. The majority of the site consists of mixed, relatively open savannah thornveld or scrub intermingled with shorter grassy shrublands considered to be of low or medium sensitivity. The slopes and valleys of the site, where the density of woody species and thicket communities is higher, are considered to be of high or very high sensitivity.

In terms of fauna, there are several listed mammals which occur in the area and which would potentially be impacted by the development. This includes the Brown Hyena, Serval, White-tailed Mouse, African Striped Weasel, Black-footed Cat, Leopard, Grey Rhebok and Mountain Reedbuck. Of greatest potential concern are the Mountain Reedbuck, Grey Rhebok and Black-footed Cat which are the listed species most likely to maintain free-ranging populations within the affected area, within habitats that would potentially be affected by the development. Mountain Reedbuck and Grey Rhebok are likely to be displaced during construction but would likely move back into the affected areas once the facility is operational as they are likely to become at least partially habituated to the presence and operation of the wind turbines. There are no listed amphibians or reptiles which are known to occur in the vicinity of the site.

The Ripponn Wind Farm site has not been well-sampled historically, with the result that there are fewer plant species of conservation concern known from the area than might be expected. Of the three reported plant species of concern recorded in the area, only *Crinum campanulatum* and *Crassula decidua* are of potential concern. However, the former is associated with pans and

wetlands and therefore not likely to be impacted, while *Crassula decidua* is associated with karroid scrub near drainage lines which are low-lying areas likely to be largely avoided by the wind farm.

Under the layout assessed, there are six turbines within CBA 2 areas and an additional 15 turbines within ESAs. The CBA 2 areas and many of the affected ESAs are driven largely by the expected presence of avifauna of concern in the area. The estimated footprint within the ESA is 17.84 ha and 8 ha within the areas of CBA 2. Although development within CBAs is undesirable and can negatively impact the biodiversity value and ecological functioning of the affected CBAs, the development footprint within the CBAs is relatively low and the loss of less than 10 ha of total habitat within the CBA 2 area is considered to have a moderate to low localised impact and is considered acceptable. In addition, the 2016 NPAES does not include any focus areas within 20km of the site, indicating that the development would not impact future conservation expansion priorities.

In terms of cumulative impacts in and around the Ripponn site, there are several operational and approved wind energy facilities in the area, most notably east of Cookhouse, with an approximate footprint of 600ha. The planned facilities which are not yet constructed would have a footprint of approximately 500ha. Apart from the above facilities, the current suite of projects would include the Ripponn WEF as well as an additional 4 planned projects. The majority of these projects are located within the Bedford Dry Grassland and Great Fish Thicket vegetation types. As these vegetation types are classified as Least Concern and have not experienced a high degree of transformation to date, the contribution of the Ripponn project (ca. 40 ha) to cumulative impact is considered acceptable.

Impact Statement

There are no impacts associated with the Ripponn Wind Farm that cannot be mitigated to an acceptable level and as such, the assessed layout is considered acceptable. With the application of relatively simple mitigation and avoidance measures, the impact of the Ripponn Wind Farm on the local environment can be reduced to an acceptable magnitude. The contribution of the Ripponn Wind Farm development to cumulative impact in the area would be low and is considered acceptable. Overall, there are no specific long-term impacts likely to be associated with the development of the Ripponn Wind Farm that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

1 INTRODUCTION

Ripponn (Pty) Ltd is proposing the development of a commercial wind farm and associated infrastructure on a site located approximately 28km south of Cookhouse (measured from the centre of the site) within the Blue Crane Route Local Municipality and the Sarah Baartman District Municipality in the Eastern Cape Province. A preferred project site with an extent of ~5418 ha has been identified by Ripponn (Pty) Ltd as a technically suitable area for the development of the Ripponn Wind Farm with a contracted capacity of up to 324MW that can accommodate up to 36 turbines. The entire project site is located within the Cookhouse Renewable Energy Development Zone (REDZ). Due to the location of the project site within the REDZ, a Basic Assessment (BA) process will be undertaken in accordance with GN114 as formally gazetted on 16 February 2018. Ripponn (Pty) Ltd has appointed Savannah Environmental as the independent Environmental Assessment Practitioner (EAP) to undertake the required environmental authorisation process for the proposed Ripponn Wind Farm. Savannah Environmental has, in turn, appointed 3Foxes Biodiversity Solutions to provide a terrestrial fauna and flora specialist impact assessment study of the proposed development as part of the BA process.

The purpose of the terrestrial fauna and flora specialist Basic Assessment study 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 a wind energy facility on the site. A desktop review of the available ecological information for the area as well as a number of site visits and a field assessment 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 study is detailed in Section 1.1 below.

1.1 SCOPE OF STUDY

The scope of 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 Environmental Management Programme (EMPr);
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- a description of any assumption's uncertainties 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 minimize 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:
    - Pre-construction
    - Construction
    - Operation
    - Decommissioning

1.2 ASSESSMENT APPROACH & PHILOSOPHY

This assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 982) in terms of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA), as well as the recently promulgated notice issued in terms of NEMA, *"National Environmental Management Act, 1998 (Act No. 107 Of 1998): Procedures to be followed for the*

assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation [G 43110 – GN 320]". The applicable site verification report as required, is included under Annex 5 of this report and the required *Protocols for the assessment and reporting of environmental impacts on terrestrial animal species, plant species and terrestrial biodiversity are* provided in Annex 6-8. It should however be noted that this assessment does not need to be aligned with the protocols, since the DEA has indicated that irrespective of whether an EA application for a development has been submitted, if an assessment started before the protocols came into effect on 9 May 2020 the protocols are not applicable and the assessment should adhere Appendix 6 of the EIA regulations. Since this assessment commenced in 2019, the study should comply with Appendix 6. However, the content of this report is aligned to be compliant to Appendix 6 and protocols.

In terms of NEMA, this report assesses 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;
- 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.

1.3 RELEVANT ASPECTS OF THE DEVELOPMENT

Ripponn (Pty) Ltd is proposing the development of a commercial wind farm and associated infrastructure on a site located approximately 27km south-east of Somerset East and 20km south-west of Cookhouse (measured from the centre of the site) within the Blue Crane Route Local Municipality and the Sarah Baartman District Municipality in the Eastern Cape Province. A preferred project site with an extent of ~5418 ha has been identified by Ripponn (Pty) Ltd as a technically suitable area for the development of the Ripponn Wind Farm with a contracted capacity of up to 324MW that can accommodate up to 37 turbines. The entire project site is located within the Cookhouse Renewable Energy Development Zone (REDZ). The Ripponn Wind Farm project site is proposed to accommodate the following infrastructure, which will enable the wind farm to supply a contracted capacity of up to 324MW:

- Up to 36 wind turbines with a maximum hub height of up to 166m. The tip height of the turbines will be up to 246m;
- A 132/33kV on-site collector substation to be connected to a proposed 400kV Main Transmission Substation (MTS) located to the south via a new 132kV overhead power line (twin turn dual circuit line). The development of the proposed 400kV Main Transmission Substation will be assessed as part of the separate BA process in order to obtain Environmental Authorisation;
- Concrete turbine foundations and turbine hardstands;
- Temporary laydown areas which will accommodate the boom erection, storage and assembly area;
- Cabling between the turbines, to be laid underground where practical;
- Access roads to the site and between project components with a width of approximately 4,5m;
- A temporary concrete batching plant;
- Staff accommodation (temporary); and
- Operation and Maintenance buildings including a gate house, security building, control centre, offices, warehouses, a workshop and visitors' centre.

A development envelope for the placement of the wind energy facility infrastructure (i.e., development footprint) has been identified within the project site and assessed as part of the BA process. The development envelope is ~5418ha in extent and the much smaller development footprint of ~40 ha will be placed and sited within the development envelope.

In terms of the above estimated footprint of 40 ha, this represents the hardened footprint of the development at operation. However, during construction, there would be additional temporary disturbance along roads, at turbine hard stands, at the construction camp and other temporary staging areas and development footprints. This has been calculated at approximately 100 ha and although some of this disturbed area will recover and be available for fauna and flora, the 100 ha of disturbed ground following construction is used for the current assessment and represents the worst-case scenario in terms of ecological impact.

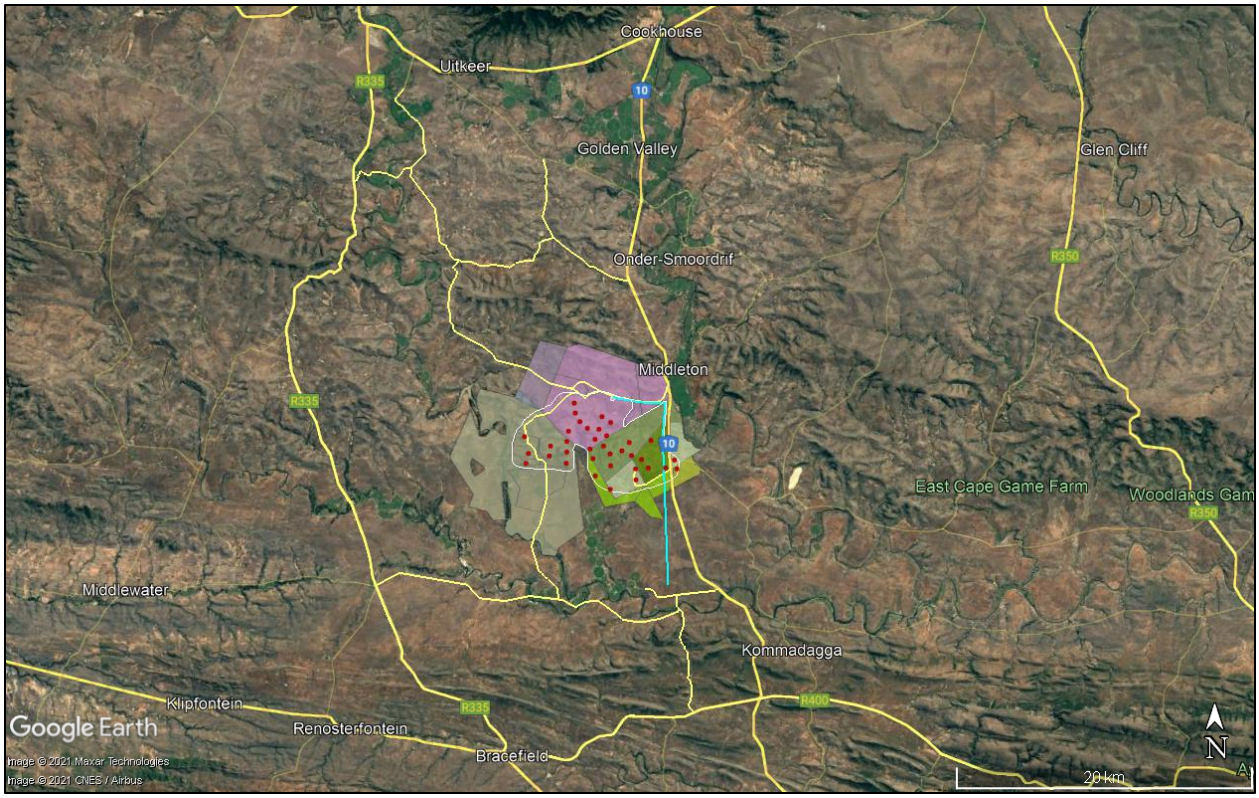


Figure 1. Location map of the Ripponn Wind Farm, showing the location along the N10, south of Cookhouse.

2 METHODOLOGY

2.1 DATA SOURCING AND REVIEW

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

Vegetation:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2012 and SANBI 2018 update).
- Information on plant and animal species recorded for the wider area was extracted from the SABIF/SIBIS database hosted by 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 (2021).

Ecosystem:

- Freshwater and wetland information was extracted from the 2018 NBA and the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Critical Biodiversity Areas in the study area were obtained from the 2019 Eastern Cape Biodiversity Plan (Desmet & Hawley 2019).

