Terrestrial Ecology Assessment

prepared in accordance with the
"*Protocol for the Specialist Assessment and minimum report content requirements for environmental impacts on Terrestrial Animal Species, Terrestrial Plant Species and Terrestrial Biodiversity*"Jessa Grid Connection (Jessa M, Jessa S and Jessa Z)and associated infrastructure near Beaufort West

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Terrestrial Ecology Assessment Report for the Jessa Grid Connection (Jessa M, Jessa S and Jessa Z) near Beaufort West in the Western Cape Province.

Location:
Near Beaufort West in the Beaufort West Local Municipality

For: ENERTRAG South Africa (Pty) Ltd

21 May 2022

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SPECIALIST DETAILS & DECLARATION

This report has been prepared in accordance with the "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species, terrestrial plant species and terrestrial biodiversity", as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020. It has been prepared independently of influence or prejudice by any parties.

The details of Specialists are as follows –

Table 1: Details of Specialists

Specialist	Qualifications
Dr David Hoare	PhD Pr.Sci.Nat. 400221/05 (Ecological Science, Botanical Science)
Dr Wynand Vlok	PhD Pr.Sci.Nat. 400109/95 (Zoological Science, Botanical Science)

Details of Author:
Dr David Hoare

PhD (Botany) – Nelson Mandela Metropolitan University, Port Elizabeth

Main areas of specialisation

- Vegetation and general ecology (grasslands, savanna, Albany thicket, fynbos, coastal systems, wetlands).
- Plant biodiversity and threatened plant species specialist.
- Alien plant identification and control / management plans.
- Remote sensing, analysis and mapping of vegetation.
- Specialist consultant for environmental management projects.

Professional Natural Scientist, South African Council for Natural Scientific Professions, Reg. no. 400221/05 (Ecology, Botany)
Member, International Association of Vegetation Scientists (IAVS)
Member, Ecological Society of America (ESA)
Member, International Association for Impact Assessment (IAIA)
Member, Herpetological Association of Africa (HAA)

Employment history

- 1 December 2004 – present, Director, David Hoare Consulting (Pty) Ltd. Consultant, specialist consultant contracted to various companies and organisations.
- 1January 2009 – 30 June 2009, Lecturer, University of Pretoria, Botany Dept.
- 1January 2013 – 30 June 2013, Lecturer, University of Pretoria, Botany Dept.
- 1 February 1998 – 30 November 2004, Researcher, Agricultural Research Council, Range and Forage Institute, Private Bag X05, Lynn East, 0039. Duties: project management, general vegetation ecology, remote sensing image processing.

Declaration of independence:

David Hoare Consulting (Pty) Ltd in an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by David Hoare Consulting (Pty) Ltd is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure:

David Hoare Consulting (Pty) Ltd undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to David Hoare Consulting (Pty) Ltd by the client and in addition to information obtained during the course of this study, David Hoare Consulting (Pty) Ltd present the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practise.

_____ 7 June 2022

Dr David Hoare Date

TERMS OF REFERENCE

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

General information

1.1. An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "**very high sensitivity**" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.

1.2. An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being "**low sensitivity**" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.

1.3. However, where the information gathered from the site sensitivity verification differs from the designation of "very high" terrestrial biodiversity sensitivity on the screening tool and it is found to be of a "low" sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.

1.4. Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a "low" terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.

1.5. If any part of the proposed development footprint falls within an area of "very high" sensitivity, the assessment and reporting requirements prescribed for the "very high" sensitivity apply to the entire footprint, ***excluding linear activities*** *for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase*, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.

Terrestrial Biodiversity Specialist Assessment

2.1. The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.

2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint.

2.3. The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:

2.3.1. a description of the ecological drivers or processes of the system and how the proposed development will impact these;

2.3.2. ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;

2.3.3. the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;

2.3.4. the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments;

2.3.5. a description of terrestrial biodiversity and ecosystems on the preferred site, including:

(a) main vegetation types;

(b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;

(c) ecologicalconnectivity,habitatfragmentation,ecologicalprocesses and fine- scale habitats; and

(d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;

2.3.6. the assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and

2.3.7. the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:

2.3.7.1. terrestrial critical biodiversity areas (CBAs), including:

(a) the reasons why an area has been identified as a CBA;

(b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;

(c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);

(d) the impact on ecosystem threat status;

(e) the impact on explicit subtypes in the vegetation;

(f) the impact on overall species and ecosystem diversity of the site; and

(g) the impact on any changes to threat status of populations of species of conservation concern in the CBA;

2.3.7.2. terrestrial ecological support areas (ESAs), including:

(a) the impact on the ecological processes that operate within or across the site;

(b) the extent the proposed development will impact on the functionality of the ESA; and

(c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;

2.3.7.3. protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-

(a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;

2.3.7.4. priority areas for protected area expansion, including-

(a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;

2.3.7.5. SWSAsincluding:

(a) the impact(s) on the terrestrial habitat of a SWSA; and

(b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);

2.3.7.6. FEPAsubcatchments,including-

(a) theimpactsoftheproposeddevelopmentonhabitatconditionand species in the FEPA sub catchment;

2.3.7.7 indigenous forests, including:

(a) impact on the ecological integrity of the forest; and

(b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.