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, 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 (2018).

2.2 Site Visits & Field Assessment

The Ripponn Wind Farm site was visited and sampled over four days from the 30th June to 3rd of July 2020 for the current study. During the site visit, the different biodiversity features, habitat, and landscape units present at the site were identified, mapped and characterised in the field. Specific features visible on the satellite imagery of the site were also marked for field inspection and were verified and assessed during the site visit. Walk-through-surveys were conducted within representative areas across the different habitat units identified and all plant and animal species observed were recorded.

2.3 Sensitivity Mapping & 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 or quartz outcrops 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 usually constrained to some degree 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	10%	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	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	2%	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.

2.4 Limitations & Assumptions

The current study is based on a detailed field assessment as well as an associated desktop study. The conditions at the time of the site visit were acceptable for the field assessment. Although it was the drier winter months, this followed a late wet season with the result that the vegetation of

the site was still in an adequate condition for the field assessment with the majority of species present still identifiable. As a result, the vegetation surveys conducted at the site are considered reliable and the species lists obtained for the site are considered comprehensive, with few species that would not have been present at the time of the field assessment. As a result of the timing and favourable conditions associated with the site visits, there are few significant limitations with regards to the results of the field assessment for vegetation. The presence of some fauna is difficult to verify in the field as these may be shy or rare and their potential presence at the site must be evaluated based on the literature and available databases. In many cases, these databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many remote areas have not been well sampled with the result that the species lists derived for the area do not always adequately reflect the actual fauna and flora present at the site. In order to reduce this limitation, and ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study site.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 BROAD-SCALE VEGETATION PATTERNS

The national vegetation map (Mucina & Rutherford 2006, SANBI 2018 update) for the study area is depicted below in Figure 2. Almost the entire Ripponn Wind Farm site is mapped as falling within the Great Fish Thicket vegetation type, with a slight intrusion of Albany Broken Veld along the southern boundary of the site. There is also a small extent of Southern Karoo Riviere along the larger drainage features of the site. Although this provides a coarse representation of the vegetation of the site, there is some differentiation of the vegetation based on aspect, elevation and moisture availability. A fine-scale habitat map derived from field observations at the site is depicted below in Figure 3. Each of the vegetation types present within the Ripponn site are described and illustrated below.

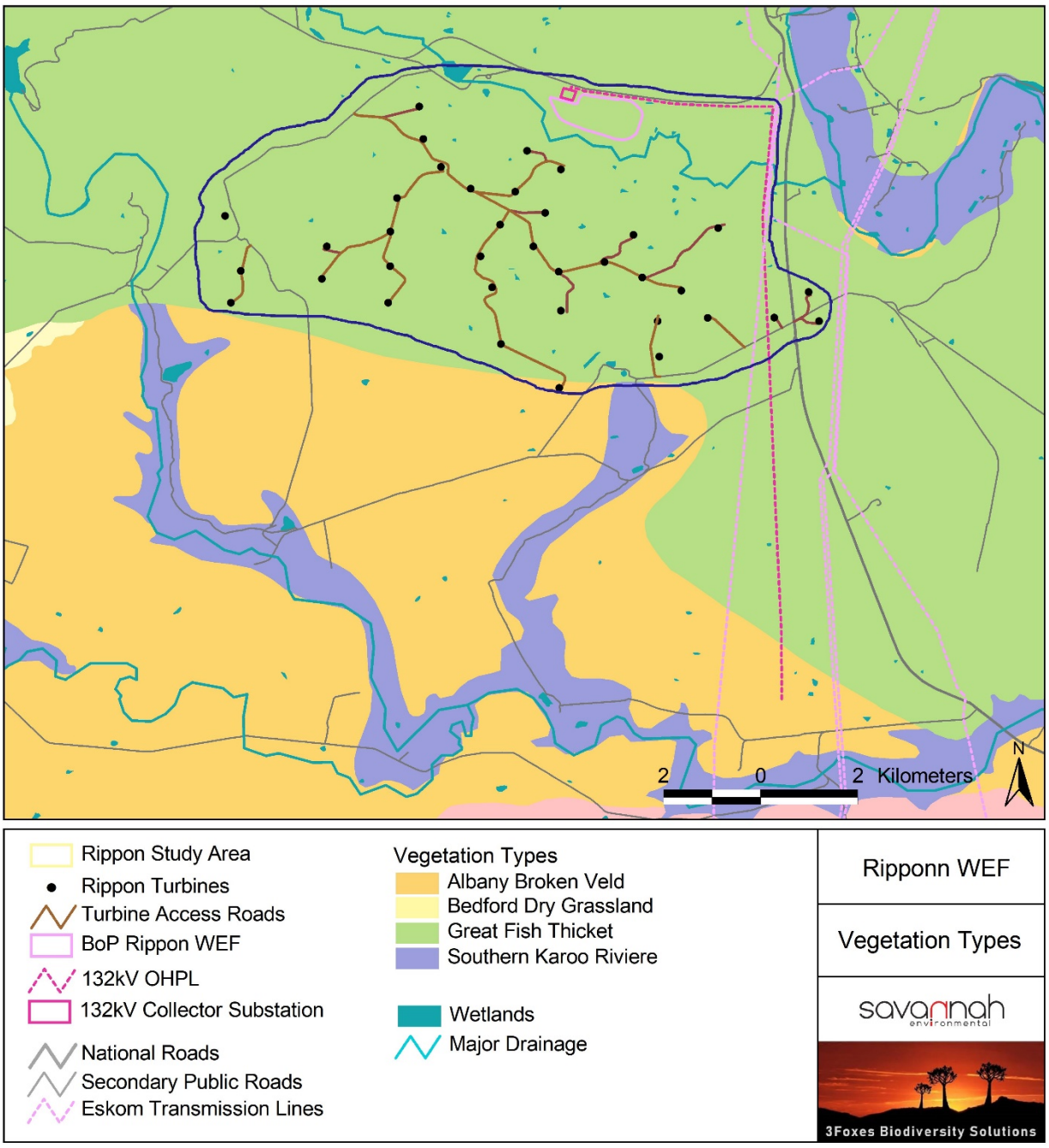


Figure 2. The 2018 update of the national vegetation map for the study area showing that the whole of the Ripponn site consists of Great Fish Thicket.

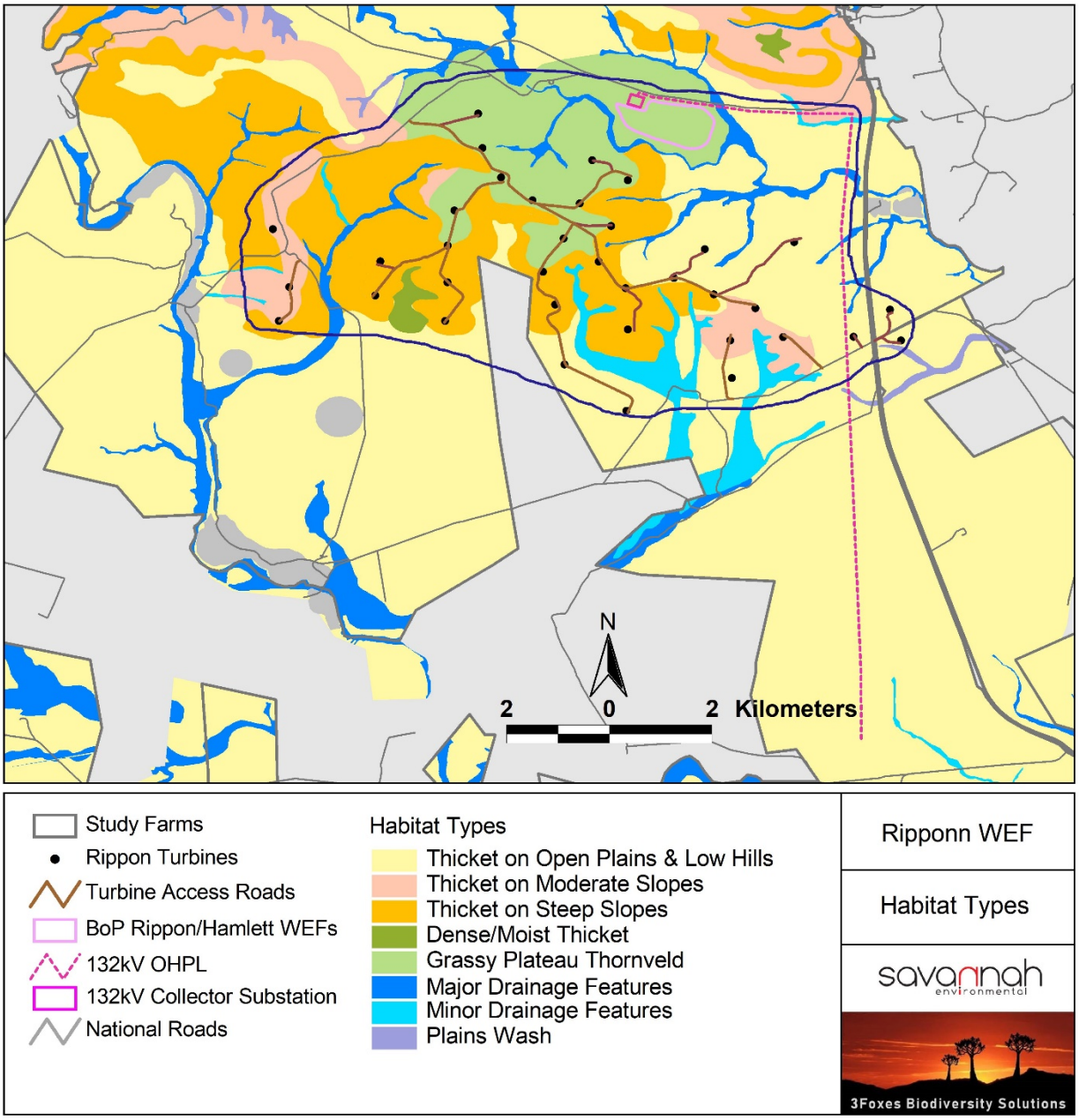


Figure 3. Fine-scale vegetation map of the Ripponn Wind Farm site, illustrating the different vegetation types and habitats present at the site and their distribution.

Great Fish Thicket

Great Fish Thicket is restricted to the Eastern Cape Province, mainly in the lower Great Fish River and Keiskamma River Valleys, extending up the Great Fish River Valley northwards to Cookhouse and into the southernmost part of the Cradock District. Extending up the Keiskamma River Valley as far as its confluence with the Tyume River. It is associated with the steep slopes

of deeply dissected rivers supporting short, medium and tall thicket types, where both the woody trees and shrubs and the succulent component are well-developed, with many spinescent shrubs. *Portulacaria afra* is locally dominant, decreasing in relative abundance and is replaced by *Euphorbia bothae* with increasing aridity. With increasing moisture status on southern aspects and in the riparian zone, *P.afra* is replaced by woody elements and tall emergent *Euphorbia tetragona* and *E.triangularis*. Great Fish Thicket is classified as least threatened, but less than 10% is formally conserved. Great Fish Thicket has not been significantly transformed by agriculture and only 3% has been lost to cultivation and an additional 1% to urbanisation.

Within the site, there is very little *Portulacaria afra* present and while this may be as a result of overgrazing, this seems to be natural and the vegetation of the site appears to represent a broad transition area between Great Fish Thicket and Bedford Dry Grassland, with thicket-leaning communities in wetter areas and south-facing slopes and grassland-leaning communities on dry slopes and high-elevation areas. The Great Fish Thicket in the study area is dominated by trees and large shrubs such as *Pappea capensis*, *Schotia afra* var. *afra*, *Olea europaea* subsp. *africana*, *Grewia occidentalis*, *Putterlickia pyracantha, Ehretia rigida*, *Cussonia spicata*, *Carissa bispinosa* subsp. *bispinosa*, *Kalanchoe rotundifolia, Mestoklema tuberosum* and *Euclea undulata*. The grass and forb layer is dominated by species such as *Digitaria eriantha*, *P. maximum*, *Themeda triandra, Hibiscus pusillus Sansevieria hyacinthoides* and *Aloe striata*.