2.4. The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.

Terrestrial Biodiversity Specialist Assessment Report

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:

3.1.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;
3.1.2. a signed statement of independence by the specialist;
3.1.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
3.1.4. a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;
3.1.5. a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;
3.1.6. a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);
3.1.7. additional environmental impacts expected from the proposed development;
3.1.8. any direct, indirect and cumulative impacts of the proposed development;
3.1.9. the degree to which impacts and risks can be mitigated;
3.1.10. the degree to which the impacts and risks can be reversed;
3.1.11. the degree to which the impacts and risks can cause loss of irreplaceable resources;
3.1.12. proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);
3.1.13. a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;
3.1.14. a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and
3.1.15. any conditions to which this statement is subjected.

3.2.The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.

3.3. A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

LIMITATIONS, ASSUMPTIONS & UNCERTAINTIES

The following assumptions, limitations, uncertainties are listed regarding the ecological assessment of the site:

- The assessment is based on a single reconnaissance site visit. The current study is based on an extensive site visit as well as a desktop study of the available information. The time spent on site was adequate for understanding general patterns across affected areas.
- There had been an extreme drought affecting the area at the time of the field survey. It was therefore not possible to collect floristic data with any degree of confidence. This makes it difficult to characterize specific parts of the landscape.
- Compiling the list of species that could potentially occur on site is limited by the paucity of collection records for the area. The list of plant species that could potentially occur on site was therefore taken from a wider area and from literature sources that may include species that do not occur on site and may miss species that do occur on site. In order to compile a comprehensive site-specific list of the biota on site, studies would be required that would include different seasons, be undertaken over a number of years and include extensive sampling. Due to time constraints, this was not possible for this study.
- Rare and threatened plant and animal species are, by their nature, usually very difficult to locate and can be easily missed.

1 INTRODUCTION

1.1 Project Background

ENERTRAG South Africa (Pty) Ltd (ESA) has proposed construction of three Wind Energy Facilities (WEFs) and associated grid line infrastructure near Beaufort West in the Western Cape Province of South Africa.

The above-mentioned WEF and associated grid connection infrastructure projects form part of a greater renewable energy project known as the 'Jessa Cluster', being proposed by ESA near the town of Beaufort West. The projects which form part of the proposed 'Jessa Cluster' include the following (Figure 1):

- Jessa M WEF – DFFE Reference Number:14/12/16/3/3/1/2494;
- Jessa M Grid Connection – DFFE Reference Number: To be Allocated;
- Jessa S WEF – DFFE Reference Number:14/12/16/3/3/1/2497;
- Jessa S M Grid Connection – DFFE Reference Number: To be Allocated;
- Jessa Z WEF – DFFE Reference Number:14/12/16/3/3/1/2496; and
- Jessa Z Grid Connection – DFFE Reference Number: To be Allocated.

It should be noted that this report focuses on the Jessa M, Jessa S and Jessa Z Grid Connections (including associated infrastructure) only, with the WEF projects reported on separately in a standalone Terrestrial Ecology report.

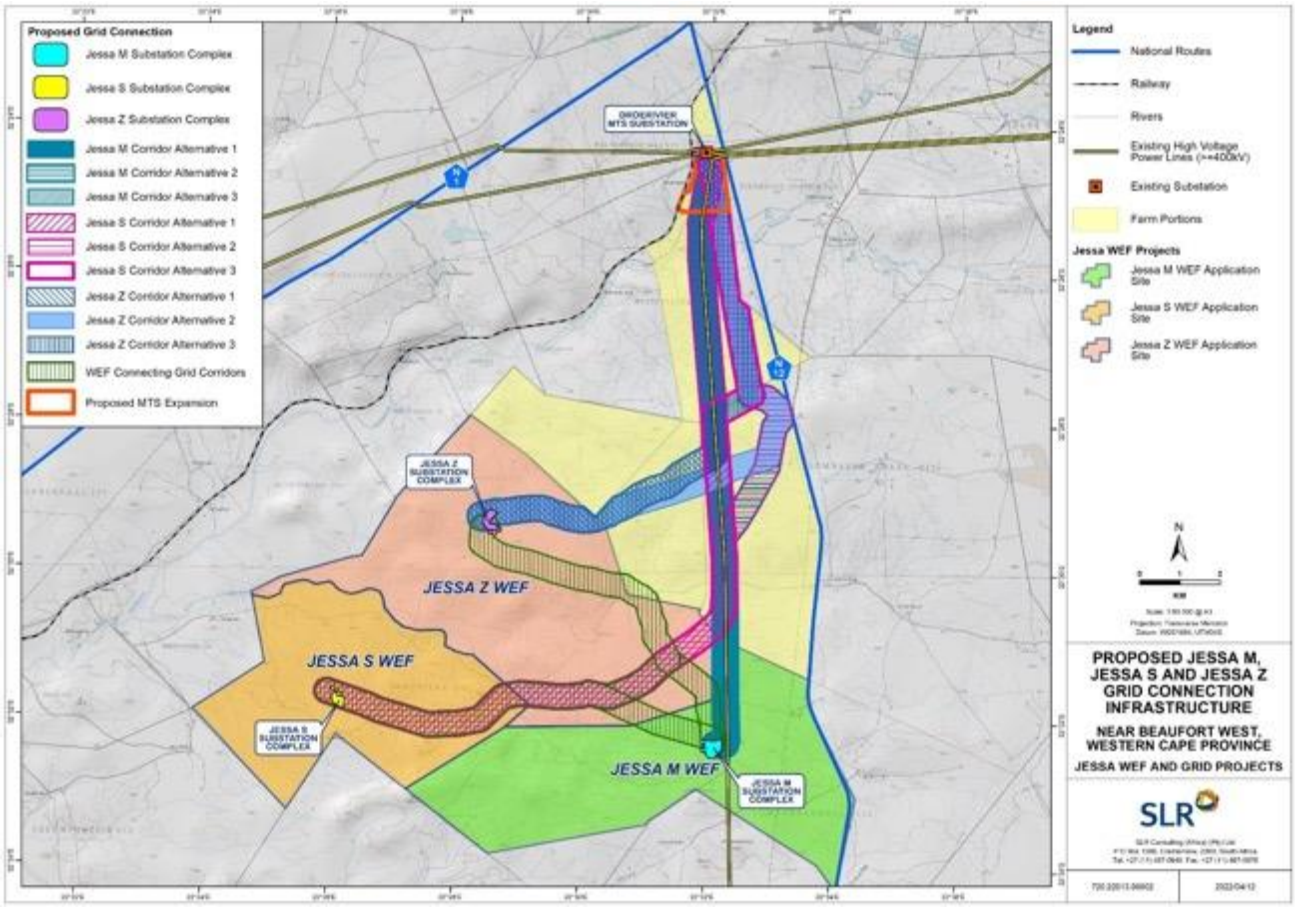

Figure 1: Map showing WEF & associated grid connection infrastructure projects which form part of proposed Jessa Cluster

ESA proposes to connect all three (3) WEF projects to the nearby Eskom Droërivier MTS through the proposed powerlines (grid connection), transmitting up to 132kV (either single or double circuit). The proposed Jessa Grid

Connection projects therefore aim to feed the electricity generated by the proposed Jessa WEF projects into the national grid.
The grid connection infrastructure projects which form part of the Jessa Cluster require several key components to facilitate the distribution and transmission of electricity at a large scale, which includes the following:

- A switching station located near the substation in the O&M Complex from which the 132kV powerline will connect, to the Droërivier MTS (note the remainder of the O&M complex components form part of the respective Jessa WEF applications, however the switching station component should be authorised as part of the respective Jessa Grid application); (see Figure 1 for O&M compex referred to as "substation complex");
- 132kV powerlines (either single or double circuit), connecting the proposed Jessa WEF projects (Jessa to each other via their respectivesubstations(132kV WEF connecting powerlines, see Figure 1 for "WEF Connecting Corridors");
- 132kV transmission line from each WEF substation to the Eskom Droërivier Main Transmission Substation (MTS); and
- Temporary maintenance roads / jeep tracks;
- Upgrades to the existing Droërivier MTS (within the current footprint); or
- If required, an expansion / additional 132kV/400 kV MTS (approx. 20ha-30ha in extent).