Figure 4. Typical Great Fish Thicket vegetation of the Ripponn site, with scattered trees and large shrubs within a grassy matrix. Dense thicket is visible on the south-facing thicket in the foreground with tall *Euphorbia triangularis* trees.

Figure 5. Typical landscape within the north of the Ripponn site, showing the relatively open nature of the veld and dominance of perennial grasses.

Figure 6. Example of the landscape within the Ripponn site, with a minor drainage draining the typical low hills which characterise a large part of the site.

Albany Broken Veld

Although there is little Albany Broken veld within the site itself, the vegetation along the power line towards the MTS has been mapped within the VegMap as Albany Broken Veld. In the field, there is however very little to differentiate these areas from the adjacent Great Fish Thicket and the site appears to fall within a transition area between these two vegetation types. Albany Broken Veld is restricted to the Eastern Cape Province, from north of the Zuurberg Mountains and south of Middlewater, Redding and the area around the confluence of the Great and Little Fish Rivers and extending eastwards, north of the mountain ridges around Riebeeck East to the Carlisle Bridge area and south of these ridges in the upper Bushmans River Valley past Alicedale and up the New Years River Valley, including also some irregular linear patches east of Riebeeck East. Typical and characteristic species observed in the area include trees such as *Acacia natalitia*, *Euclea undulata*, *Pappea capensis*, *Schotia afra* var. *afra*, *Boscia oleoides* and *Cussonia spicata*. Common and dominant sharubs include *Grewia robusta*, *Lycium cinereum*, *Putterlickia pyracantha*, *Rhigozum obovatum*, *Rhus incisa* var. *effusa*, *Asparagus striatus*, *A. suaveolens*, *Becium burchellianum*, *Chrysocoma ciliata*, *Selago fruticosa*, *Eriocephalus ericoides* subsp. *ericoides*, *Felicia filifolia*, *F. muricata*, *Gnidia cuneata*, *Helichrysum dregeanum*, *Hermannia linearifolia*, *Indigofera sessilifolia*, *Pentzia incana* and *Rosenia humilis*. Succulents present include *Aloe ferox*, *Aloe striata*, *Cotyledon campanulata*, *Drosanthemum lique* and *Mestoklema tuberosum*. Forbs and herbs present include *Gazania krebsiana*, *Hermannia pulverata*, *Hibiscus pusillus*, *Bulbine frutescens* and *Drimia altissima*. Perennial and annual grasses present include *Aristida congesta*, *Eragrostis obtusa*, *Sporobolus fimbriatus*, *Tragus berteronianus*, *Cynodon incompletus*, *Digitaria eriantha*, *Ehrharta calycina*, *Eragrostis curvula*, *Setaria sphacelata* and *Tragus koelerioides*. Although there are areas within this vegetation type that are considered sensitive, in general and in context of the site, this is not considered to represent a very sensitive vegetation type.

Azonal Habitats

Although there are no major drainage lines within the site, it is flanked in the east by the Great Fish River and in the west by the Klein Fish River. These areas are mapped as the Southern Karoo Riviere vegetation type. The Southern Karoo Riviere vegetation type is associated with the rivers of the central karoo such as the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega and Sundays Rivers. About 12% has been transformed as a result of intensive agriculture and the construction of dams. Species present along the drainage lines include *Acacia natalita*, *Searsia pyroides* var. *gracilis*, *Cyperus textilis*, *Sporobolus fimbriatus*, *Limonium* sp., *Phragmites australis*, *Galenia sarcophylla* and *Cynodon incompletus*. The drainage lines are considered important habitats for fauna and flora and should be avoided as much as possible.

3.2 LISTED PLANT SPECIES

According to the SANBI POSA database, only 109 species have been recorded from the broader study area, bounded by the Fish River in the east and the R335 in the west. This is clearly an underestimate and indicates that the area has not been well-sampled in the past. In order to address this deficiency, the area of interest was expanded significantly and the area sampled extends from Cookhouse and Somerset East in the north, to Bracefield and Kommadagga in the south. Within this larger area, 277 records were returned, including three listed species as described below in Table 2. Of the three listed species, one is erroneous and does not occur in the Eastern Cape and another is not known from the study area and is not likely present. The third, *Crassula decidua*, is poorly known but has been recorded from Cookhouse, Somerset East and Cradock, where it appears to be associated with low karroid vegetation or in amongst succulent *Euphorbia* shrubs close to rivers. As such, it is possible that this species is present on the Ripponn site. However, this species was not observed and if present it is not likely that it would be significantly affected by the development, given its' likely association with drainage features. However, it is clear that the area has not been well sampled in the past and as a result, it is recommended that the development is subject to a preconstruction walk-through of the development footprint and if any listed species are found to be present in the affected areas, it is likely most can be avoided through turbine or road micro-siting and those that cannot be avoided can be translocated to safety if necessary.

Table 2. List of plant species of conservation concern that are known to occur in the wider area around the site and their potential to be present within the site based on their recorded distribution and habitat requirements.

Family	Genus	Species	Status	Comment
Aizoaceae	*Drosanthemum*	*crassum*	NT	This species is restricted to the Western Cape and the record for the study area is likely due to taxonomic changes or misidentified specimens.
Amaryllidaceae	*Crinum*	*campanulatum*	NT	Occurs in the Albany district, between Alexandria, Grahamstown, Bathurst and East London. As such, this species is highly unlikely to occur within the site. As it is associated with wetlands, there would also be minimal suitable habitat for this species within the site.
Crassulaceae	*Crassula*	*decidua*	NT	Occurs near Cookhouse, Somerset East and Cradock where it is associated with low karroid vegetation or in amongst succulent *Euphorbia* shrubs close to rivers.

3.3 FAUNAL COMMUNITIES

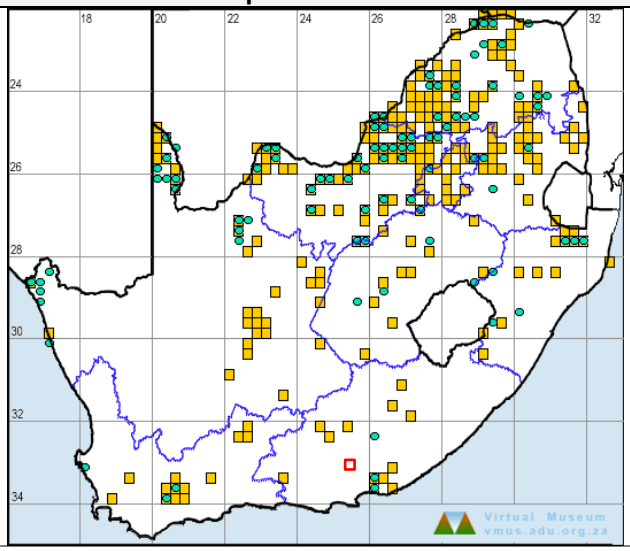
Mammals

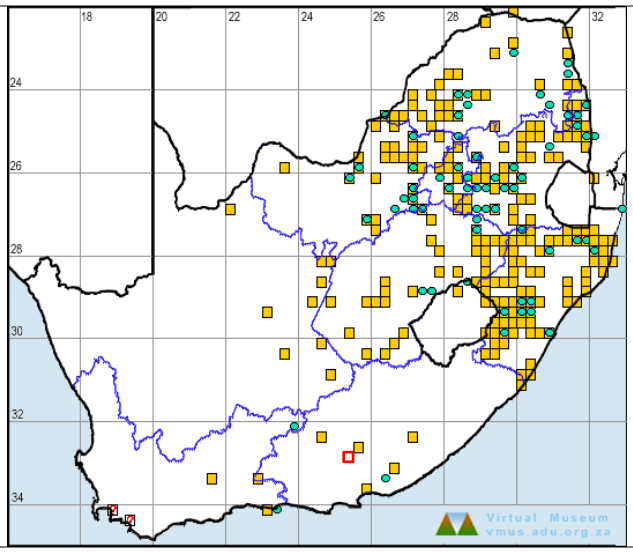
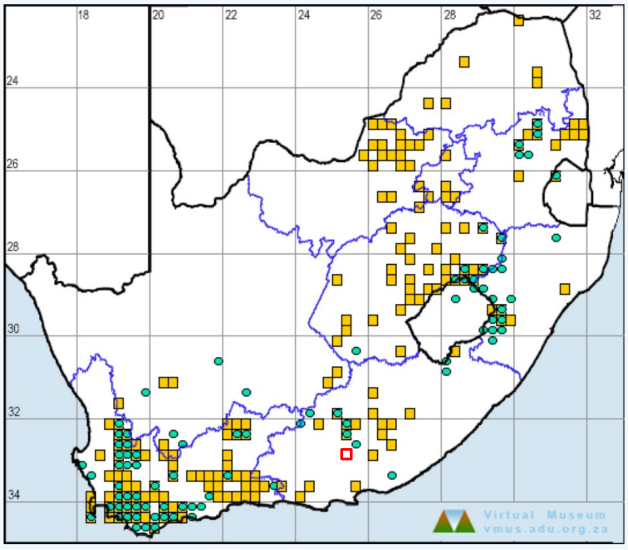
As many as 50 different naturally-occurring mammal species have been recorded from the vicinity of the Ripponn site (Appendix 2). Common species observed during the site visit include Steenbok, Common Duiker, Kudu, Cape Porcupine, South African Ground Squirrel, Springhare, Aardvark, Grey Mongoose, Yellow Mongoose, Cape Hare, Bat-eared Fox, Vervet Monkey, Chacma Baboon, Suricate, Caracal and Black-backed Jackal. There is also some game farming in the area, with the result that there are also several introduced or farmed species present in the area, but as these populations are mostly maintained and managed by the landowners, they are not considered further here. Apart from the above common species, there are also several red-listed mammals which are confirmed present in the area or which may be present. These are detailed below in Table 3 and include Brown Hyena, Serval, White-tailed Rat, African Striped Weasel, Grey Rhebok, Black-footed Cat, Leopard and Mountain Reedbuck. Some of these species occur in the wider area at a low density and do not have well-established populations outside of conservation areas and larger game farms. Of greatest potential concern for the Ripponn development are likely to be Mountain Reedbuck, Grey Rhebok, White-tailed Mouse and Black-footed Cat which are the listed species most likely to maintain free-ranging populations within the affected area within habitats that would potentially be affected by the development. For the larger, more ubiquitous listed species such as Mountain Reedbuck and Grey Rhebok, these species are likely to be displaced during construction but would likely move back into the affected areas once the facility is operational as they are likely to become at least partly habituated to the presence and operation of the wind turbines. The more sensitive species such as Serval or Brown Hyena have large national and provincial distribution ranges and it is highly unlikely that the development would compromise the local or regional populations of these species. In general, the major long-term impacts of the development would be about 50 ha of direct habitat loss for the resident mammals and some disturbance associated with noise and human activity associated with turbine construction and operation, which would have a greater extent, dependent on the specific response of the affected species.

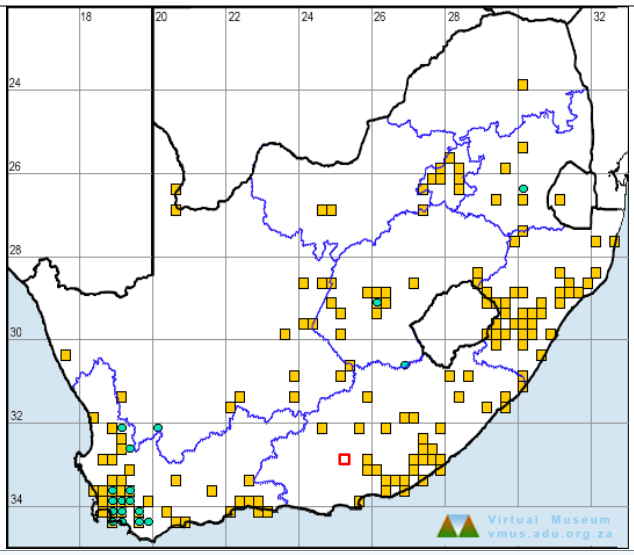
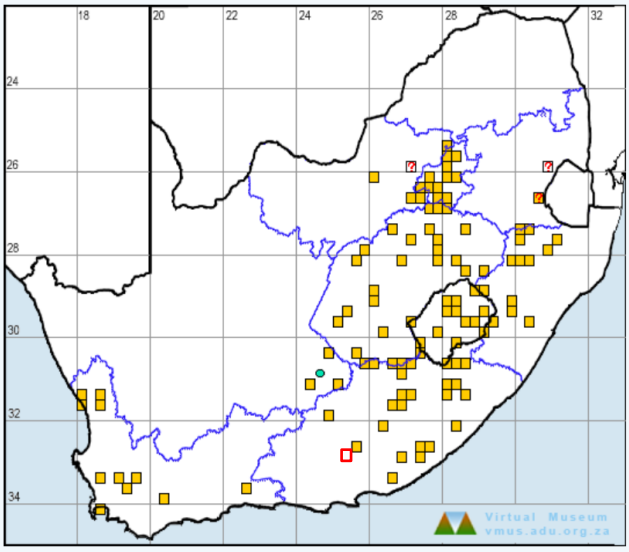
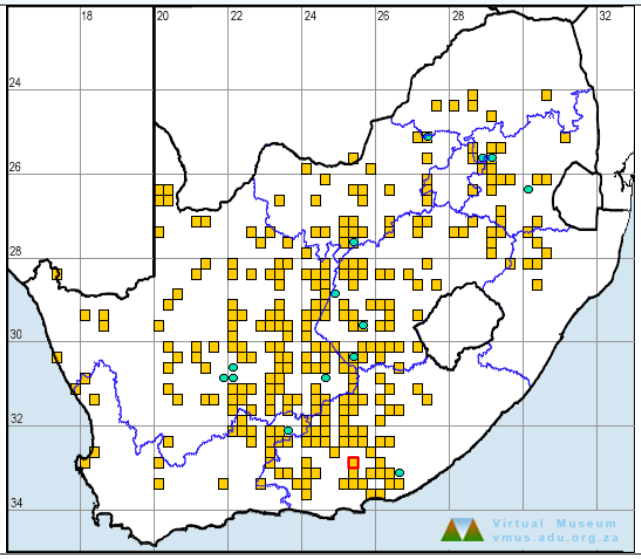
A potential but little-known impact may occur as a result of the noise and infra-sound generated by the wind turbines. Some fauna and in particular, elephants are known to communicate using low-frequency sounds and would potentially be impacted by similar low-frequency noise generated by wind turbines. This is however not a documented impact associated with wind turbines and there are no published records of elephants being negatively impacted by wind turbines to date. A major source of background infrasound in the natural environment is wind-generated, with the result that increasing levels of infrasound generated by wind turbines occur simultaneously with increasing levels of natural background noise as the wind speed increases. The contribution of wind turbines to infrasound appears to become undetectable from background

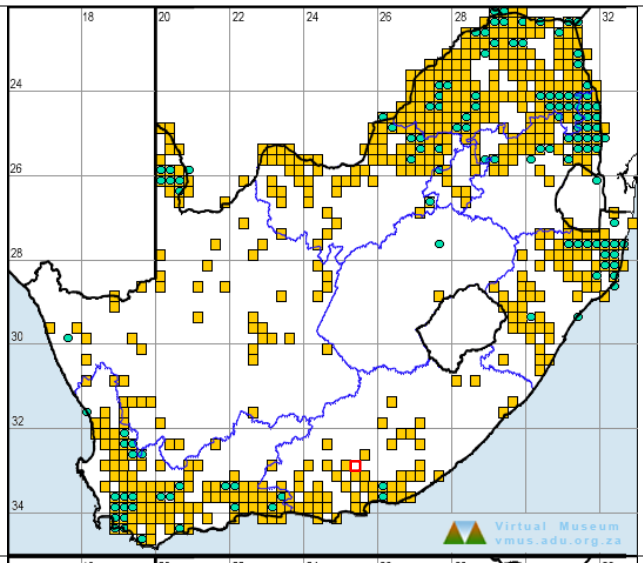
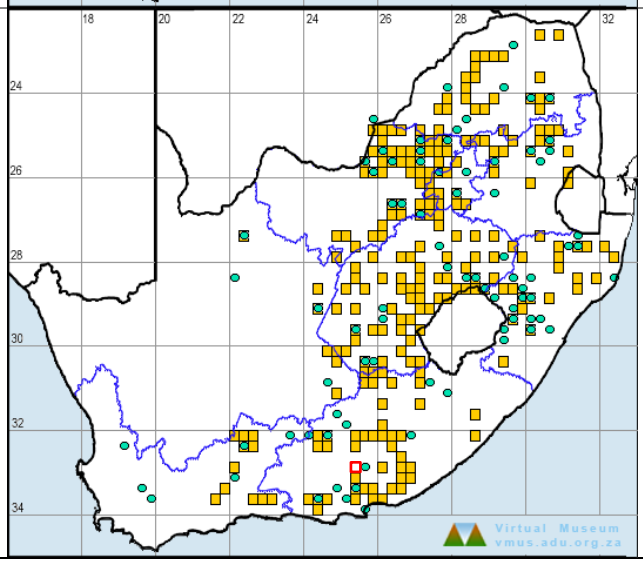
levels, even in rural environments within 1.5km of wind farms (Evans et al. 2013). As such, while elephants living nearby wind farms may experience some noise disturbance, this impact is currently too poorly documented to be assessed with sufficient confidence to allow firm predictions in this regard. There does however appear to be some evidence that this impact would not extend for very large distances from wind farms and as such can likely be considered to represent a local impact. There are not any reserves with elephants or rhino in close proximity to the Ripponnn site and the nearest elephants are tens of kilometers away, with the result that an impact on large mammals due to infrasound impacts is not likely. Apart from the infrasound, audible noise generated by the turbines may have a negative impact on noise-sensitive species. Although this impact has not been well documented and warrants investigation, it is plausible that species that use sound for prey detection or predator avoidance may be negatively affected by the noise generated by the wind turbines. There are however no species of high conservation concern that are likely to be affected by noise at the site, so this impact is likely to be of limited extent and restricted to a subset of the fauna present. In addition, studies of noise impacts on fauna have demonstrated that many faunal species are able to use various behavioural adaptations to reduce the impact of noise on their activities.

Table 3. Red-listed mammals which potentially occur at the Ripponn site with their distribution map in the country according to the ADU database and their likelihood of being impacted by the development. The quarter degree square that the site falls into is shown by red square.

Species	ADU Distribution Map	Comment
Hyaena brunnea Brown Hyena Near Threatened		The wider area is considered relatively favourable for Brown Hyena due to the large number of game farms and conservation areas present. The density of Brown Hyena would however be low and within the Ripponn site itself not likely to be common and it is not likely that site maintains a resident population. Although it is possible that the development would result in some habitat loss for this species, this is not considered highly likely given that this species is largely restricted to conservation areas.

Leptailurus serval Serval Near Threatened		Serval are rare in the Eastern Cape as the tall grassland habitat they prefer is not common. Several conservation areas are however attempting to re-establish them in the area. As this species is associated with tall grassland or wetlands with a high density of rodents, it is not likely that there would be significant conflict between this species and the wind farm.
Pelea capreolus Vaal Rhebok Near Threatened		Grey Rhebok are associated with rocky hills, grassy mountain slopes, and plateau grasslands in the eastern extent of their distribution. They are predominantly browsers, often feeding on ground-hugging forbs, and largely water independent, obtaining most of their water requirements from their food. This species is present in the area and tends to the associated with the hills of the study area. Although this species may experience some habitat loss from the roads and wind turbines of the development, it may become habituated to the wind turbines and the noise they make, thereby reducing the potential impact on this species to some degree.

Poecilogale albinucha African Striped Weasel Near Threatened		The Striped Weasel is likely to occur in the area at a low density. It is likely to prefer the areas of the denser vegetation at the site such as along drainage lines. Although the development is likely to create some habitat loss or long-term disturbance from turbine noise for this species, any impacts are not likely to compromise the local population of Striped Weasel.
Mystromys albicaudatus African White-tailed Rat Vulnerable		Usually associated with calcrete soils within grasslands. They are never found on soft, sandy substrate, rocks, wetlands or river banks. Potentially present on the site, but unlikely to be significantly affected by the wind farm development as it is nocturnal and the extent of habitat loss resulting from the development would not be significant for this widespread species.
Felis nigripes Black-footed Cat Vulnerable		Black-footed Cat are widespread in the semi-arid parts of the country and prefer areas with a mix of dense and open areas of vegetation. This species is likely to occur at the site at typical low density. It is likely that the development would result in some habitat loss for this species but given that it has a relatively wide habitat tolerance, the affected areas would not be considered particularly important for Black-footed Cat. It is not likely that the development would compromise the local or regional population of this species.

Panthera pardus Leopard Vulnerable		Leopard in the Eastern Cape are associated with conservation areas or rugged mountainous terrain. As such, the Ripponn development is not likely to result in significant habitat loss for this species.
Redunca fulvorufula Mountain Reedbuck Endangered		Mountain Reedbuck are relatively common in the area around the site, but tend to be associated with the more mountainous slopes and higher elevation grasslands of the area. Although this species may experience some habitat loss from the roads and wind turbines of the development, it is also likely to become habituated to the wind turbines and the noise they make with the result that a significant impact on this species is not likely.

Reptiles

Based on the ADU database, thirty-three reptile species have been recorded from the area around the Ripponn site. This is a relatively high total, indicating that reptile diversity in the area is quite high and can be ascribed to the high diversity of habitats in the area, but also suggests that the area has been relatively well sampled. Common species observed during the site visit or on previous projects in the immediate area include Thin-tailed Legless Skink, Southern Rock Agama, Common Ground Agama, Cape Girdled Lizard, Spotted Gecko, Leopard Tortoise, Angulate Tortoise, Red-lipped Snake, Rock Monitor and Puff Adder. The drainage lines with dense riparian vegetation and the rocky hills and especially those with large rocky outcrops are considered to represent the most important reptile habitat at the site. The only reptile of potential concern known from the area is the Albany Sandveld Lizard *Nucras taeniolata* which is a narrow endemic that was previously listed as Near Threatened but as of 2017 has been assessed as being of Least

Concern. This species has not been recorded from the vicinity of the Ripponn site and based on the preferred habitat description, is not likely to occur within the site.

In terms of the likely impacts of the development on reptiles, habitat loss is not likely to be highly significant as the direct footprint of the development would be less than 110 ha and this would not be highly significant in context of the affected habitats and the reptile community present. In some situations, the loss of vegetation cover associated with roads and other cleared areas can generate significant impact on reptiles as they may be vulnerable to predation while crossing such cleared areas, but as the site is semi-arid, plant cover is variable and the majority of reptile species present are not likely to be particularly affected by the wind farm roads.

Figure 7. Some of the more common reptiles observed at the site include, from top left, the Rock Monitor, Spotted Grass Snake (Skaapsteker), Angulate Tortoise and Common Ground Agama.