To allow efficient transmission, the electricity generated by the wind turbines of the respective Jessa WEF projects undergoes a voltage 'step-up' process that occurs at each wind turbine, where power is stepped up to a maximum of 33kV (either in the turbine or in a small transformer container next to the turbine) and again at each of the onsite WEF substations where power is stepped up to 132kV. The power is then transferred through a switching station (next to each WEF substation) along a 132kV line where it will connect into the Droërivier MTS and will form part of the national grid.

As an alternative to connecting directly to the existing Eskom Droerivier MTS, ESA will explore the possible expansion of the MTS. A 20-30 Ha area will therefore be assessed for this purpose over portion 10 of farm Weltevreden near the Eskom MTS.

1.2 Identified Theme Sensitivities

A sensitivity screening report from the DEA Online Screening Tool for the entire cluster of projects was requested in the application category: Utilities Infrastructure| Electricity| Distribution and Transmission| Powerline. The same has been done for the switching station and the MTS because powerlines and substations are categorized separately on the Screening Tool. The sensitivities are, however, identical. The DEA Screening Tool report for the area indicates the following ecological sensitivities:

Theme	**Very High sensitivity**	**High sensitivity**	**Medium sensitivity**	**Low sensitivity**
Animal Species Theme		**X**		
Plant Species Theme			**X**	
Terrestrial Biodiversity Theme	**X**			

1.2.1 Animal Species theme

The animal species theme was highlighted as being of High sensitivity due the potential presence of the following species:

Sensitivity	Feature(s)
High	Mammalia-*Felis nigripes*
High	Aves-*Aquila verreauxii*
High	Aves-*Circus maurus*
High	Aves-*Neotis ludwigii*

Medium	Aves-*Circus maurus*
Medium	Aves-*Aquila verreauxii*
Medium	Reptilia-*Chersobius boulengeri*

As a result of the potential presence of these sensitive species, a separate animal species theme assessments wasconducted and the Terrestrial Ecology Impact Assessment Report has been compiled to address the High and Very High sensitivities for the Animal and Terrestrial Biodiversity Themes.

1.2.2 Plant Species theme

The plant species theme was highlighted as being of Medium sensitivity due the potential presence of the following species:

Sensitivity	Feature(s)
Medium	*Ruschia beaufortensis*
Medium	Sensitive species 383
Medium	*Peersia frithii*
Medium	Sensitive species 1212
Medium	*Tritonia florentiae*

As a result of the potential presence of these sensitive species, a separate plant species theme assessments is being conducted and a standalone Plant Species Compliance Statement has been compiled due to the Medium Sensitivity and has been appended to the Terrestrial Ecology Impact Assessment Report.