Amphibians

Amphibian diversity within the Ripponn site is likely to be relatively low. A total of 15 species are known from the area according to the ADU database and includes no species of conservation concern. Within the site, the ephemeral streams, farm dams and larger ephemeral drainage lines are the most important habitats for amphibians. Species observed in the area include Raucous Toad, Bubbling Kassinia, Common Platanna, Bronze Caco and Common River Frog. The amphibian community can be broadly divided into those species strongly associated with water bodies such as River Frogs and Platanna and those species which are able to range more freely such as toads and Caco's which may breed in streams and ponds, but are more terrestrial in nature. As the development would avoid riparian habitats, except for occasional access road crossings of drainage features in the lower-lying areas, the former group are not likely to be significantly affected by the development, while the latter group would likely experience some habitat loss and disturbance associated with the development. However, overall, impacts on amphibians are likely to be local in nature and it is not likely that the local population of any resident species would be compromised by the development.

3.4 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

An extract of the 2019 Eastern Cape Biodiversity Plan for the study area is illustrated below (Figure 10). This biodiversity assessment identifies CBAs which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to maintain ecosystem functioning and meet national biodiversity objectives. Under the layout assessed, there are six turbines within CBAs and an additional 15 turbines within ESAs. The CBA 2 areas as well as many of the affected ESAs are driven largely by the expected presence of avifauna of concern in the area. From a terrestrial ecological perspective, these areas provide representivity of the affected vegetation types, but do not appear to be related to any other specific biodiversity features unrelated to significance of these areas for avifauna. This agrees with the observations of the site, which indicate that the topography of the site has some value in increasing the heterogeneity of the vegetation and availability of habitats, but otherwise, it represents typical thicket vegetation, similar to other adjacent areas. The estimated footprint of the development within the ESA is 17.84 ha and 8 ha within the areas of CBA 2. Although development within CBAs is undesirable and can negatively impact the biodiversity value and ecological functioning of the affected CBAs, the development footprint within the CBAs is relatively low and the loss of less than 10 ha of total habitat within the CBA 2 area is considered to have a moderate to low impact and is considered acceptable. In addition, the 2016 NPAES does not include any focus areas near to the site and the closest expansion focus areas are around Addo Elephant National Park well south of the site.

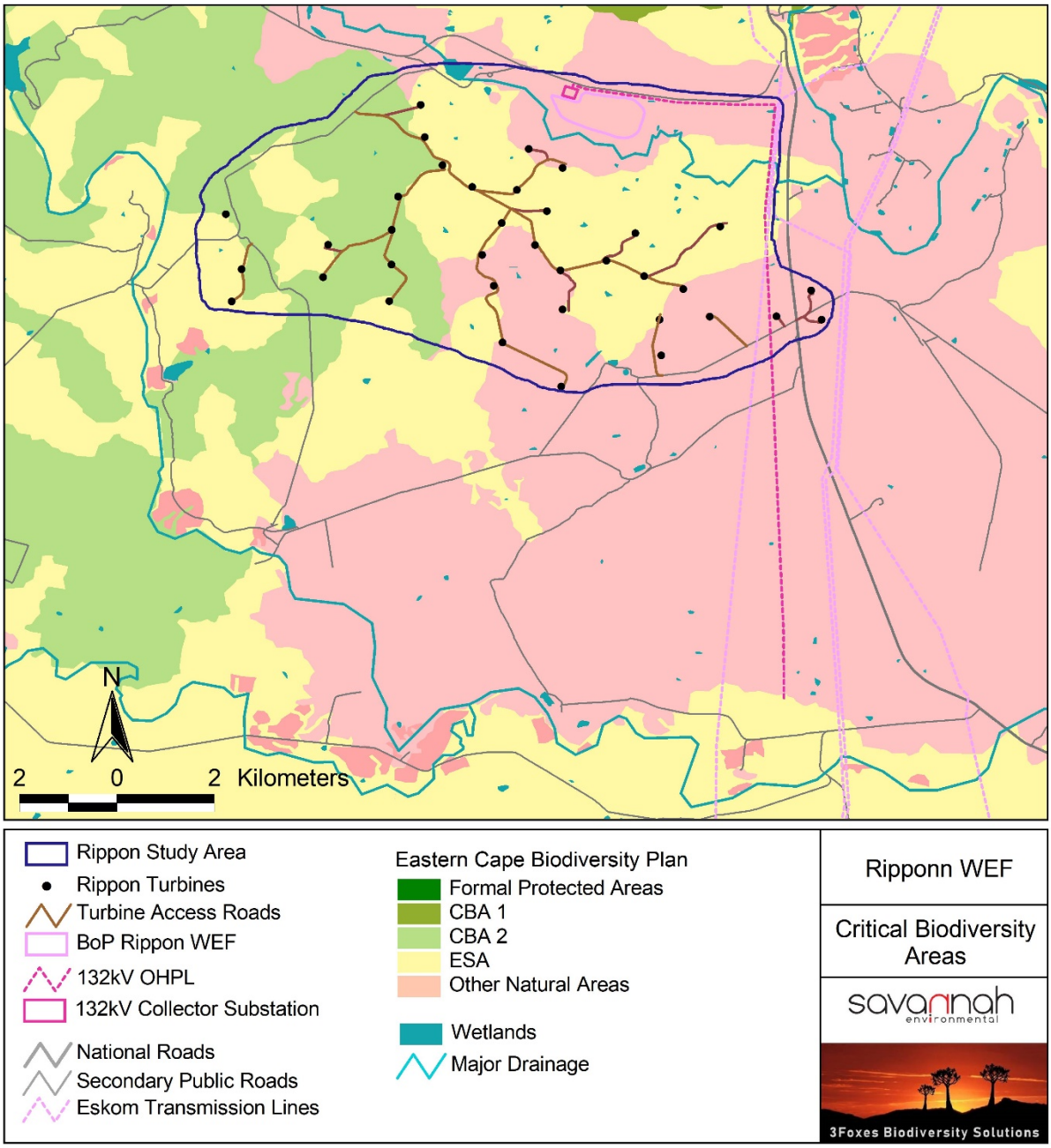


Figure 8. Extract of the Eastern Cape Biodiversity Plan for the study area, showing the CBA 2 in the east of the site and the presence of a large ESA across the site.

3.5 CUMULATIVE IMPACTS

Where other renewable energy developments occur within 30km of a site, a cumulative impact assessment is required. This includes a general assessment of cumulative impact as well as an assessment of different potential cumulative impact sources and an indication of the size or extent of the identified cumulative impact.

In terms of existing impacts in the area, there is a cluster of wind farms east of Cookhouse, with an approximate footprint of 600ha (Figure 8). In addition, there are also numerous approved but not built facilities which generally lie adjacent to the existing operational facilities. The exception is the Highlands WEF which lies to the west of Somerset East. The planned facilities would have a footprint of approximately 500ha. Apart from the above facilities, the current suite of projects would include the Ripponn WEF as well as an additional 4 planned projects. The total footprint of these facilities would be approximately 100 ha each. Thus, in terms of total impact, all built and planned projects would amount to approximately 2000 ha in extent. The majority of these projects are located within the Bedford Dry Grassland and Great Fish Thicket vegetation types. As these vegetation types are classified as Least Concern and have not experienced a high degree of transformation to date, the contribution of the Ripponn project to cumulative impact is considered acceptable.

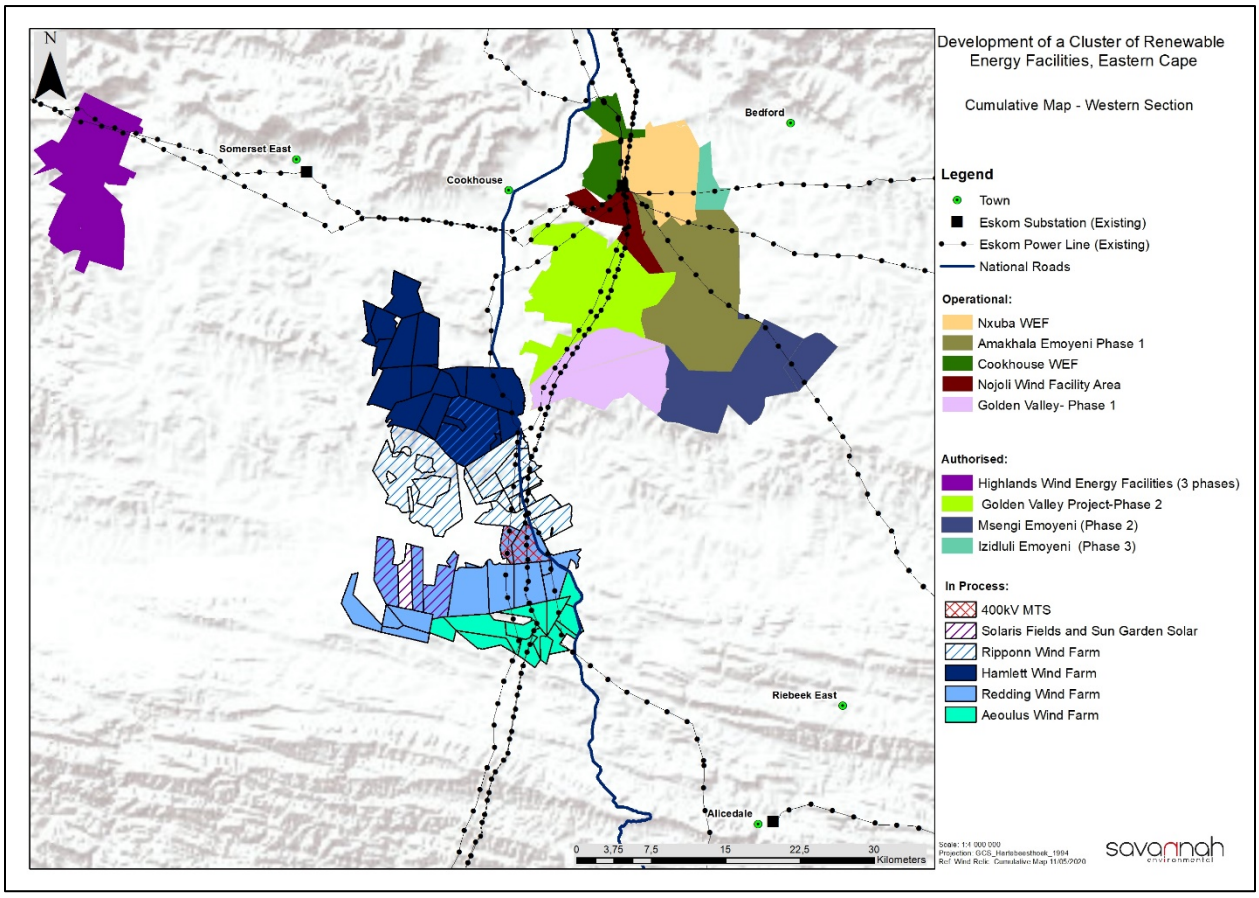


Figure 9. Map of other renewable energy projects known from the vicinity of the Ripponn Wind Farm. There is a cluster of operational and planned wind farms east of Cookhouse, while the current project would impact an area with no existing wind energy facilities.

4 RIPPONN SENSITIVITY ASSESSMENT

The sensitivity map for the study area is depicted below in Figure 10. The majority of the site consists of mixed, relatively open savannah or lower grassy shrublands considered to be of low or medium sensitivity. The slopes and valleys of the site, where the density of woody species and thicket communities is higher, are considered to be of high or very high sensitivity. Features that have been classified as high sensitivity include the steep slopes and ridges that characterise the site; while the drainage lines and areas of dense thicket are considered to be very high sensitivity.

The footprint of the development within the different sensitivity classes is summarised below in Table 4. The footprint of the development is estimated at 40 ha, not including the BoP, which would add an additional 50ha to the development footprint within the medium sensitivity areas. The extent of the footprint within each class is well-within the specified acceptable limits and as such, there are no fatal-flaws from a purely technical standpoint in terms of the sensitivity mapping. Although there is some footprint within the Very High sensitivity areas, this is largely along existing road alignments and actual habitat loss in these areas would be low. The acceptability of the development must also be considered overall in terms of general ecological and cumulative impacts. However, given the avoidance of sensitive features at the site under the layout and the relatively low total estimated footprint, these are also within acceptable limits and no high post-mitigation impacts are likely to occur as a result of the development.