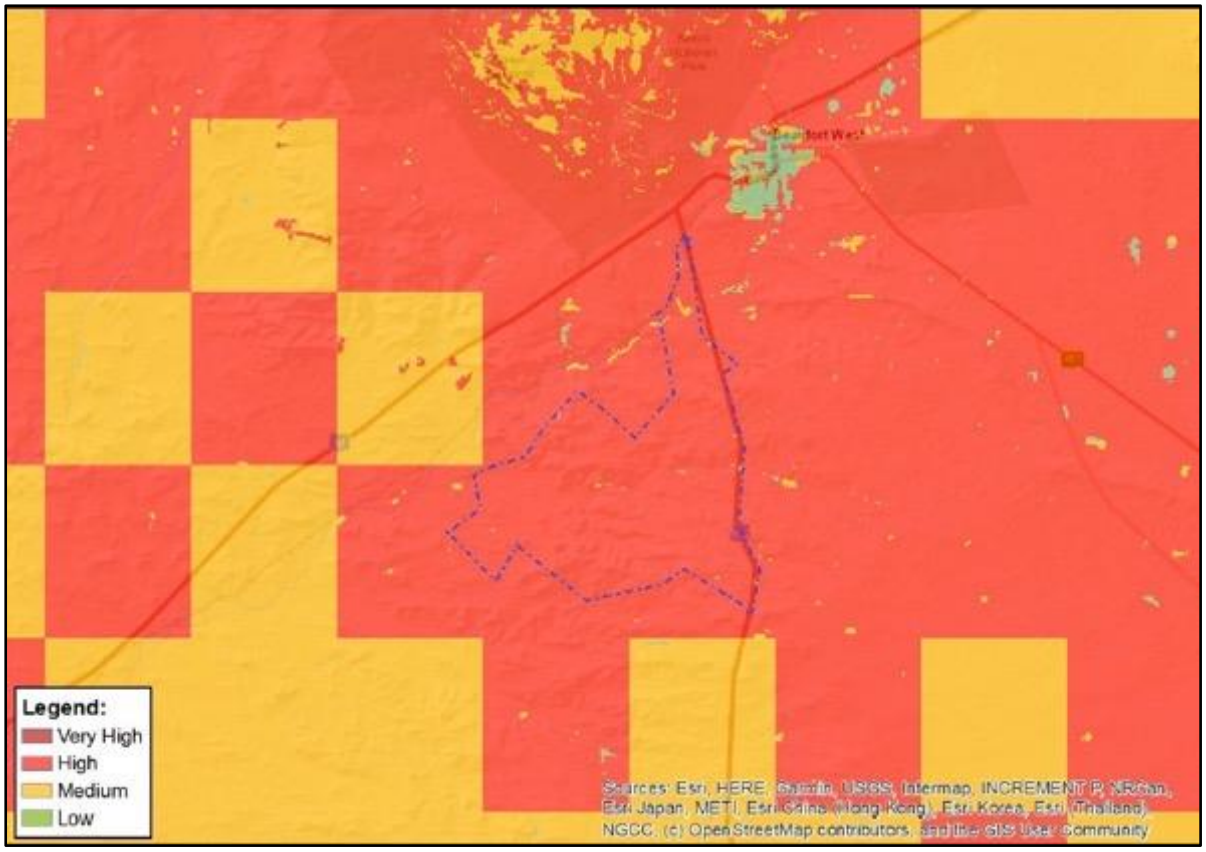

Figure 2: Screening tool map of relative animal species theme sensitivity.

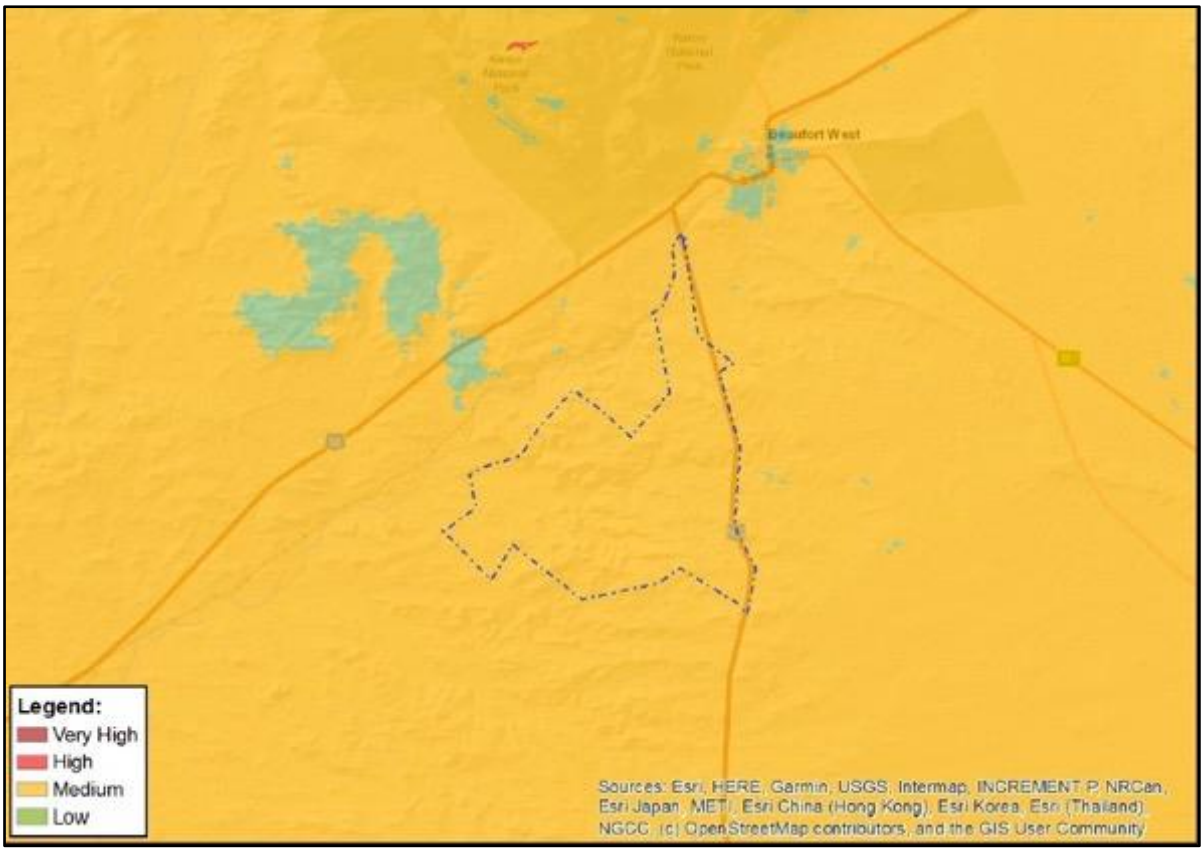

Figure 3: Screening tool map of relative plant species theme sensitivity.