Table 4. The extent of the development footprint within the different sensitivity categories of the site.

Sensitivity	Acceptable Loss (%)	Site Extent (ha)	Acceptable Loss (Ha)	Development Footprint (Ha)	Actual Loss (%)
Low	10%	1704.7	170.47	9.48	0.56
Medium	5%	1927.16	96.358	28.75	1.49
High	2%	528.64	10.5728	0	0.00
Very High	0.25%	1088.04	2.7201	2.35	0.22

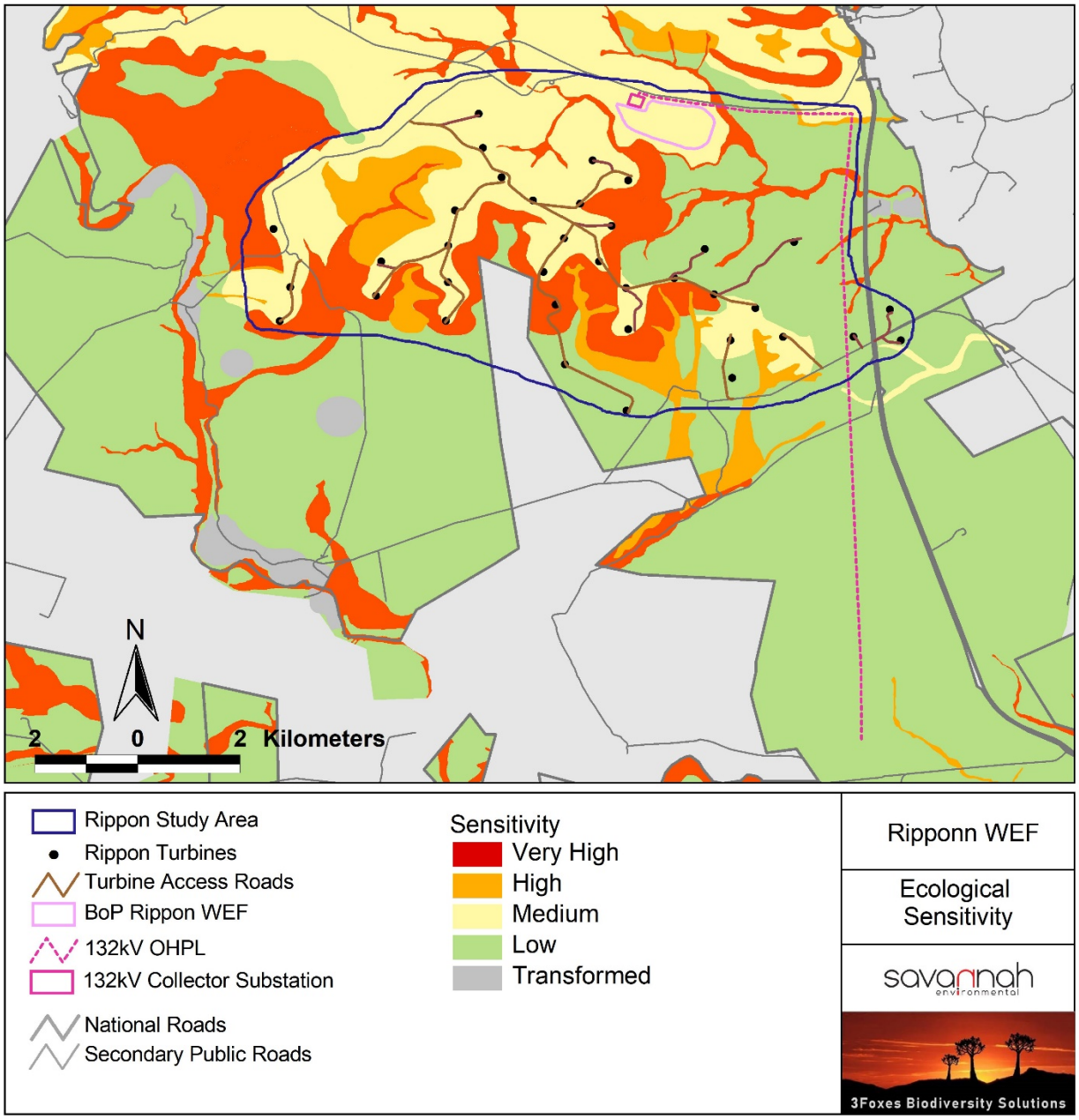


Figure 10. Ecological sensitivity map for the Ripponn study area, showing the draft turbine layout for the Ripponn Wind Farm development.

5 *IMPACTS AND ISSUES IDENTIFICATION*

The development of the Ripponn Wind Farm, is likely to result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as turbine foundations and service areas, roads, operations buildings etc. The following impacts are identified as the major impacts that are likely to be associated with the

development and which are assessed for the Ripponn Wind Farm, for the preconstruction, construction and operation phases of the development.

5.1 IDENTIFICATION OF POTENTIAL IMPACTS

The likely impacts on the terrestrial ecology of the site resulting from the development of the Ripponn Wind Farm are identified and discussed below with reference to the characteristics and features of the site. The major risk factors and contributing activities associated with the development are identified and briefly outlined and summarised below before the impacts are assessed

Impact 1. Impacts on vegetation and listed or protected plant species

The development would require vegetation clearing for turbines, roads and other hard infrastructure. Apart from the direct loss of vegetation within the development footprint, listed and protected species may also be impacted. These impacts would occur during the construction phase of the development, with additional vegetation impacts during operation likely to be relatively low. This impact is therefore assessed for the construction phase only.

Impact 2. Direct Faunal Impacts

Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed if proper management and monitoring is not in place. Traffic at the site during all phases of the project would pose a risk of collisions with fauna. Slower types such as tortoises, snakes and certain mammals would be most susceptible and the impact would be largely concentrated to the construction phase when vehicle activity was high. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. During the operation phase, noise generated by the operation of the turbines is likely to negatively affect at least some fauna. Faunal impacts will therefore be assessed during the construction and operation phase of the facility.

Impact 3. Increased Erosion Risk

The large amount of disturbance created during construction would leave the site vulnerable to wind and water erosion. Soil disturbance associated with the development will render the impacted areas vulnerable to erosion and measures to limit erosion will need to be implemented. This impact is likely to manifest during construction and would persist into the operation phase and should therefore be assessed for both phases.

Impact 4. Alien Plant Invasion

The disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some woody aliens are already present in the area and additional alien plant invasion following construction is highly likely and regular alien plant clearing activities would be required. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion, however, the roadsides and turbine service areas are likely to remain foci of alien plant invasion for years. This impact would manifest during the operation phase, although some of the required measures to reduce this impact are required during construction.

Impact 5. Impacts on CBAs

The development will result in some habitat loss, and fragmentation within a CBA 2 and ESA. In addition, the presence of the wind turbines and daily operational activities at the site may deter certain species from the area, or result in habitat degradation for certain noise or disturbance-sensitive faunal species. This impact would persist for the life of the facility and is thus assessed for the operation phase of the wind farm.

Impact 6. Cumulative Impact 1. Cumulative Impacts on broad-scale ecological processes

The development will contribute to cumulative impacts on habitat loss and fragmentation in the area and potentially the ability to meet future conservation targets. In addition, the presence of the wind turbines and daily operational activities at the site may deter certain species from the area, resulting in a loss in broad-scale landscape connectivity.

6 ASSESSMENT OF IMPACTS

An assessment of the likely extent and significance of each impact identified above is made below for each phase of the development.

6.1 CONSTRUCTION PHASE

Impact 1. Impacts on vegetation and protected plant species

Nature: Vegetation clearing for access roads, turbines and their service areas and other infrastructure will impact on vegetation and protected plant species.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (3)	Long-term (3)
Magnitude	Moderate (6)	Moderate (5)
Probability	Definite (5)	Probable (4)
Significance	**Medium (55)**	**40 (Medium)**

Status (positive or negative)	Negative	Negative
Reversibility	This impact is not highly reversible as it would take a long time for any cleared areas to return to their former state and rehabilitation of arid environments is difficult.	
Irreplaceable loss of resources?	There would be some potential loss of long-term productivity and diversity as it would take a long time (decades) for any cleared areas to return to their former state and rehabilitation of arid environments is difficult.	
Can impacts be mitigated?	Yes	

Mitigation:

Mitigation measures to reduce residual risk or enhance opportunities:

1) The footprint within ephemeral drainage lines should be minimized as much as possible.
2) Pre-construction walk-through of the approved development footprint must be undertaken to ensure that sensitive habitats and species are avoided where possible.
3) Ensure that laydown and other temporary infrastructure is placed within low sensitivity areas, preferably previously transformed areas, if possible.
4) Minimise the development footprint as far as possible and rehabilitate disturbed areas that are not required for the operation phase of the development.
5) A large proportion of the impact of the development stems from the access roads and the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible. Crossings of drainage features is considered acceptable contingent on the input of the freshwater specialist in this regard.
6) Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
7) 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.

Cumulative impacts:

The clearing would contribute to cumulative vegetation impacts in the area. The development footprint during construction is however approximately 110 ha and given the intact nature of the surrounding area and the current low level of existing transformation impacts, the contribution of the Ripponn Wind Farm to cumulative impact in the area is considered to be local in nature of a relatively low magnitude.

Residual Risks:

Since vegetation clearing is an inevitable consequence of the development, this component of the development impact cannot be entirely mitigated and some residual habitat loss equivalent to the footprint of the development will remain.

Impact 2. Impacts on fauna due to construction phase activities

Nature: Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed if proper management and monitoring is not in place.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (5)
Probability	Highly Likely (4)	Probable (3)
Significance	**Medium (40)**	**27 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Noise and disturbance are largely reversible but habitat loss due to transformation of intact habitat is not considered easily reversible.	
Irreplaceable loss of resources?	It is not likely that there would be significant irreplaceable loss of resources in terms of fauna.	
Can impacts be mitigated?	Yes	

Mitigation:

Mitigation measures to reduce residual risk or enhance opportunities:

1) Pre-construction walk-through of the facility to micro-site roads and turbines.
2) 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.
3) The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off of the construction site.
4) No fires should be allowed within the site as there is a risk of runaway veld fires.
5) No fuelwood collection should be allowed on-site.
6) If any parts of the site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs or HPS bulbs) as far as practically possible, which do not attract insects and which should be directed downwards.
7) 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.
8) No unauthorized persons should be allowed onto the site and site access should be strictly controlled.
9) 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.
10) All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and snakes which are often persecuted out of fear or superstition.

Cumulative impacts: The clearing would contribute to cumulative habitat loss for fauna in the area, but this would be largely local in nature.
Residual Risks: Noise and disturbance would be transient and largely reversible but habitat loss due to transformation of intact habitat would be permanent.

6.2 OPERATION PHASE IMPACTS

Impact 3. Impacts on fauna due to operation phase activities

Nature: Fauna will be negatively affected by the operation of the wind farm due to the human disturbance, the presence of vehicles on the site and possibly by noise generated by the wind turbines.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (3)	Long-term (3)
Magnitude	Medium Low (4)	Low (3)
Probability	Highly Likely (4)	Probable (3)
Significance	**Medium (36)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Noise and disturbance are generally reversible impacts that would occur on a more or less persistent basis during the life of the wind farm, but cease thereafter.	
Irreplaceable loss of resources?	It is not likely that there would be significant irreplaceable loss of resources in terms of fauna.	
Can impacts be mitigated?	Yes	

Mitigation:

Mitigation measures to reduce residual risk or enhance opportunities:

1) Management of the site should take place within the context of an Open Space Management Plan.
2) No unauthorized persons should be allowed onto the site.
3) Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
4) The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except landowners or other individuals with the appropriate permits and permissions where required.
5) If any parts of the site need to be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs or HPS bulbs) as far as possible, which do not attract insects.

6) 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. 7) 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. 8) If parts of the facility such as the substation are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not the outside.
Cumulative impacts: The habitat loss resulting from hard infrastructure would contribute to cumulative habitat loss for fauna in the area, but this would be largely local in nature.
Residual Risks: Noise and disturbance are not avoidable during the operation of the wind farm with the result that some residual disturbance, expressed as habitat degradation for affected fauna will occur during operation of the facility.

Impact 4. Increased Erosion Risk

Nature: Following construction, the site will be highly vulnerable to soil erosion due to the disturbance created and likely low natural revegetation of disturbed areas.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Medium-term (4)
Magnitude	Moderate (5)	Low (3)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**16 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversibility would be high for mild erosion, but would become increasingly low with increasing severity of erosion.	
Irreplaceable loss of resources?	Large amounts of erosion would result in some irreplaceable loss of topsoil and ecosystem productivity, but with mitigation there would be no significant loss of resources.	
Can impacts be mitigated?	Yes	
Mitigation: Mitigation measures to reduce residual risk or enhance opportunities: 1) Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan.		

2) 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. 3) Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance must be undertaken, as per the Erosion Management and Rehabilitation Plans for the project. 4) All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. 5) All cleared areas must be revegetated with indigenous perennial shrubs and succulents from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.
Cumulative impacts: Erosion would contribute to cumulative ecosystem degradation in the area, but with mitigation, this impact can be avoided.
Residual Risks: Some low-level erosion due to wind and water impacts is likely to occur despite erosion control measures. With the effective implementation of the recommended mitigation, the magnitude of this residual impact can however be reduced to a low level.

Impact 5. Alien plant invasion risk

Nature: Following construction, the site will be highly vulnerable to alien plant invasion due to disturbance and the increased runoff created by the hard infrastructure. Drainage lines and other wetter areas are likely to be particularly vulnerable.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Moderate (4)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**12 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversibility would be high for mild infestation, but would become increasingly low with extensive invasion.	
Irreplaceable loss of resources?	It is not likely that there would be significant irreplaceable loss of resources if this impact is managed.	
Can impacts be mitigated?	Yes	

Mitigation:

Mitigation measures to reduce residual risk or enhance opportunities:

1) Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
2) 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 plant species are already present in the area and are likely to increase rapidly if not controlled. 3) Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility must be undertaken as these are also likely to be prone to invasion problems. 4) 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.
Cumulative impacts: Alien invasion would contribute to cumulative ecosystem degradation in the area, but with mitigation, this impact can be avoided.
Residual Risks: Although some alien plant invasion is likely to occur at the site, with mitigation, there would be minimal residual impact.

Impact 6. Impact on CBAs and broad-scale ecological processes

Nature: Transformation and presence of the facility will contribute to cumulative habitat loss within the affected CBA 2 and wider ESAs and may compromise the overall ecological functioning of the CBAs and their long-term biodiversity value.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (5)	Low (4)
Probability	Highly Likely (4)	Likely (3)
Significance	**Medium (44)**	**Low (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

1) Minimise the development footprint within the CBA 2 and other mapped high sensitivity areas.
2) There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora.
3) All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development.

4) Noise and disturbance on the site should be kept to a minimum during operation and maintenance activities.
Residual Impacts: Habitat loss within the CBAs and ESAs cannot be fully mitigated and the noise and disturbance generated by the turbines during operation cannot be avoided with the result that some residual disturbance, expressed as habitat degradation for affected fauna will occur during operation of the facility within the CBAs.

6.3 DECOMMISSIONING PHASE IMPACTS

Impact 7. Impacts on fauna due to decommissioning phase activities

Nature: Fauna will be negatively affected by the decommissioning of the wind farm due to the human disturbance, the presence and operation of vehicles and heavy machinery on the site and the noise generated.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (5)	Low (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (36)**	**18 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Noise and disturbance would be of relatively short duration and are considered reversible.	
Irreplaceable loss of resources?	It is not likely that there would be significant irreplaceable loss of resources in terms of fauna.	
Can impacts be mitigated?	Yes	

Mitigation:

Mitigation measures to reduce residual risk or enhance opportunities:

1) Any potentially dangerous fauna such as snakes or fauna threatened by the decommissioning activities should be removed to a safe location prior to the commencement of decommissioning activities.
2) 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.
3) 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.
4) No excavated holes or trenches should be left open for extended periods as fauna may fall in and become trapped.
5) All above-ground infrastructure should be removed from the site. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional

disturbance and impact, however, this should be in accordance with the facilities' decommissioning and recycling plan, and as per the agreements with the landowners concerned.
Cumulative impacts: There would be transient contribution to cumulative disturbance impacts, but this would cease after decommissioning.
Residual Risks: Noise and disturbance during decommissioning would be unavoidable, but would be transient and ultimately the site would be restored to a near-natural state.

Impact 8. Increased Erosion Risk due to Decommissioning

Nature: Following decommissioning, the site will be highly vulnerable to soil erosion due to the disturbance created by the removal of infrastructure from the site.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Moderate (5)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversibility would be high for mild erosion, but would become increasingly low with increasing severity of erosion.	
Irreplaceable loss of resources?	It is not likely that there would be significant irreplaceable loss of resources if this impact is managed.	
Can impacts be mitigated?	Yes	
Mitigation: Mitigation measures to reduce residual risk or enhance opportunities: 1) Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. 2) There should be regular monitoring for erosion for at least 5 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. 3) All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. 4) All disturbed and cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area.		
Cumulative impacts: Erosion would contribute to cumulative ecosystem degradation in the area, but with mitigation, this impact can be avoided.		
Residual Risks:		

Some low-level erosion due to wind and water impacts are likely to occur following decommissioning despite erosion control measures. With the effective implementation of the recommended mitigation, the magnitude of this residual impact can however be reduced to a low level.

Impact 9. Alien plant invasion risk following decommissioning

Nature: Following decommissioning, the site will be highly vulnerable to alien plant invasion due to the large amount of disturbance generated by decommissioning. Disturbed areas, drainage lines and other wetter areas are likely to be particularly vulnerable.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (4)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (27)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversibility would be high for mild infestation, but would become increasingly low with extensive invasion.	
Irreplaceable loss of resources?	It is not likely that there would be significant irreplaceable loss of resources if this impact is managed.	
Can impacts be mitigated?	Yes	

Mitigation:

Mitigation measures to reduce residual risk or enhance opportunities:

1) Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
2) 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 plant species are already present in the area and are likely to increase rapidly if not controlled.
3) Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility must be undertaken as these are also likely to be prone to invasion problems.
4) 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.

Cumulative impacts:

Alien invasion would contribute to cumulative ecosystem degradation in the area, but with mitigation, this impact can be avoided.

Residual Risks:

Although some alien plant invasion is likely to occur at the site, with mitigation, there would be minimal residual impact.

6.4 CUMULATIVE IMPACTS

Impact 10. Cumulative ecological impacts due to wind energy development in the area.

Nature: Wind energy development in the wider area around the site will generate cumulative impacts on habitat loss and fragmentation for fauna and flora.		
	Overall impact of the proposed project considered in isolation	***Cumulative impact of the project and other projects in the area***
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Moderate (5)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	No	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: 1) Minimise habitat loss and degradation within high-value faunal habitats such as drainage lines. 2) Promote sustainable land use practices in the area and especially on wind farm properties to improve the quality of the habitat for fauna and flora. 3) Ensure that alien species of flora as well as fauna are managed to ensure that they do not have a broadly negative impact.		
Residual Impacts: The wind farm developments in the area will generate some residual impact through noise, disturbance and habitat loss. There is however currently only one operational wind farm in the area and the additional contribution of the current project to residual impact would be relatively low.		

7 CONCLUSION & RECOMMENDATIONS

The Ripponn Wind Farm site falls almost entirely within the Great Fish Thicket vegetation type, with some Southern Karoo Riviere and Albany Broken Veld along the southern boundary of the site. Based on the field assessment, there are no clear boundaries between the areas of Great Fish Thicket, Albany Broken Veld and Bedford Dry Grassland, suggesting that the area represents a broad transitional area between these vegetation types. The majority of the site consists of mixed, relatively open savannah thornveld or scrub intermingled with shorter grassy shrublands considered to be of low or medium sensitivity. The slopes and valleys of the site, where the density of woody species and thicket communities is higher, are considered to be of high or very high sensitivity.

In terms of fauna, there are several listed mammals which occur in the area and which would potentially be impacted by the development. This includes the Brown Hyena, Serval, White-tailed Mouse, African Striped Weasel, Black-footed Cat, Leopard, Grey Rhebok and Mountain Reedbuck. Of greatest potential concern are the Mountain Reedbuck, Grey Rhebok and Black-footed Cat which are the listed species most likely to maintain free-ranging populations within the affected area, within habitats that would potentially be affected by the development. Mountain Reedbuck and Grey Rhebok are likely to be displaced during construction but would likely move back into the affected areas once the facility is operational as they are likely to become at least partially habituated to the presence and operation of the wind turbines. There are no listed amphibians or reptiles which are known to occur in the vicinity of the site.

The Ripponn Wind Farm site has not been well-sampled historically, with the result that there are fewer plant species of conservation concern known from the area than might be expected. Of the three reported plant species of concern recorded in the area, only *Crinum campanulatum* and *Crassula decidua* are of potential concern. However, the former is associated with pans and wetlands and therefore not likely to be impacted, while *Crassula decidua* is associated with karroid scrub near drainage lines which are low-lying areas likely to be largely avoided by the wind farm. Although no additional species of concern were observed on the site, it is possible that there are additional listed plant species present and as such, it is recommended that the development is subject to a pre-construction walk-through of the development footprint. If any listed species are found to be present within the affected areas, it is likely these can be avoided through turbine or road micro-siting.

Under the layout assessed, there are six turbines within CBA 2 areas and an additional 15 turbines within ESAs. The CBA 2 areas and many of the affected ESAs are driven largely by the expected presence of avifauna of concern in the area. The estimated footprint within the ESA is 17.84 ha and 8 ha within the areas of CBA 2. Although development within CBAs is undesirable and can negatively impact the biodiversity value and ecological functioning of the affected CBAs, the

development footprint within the CBAs is relatively low and the loss of less than 10 ha of total habitat within the CBA 2 area is considered to have a moderate to low localised impact and is considered acceptable. In addition, the 2016 NPAES does not include any focus areas near within 20km of the site, indicating that the development would not impact future conservation expansion priorities.

In terms of cumulative impacts in and around the Ripponn site, there are several operational and approved facilities in the area, most notably east of Cookhouse, with an approximate footprint of 600ha. The planned facilities would have a footprint of approximately 500ha. Apart from the above facilities, the current suite of projects would include the Ripponn WEF as well as an additional 4 planned projects. The total footprint of these facilities would be approximately 100 ha each. Thus, in terms of total cumulative impact, all built and planned projects would amount to approximately 2000 ha in extent. The majority of these projects are located within the Bedford Dry Grassland and Great Fish Thicket vegetation types. As these vegetation types are classified as Least Concern and have not experienced a high degree of transformation to date, the contribution of the Ripponn project to cumulative impact is considered acceptable.

Impact Statement

There are no impacts associated with the Ripponn Wind Farm that cannot be mitigated to an acceptable level and as such, the assessed layout is considered acceptable. With the application of relatively simple mitigation and avoidance measures, the impact of the Ripponn Wind Farm on the local environment can be reduced to an acceptable magnitude. The contribution of the Ripponn Wind Farm development to cumulative impact in the area would be low and is considered acceptable. Overall, there are no specific long-term impacts likely to be associated with the development of the Ripponn Wind Farm that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

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9 ANNEX 1. LIST OF PLANT SCC

Plant species of conservation concern known from the vicinity of the Ripponn study site, based on the SANBI POSA database. Conservation status is from the South African Red Data List of Plants 2021.