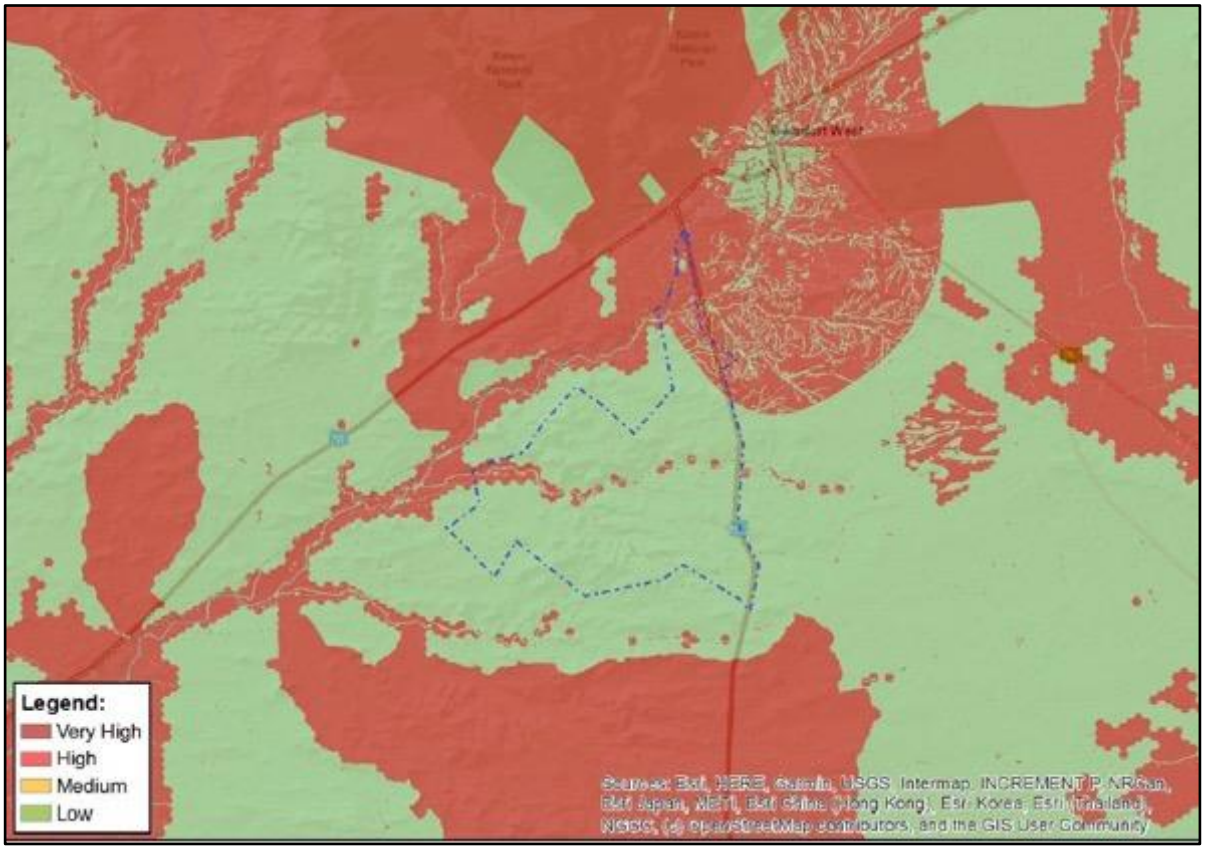

Figure 4: Screening tool map of terrestrial biodiversity theme sensitivity

1.2.3 Terrestrial Biodiversity theme

The current ecological sensitivities that triggered the Very High terrestrial biodiversity sensitivity include the following:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Ecological support area 1
Very High	Ecological support area 2

The Terrestrial Ecology Impact Assessment Report has been compiled to address the High and Very High sensitivities for the Animal and Terrestrial Biodiversity Themes.

2 METHODOLOGY

The detailed methodology followed as well as the sources of data and information used as part of this assessment is described below.

2.1 Approach

The study commenced as a desktop-study followed by a site-specific field study on 15,16 and 17 September 2021. The site is within the biomes: Gamka Karoo and Southern Karoo Riviere with a peak rainfall season in summer and autumn, which occurs in March (major) and November (minor). The timing of the survey is therefore good in terms of assessing the flora of the site, however, due to the survey having been undertaken at the end of an extended draught period (7+ years), the vegetation was in too poor condition for the field survey to generate reliable data.

During the field survey, all major natural variation on site was assessed and select locations were traversed on foot. A hand-held Garmin GPSMap 64s was used to record a track within which observations were made. Digital photographs were taken of features and habitats on site, as well as of all plant species that were seen. All plant species recorded were uploaded to the iNaturalist website.

Aerial imagery from Google Earth was used to identify and assess habitats on site. Patterns identified from satellite imagery were verified on the ground. From this ground survey, as well as ad hoc observations on site, a checklist of plant species occurring on site was compiled. Digital photographs were taken at locations where features of interest were observed.

2.2 Species of conservation concern

There are two classes of species of concern for the site under investigation, (i) those listed by conservation authorities as being on a Red List and are therefore considered to be at risk of extinction, and (ii) those listed as protected according to National and/or Provincial legislation.

2.2.1 Red List plant species

Determining the conservation status of a species is required to identify those species that are at greatest risk of extinction and, therefore, in most need of conservation action. South Africa has adopted the International Union for Conservation of Nature (IUCN) Red List Categories and Criteria to provide an objective, rigorous, scientifically founded system to identify Red List species. A published list of the Red List species of South African plants (Raimondo *et al*., 2009) contains a list of all species that are considered to be at risk of extinction. This list is updated regularly to take new information into account, but these are not published in book/paper format. Updated assessments are provided on the SANBI website (http://redlist.sanbi.org/). According to the website of the Red List of Southern African Plants (http://redlist.sanbi.org/), *the conservation status of plants indicated on the Red List of South African Plants Online represents the status of the species within South Africa's borders. This means that when a species is not endemic to South Africa, only the portion of the species population occurring within South Africa has been assessed. The global conservation status, which is a result of the assessment of the entire global range of a species, can be found on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species: http://www.iucnredlist.org*. The South African assessment is used in this study.

The purpose of listing Red List species is to provide information on the potential occurrence of species at risk of extinction in the study area that may be affected by the proposed infrastructure. Species appearing on these lists can

then be assessed in terms of their habitat requirements to determine whether any of them have a likelihood of occurring in habitats that may be affected by the proposed infrastructure.

Lists were compiled specifically for any species at risk of extinction (Red List species) previously recorded in the area. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute (http://posa.sanbi.org) for the quarter degree square/s within which the study area is situated. Habitat information for each species was obtained from various published sources. The probability of finding any of these species was then assessed by comparing the habitat requirements with those habitats that were found, during the field survey of the site, to occur there.

2.2.2 Protected trees

Regulations published for the National Forests Act (Act 84 of 1998) (NFA) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distribution of species on this list were obtained from published sources (e.g. van Wyk & van Wyk 1997) and from the SANBI Biodiversity Information System website (http://sibis.sanbi.org/) for quarter degree grids in which species have been previously recorded. Species that have been recorded anywhere in proximity to the site (within 100 km), or where it is considered possible that they could occur there, were listed and were considered as being at risk of occurring there.

2.2.3 Other protected species

National legislation was evaluated in order to provide lists of any plant or animal species that have protected status. The most important legislation is the following:

- National Environmental Management: Biodiversity Act (Act No 10 of 2004); and

This legislation contains lists of species that are protected. These lists were used to identify any species that have a geographical range that includes the study area and habitat requirements that are met by those found on site. These species were searched for within suitable habitats on site or, where relevant, if it is possible that they could occur on site, this was stated.

2.2.4 Red List animal species

Lists of threatened animal species that have a geographical range that includes the study area were obtained from literature sources (for example, Alexander & Marais 2007, Branch 1988, 2001, du Preez & Carruthers 2009, Friedmann & Daly 2004, Mills & Hes 1997, Monadjem *et al*., 2010). The likelihood of any of them occurring was evaluated based on habitat preference and habitats available within the study area. The three parameters used to assess the probability of occurrence for each species were as follows:

- *Habitat requirements*: most Red Data animals have very specific habitat requirements and the presence of these habitat characteristics within the study area were assessed;
- *Habitat status*: in the event that available habitat is considered suitable for these species, the status or ecological condition was assessed. Often, a high level of degradation of a specific habitat type will negate the potential presence of Red Data species (especially wetland-related habitats where water-quality plays a major role); and
- *Habitat linkage*: movement between areas used for breeding and feeding purposes forms an essential part of ecological existence of many species. The connectivity of the study area to these surrounding habitats and adequacy of these linkages are assessed for the ecological functioning Red Data species within the study area.

Mammal threat status is according to Child *et al*. (2016), reptile threat status is according to Bates *et al*. 2014, and amphibian threat status is according to Minter *et al*. (2004).