Family	Genus	Species	IUCN Status
Aizoaceae	*Drosanthemum*	*crassum*	NT
Amaryllidaceae	*Crinum*	*campanulatum*	NT
Crassulaceae	*Crassula*	*decidua*	NT

10 ANNEX 2. LIST OF MAMMALS

List of mammals which are likely to occur in the broad vicinity of the Ripponn study area. Conservation status is from SANBI/EWT 2016 mammal species assessment.

Scientific Name	Common Name	Status	Records
Cryptomys hottentotus	Southern African Mole-rat	Least Concern (2016)	10
Antidorcas marsupialis	Springbok	Least Concern (2016)	11
Pelea capreolus	Vaal Rhebok	Near Threatened (2016)	1
Raphicerus campestris	Steenbok	Least Concern (2016)	31
Redunca fulvorufula	Mountain Reedbuck	Near Threatened	38
Sylvicapra grimmia	Bush Duiker	Least Concern (2016)	299
Tragelaphus scriptus	Bushbuck	Least Concern	439
Tragelaphus strepsiceros	Greater Kudu	Least Concern (2016)	1729
Canis mesomelas	Black-backed Jackal	Least Concern (2016)	306
Otocyon megalotis	Bat-eared Fox	Least Concern (2016)	162
Vulpes chama	Cape Fox	Least Concern (2016)	2
Chlorocebus pygerythrus	Vervet Monkey	Least Concern (2016)	14
Papio ursinus	Chacma Baboon	Least Concern (2016)	76
Amblysomus hottentotus	Hottentot Golden Mole	Least Concern (2016)	6
Caracal caracal	Caracal	Least Concern (2016)	50
Felis nigripes	Black-footed Cat	Vulnerable (2016)	6
Felis silvestris	Wildcat	Least Concern (2016)	24
Leptailurus serval	Serval	Near Threatened (2016)	2
Panthera pardus	Leopard	Vulnerable (2016)	19
Graphiurus (Graphiurus) murinus	Forest African Dormouse	Least Concern	3
Graphiurus (Graphiurus) ocularis	Spectacled African Dormouse	Least Concern	1
Cynictis penicillata	Yellow Mongoose	Least Concern (2016)	21
Herpestes pulverulentus	Cape Gray Mongoose	Least Concern (2016)	8
Ichneumia albicauda	White-tailed Mongoose	Least Concern (2016)	2
Suricata suricatta	Meerkat	Least Concern (2016)	17
Proteles cristata	Aardwolf	Least Concern (2016)	4
Hystrix africaeaustralis	Cape Porcupine	Least Concern	20
Lepus saxatilis	Scrub Hare	Least Concern	1
Aethomys ineptus	Tete Veld Aethomys	Least Concern (2016)	1
Aethomys namaquensis	Namaqua Rock Mouse	Least Concern	1
Desmodillus auricularis	Cape Short-tailed Gerbil	Least Concern (2016)	2
Grammomys dolichurus	Common Grammomys	Least Concern (2016)	2
Mastomys coucha	Southern African Mastomys	Least Concern (2016)	3
Mastomys natalensis	Natal Mastomys	Least Concern (2016)	7
Mus (Nannomys) minutoides	Southern African Pygmy Mouse	Least Concern	1
Otomys irroratus	Southern African Vlei Rat (Fynbos type)	Least Concern (2016)	8
Otomys saundersiae	Saunders' Vlei Rat	Least Concern	1

Otomys unisulcatus	Karoo Bush Rat	Least Concern (2016)	6
Rhabdomys pumilio	Xeric Four-striped Grass Rat	Least Concern (2016)	5
Ictonyx striatus	Striped Polecat	Least Concern (2016)	2
Mellivora capensis	Honey Badger	Least Concern (2016)	11
Poecilogale albinucha	African Striped Weasel	Near Threatened (2016)	2
Dendromus melanotis	Gray African Climbing Mouse	Least Concern (2016)	1
Mystromys albicaudatus	African White-tailed Rat	Vulnerable (2016)	1
Saccostomus campestris	Southern African Pouched Mouse	Least Concern (2016)	1
Orycteropus afer	Aardvark	Least Concern (2016)	3
Procavia capensis	Cape Rock Hyrax	Least Concern (2016)	10
Crocidura flavescens	Greater Red Musk Shrew	Least Concern (2016)	1
Crocidura hirta	Lesser Red Musk Shrew	Least Concern (2016)	1
Potamochoerus porcus	Bushpig	Least Concern (2016)	11
Genetta genetta	Common Genet	Least Concern (2016)	1
Genetta tigrina	Cape Genet (Cape Large-spotted Genet)	Least Concern (2016)	6

11 ANNEX 3. LIST OF REPTILES

List of reptiles which are likely to occur in the broad vicinity of the Ripponn site, based on records from the SARCA database, conservation status is from Bates et al. 2014.

Scientific Name	Common name	Status	Records
Agama aculeata aculeata	Common Ground Agama	Least Concern (SARCA 2014)	1
Agama atra	Southern Rock Agama	Least Concern (SARCA 2014)	24
Bradypodion ventrale	Eastern Cape Dwarf Chameleon	Least Concern (SARCA 2014)	18
Crotaphopeltis hotamboeia	Red-lipped Snake	Least Concern (SARCA 2014)	11
Dasypeltis inornata	Southern Brown Egg-eater	Least Concern (SARCA 2014)	4
Dasypeltis scabra	Rhombic Egg-eater	Least Concern (SARCA 2014)	8
Dispholidus typus typus	Boomslang	Least Concern (SARCA 2014)	17
Philothamnus occidentalis	Western Natal Green Snake	Least Concern (SARCA 2014)	11
Philothamnus semivariegatus	Spotted Bush Snake	Least Concern (SARCA 2014)	6
Chamaesaura anguina anguina	Cape Grass Lizard	Least Concern (SARCA 2014)	5
Cordylus cordylus	Cape Girdled Lizard	Least Concern (SARCA 2014)	34
Pseudocordylus microlepidotus fasciatus	Karoo Crag Lizard	Least Concern (SARCA 2014)	5
Hemachatus haemachatus	Rinkhals	Least Concern (SARCA 2014)	6
Naja nivea	Cape Cobra	Least Concern (SARCA 2014)	8
Chondrodactylus bibronii	Bibron's Gecko	Least Concern (SARCA 2014)	3
Goggia essexi	Essex's Pygmy Gecko	Least Concern (SARCA 2014)	15
Lygodactylus capensis	Common Dwarf Gecko	Least Concern (SARCA 2014)	1
Pachydactylus maculatus	Spotted Gecko	Least Concern (SARCA 2014)	22
Pachydactylus mariquensis	Marico Gecko	Least Concern (SARCA 2014)	4
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	6
Nucras lalandii	Delalande's Sandveld Lizard	Least Concern (SARCA 2014)	2
Nucras taeniolata	Albany Sandveld Lizard	Near Threatened (SARCA 2014)	7
Pedioplanis burchelli	Burchell's Sand Lizard	Least Concern (SARCA 2014)	5
Pedioplanis lineoocellata pulchella	Common Sand Lizard	Least Concern (SARCA 2014)	9
Tropidosaura montana rangeri	Ranger's Mountain Lizard		7
Aparallactus capensis	Black-headed Centipede-eater	Least Concern (SARCA 2014)	7
Boaedon capensis	Brown House Snake	Least Concern (SARCA 2014)	15
Duberria lutrix lutrix	South African Slug-eater	Least Concern (SARCA 2014)	12
Homoroselaps lacteus	Spotted Harlequin Snake	Least Concern (SARCA 2014)	15
Lamprophis aurora	Aurora House Snake	Least Concern (SARCA 2014)	2
Lamprophis fuscus	Yellow-bellied House Snake	Least Concern (SARCA 2014)	7

Lycodonomorphus inornatus	Olive House Snake	Least Concern (SARCA 2014)	6
Lycodonomorphus laevissimus	Dusky-bellied Water Snake	Least Concern (SARCA 2014)	10
Lycodonomorphus rufulus	Brown Water Snake	Least Concern (SARCA 2014)	14
Lycophidion capense capense	Cape Wolf Snake	Least Concern (SARCA 2014)	7
Prosymna sundevallii	Sundevall's Shovel-snout	Least Concern (SARCA 2014)	4
Psammophis crucifer	Cross-marked Grass Snake	Least Concern (SARCA 2014)	11
Psammophis notostictus	Karoo Sand Snake	Least Concern (SARCA 2014)	7
Psammophylax rhombeatus	Spotted Grass Snake	Least Concern (SARCA 2014)	23
Pseudaspis cana	Mole Snake	Least Concern (SARCA 2014)	1
Leptotyphlops nigricans	Black Thread Snake	Least Concern (SARCA 2014)	8
Pelomedusa galeata	South African Marsh Terrapin	Not evaluated	7
Acontias gracilicauda	Thin-tailed Legless Skink	Least Concern (SARCA 2014)	8
Acontias meleagris	Cape Legless Skink	Least Concern (SARCA 2014)	4
Acontias orientalis	Eastern Legless Skink	Least Concern (SARCA 2014)	18
Scelotes caffer	Cape Dwarf Burrowing Skink	Least Concern (SARCA 2014)	11
Trachylepis capensis	Cape Skink	Least Concern (SARCA 2014)	8
Trachylepis homalocephala	Red-sided Skink	Least Concern (SARCA 2014)	5
Trachylepis varia sensu stricto	Common Variable Skink		9
Trachylepis variegata	Variegated Skink	Least Concern (SARCA 2014)	2
Chersina angulata	Angulate Tortoise	Least Concern (SARCA 2014)	11
Homopus areolatus	Parrot-beaked Tortoise	Least Concern (SARCA 2014)	12
Psammobates tentorius tentorius	Karoo Tent Tortoise		12
Stigmochelys pardalis	Leopard Tortoise	Least Concern (SARCA 2014)	9
Afrotyphlops bibronii	Bibron's Blind Snake	Least Concern (SARCA 2014)	5
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Least Concern (SARCA 2014)	8
Varanus albigularis albigularis	Rock Monitor	Least Concern (SARCA 2014)	9
Varanus niloticus	Water Monitor	Least Concern (SARCA 2014)	6
Bitis arietans arietans	Puff Adder	Least Concern (SARCA 2014)	31
Causus rhombeatus	Rhombic Night Adder	Least Concern (SARCA 2014)	14

12 ANNEX 4. LIST OF AMPHIBIANS

List of amphibians which are likely to occur in in the broad vicinity of the Ripponn site. Conservation status is from the Minter et al. 2004 or more recent 2017 SANBI assessments.

Scientific Name	Common Name	Status	Records
Breviceps adspersus	Bushveld Rain Frog	Least Concern	4
Sclerophrys capensis	Raucous Toad	Least Concern	21
Sclerophrys pardalis	Eastern Leopard Toad	Least Concern	5
Vandijkophrynus gariepensis gariepensis	Karoo Toad (subsp. gariepensis)	Least Concern	6
Hyperolius marmoratus	Painted Reed Frog	Least Concern	15
Kassina senegalensis	Bubbling Kassina	Least Concern	18
Semnodactylus wealii	Rattling Frog	Least Concern	12
Phrynobatrachus natalensis	Snoring Puddle Frog	Least Concern	1
Xenopus laevis	Common Platanna	Least Concern	5
Amietia delalandii	Delalande's River Frog	Least Concern (2017)	13
Amietia poyntoni	Poynton's River Frog	Least Concern (2017)	1
Cacosternum boettgeri	Common Caco	Least Concern (2013)	21
Cacosternum nanum	Bronze Caco	Least Concern (2013)	13
Strongylopus fasciatus	Striped Stream Frog	Least Concern	8
Tomopterna tandyi	Tandy's Sand Frog	Least Concern	2