2.2.5 *Species probability of occurrence*

Some species of plants may be cryptic, difficult to find, rare, ephemeral or generally not easy to identify while undertaking a survey of a large area. An assessment of the possibility of these species occurring there was therefore provided. For all threatened or protected flora that occur in the general geographical area of the site, a rating of the likelihood of it occurring on site is given as follows:

- LOW: no suitable habitats occur on site / habitats on site do not match habitat description for species;
- MEDIUM: habitats on site match general habitat description for species (e.g. karoo shrubland), but detailed microhabitat requirements (e.g. mountain shrubland on shallow soils overlying sandstone) are absent on the site or are unknown from the descriptions given in the literature or from the authorities;
- HIGH: habitats found on site match very strongly the general and microhabitat description for the species (e.g. mountain shrubland on shallow soils overlying sandstone); and
- DEFINITE: species found in habitats on site.

2.2.6 *Camera-trap survey*

A limited camera-trap survey was specifically undertaken to determine whether the Riverine Rabbit occurs on site or not. Potential habitat related to suitable vegetation along the rivers was identified and, within this general zone, potential sites were identified in which the rabbit could potentially occur. Camera traps were placed within these specific locations and left for a 5-week period of time. No Rivereine Rabbits were detected during this survey, but the cameras provided evidence of various other animal species that occur on site.

2.3 Sources of information

2.3.1 *Regional Vegetation*

- Broad vegetation types occurring on site were obtained from Mucina and Rutherford (2006), with updates according to the SANBI BGIS website (http://bgis.sanbi.org), as follows:
    - Mucina, L. and Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.
    - South African National Biodiversity Institute 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 23 September 2021.

2.3.2 *Threatened Ecosystems*

- The conservation status of the vegetation types were obtained from Mucina and Rutherford (2006) and the National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).
- The plant species checklist of species that could potentially occur on site was compiled from a plant species checklist extracted from the NewPosa database of the South African National biodiversity Institute (SANBI) for the quarter degree grids 2821CA.
- The IUCN Red List Category for plant species, as well as supplementary information on habitats and distribution, was obtained from the SANBI Threatened Species Programme (Red List of South African Plants, http://redlist.sanbi.org).

2.3.3 *Fauna*

- Lists of animal species that have a geographical range that includes the study area were obtained from literature sources (Bates et al., 2014 for reptiles, du Preez & Carruthers 2009 for frogs, Mills & Hes 1997 and

Friedmann and Daly, 2004 for mammals). This was supplemented with information from the Animal Demography Unit website (adu.uct.ac.za) and literature searches for specific animals, where necessary.

2.3.4 Regional plans

- Information from the National Protected Areas Expansion Strategy (NPAES) was consulted for possible inclusion of the site into a protected area in future (available on http://bgis.sanbi.org).).
- The Free State Biodiversity Area Maps were consulted for inclusion of the site into a Critical Biodiversity Area or Ecological Support Area (biodiversityadvisor.sanbi.org).

2.4 Impact Assessment

An assessment of the potential impacts of the Jessa WEF site (namely the Jessa M, Jessa S and Jessa Z WEF) was guided by the SLR Impact Table Guidelines. A pre- and post-mitigation assessment was undertaken (Refer to Table 2).

Table 2: SLR impact table interpretation of significance

PART D: INTERPRETATION OF SIGNIFICANCE		
Very High -	Very High +	Represents a key factor in decision-making. In the case of adverse effects, the impact would be considered a fatal flaw unless mitigated to lower significance.
High -	High +	These beneficial or adverse effects are considered to be very important considerations and are likely to be material for the decision-making process. In the case of negative impacts, substantial mitigation will be required.
Medium -	Medium +	These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such issues may become a decision-making issue if leading to an increase in the overall adverse effect on a particular resource or receptor. In the case of negative impacts, mitigation will be required.
Low -	Low +	These beneficial or adverse effects may be raised as localised issues. They are unlikely to be critical in the decision-making process but could be important in the subsequent design of the project. In the case of negative impacts, some mitigation is likely to be required.
Very Low -	Very Low +	These beneficial or adverse effects will not have an influence on the decision, neither will they need to be taken into account in the design of the project. In the case of negative impacts, mitigation is not necessarily required.
Insignificant		Any effects are beneath the levels of perception and inconsequential, therefore not requiring any consideration.

3 RELEVANT LEGISLATIVE AND PERMIT REQUIREMENTS

Relevant legislation is provided in this section to provide a description of the key legal considerations of importance to the proposed project. The applicable legislation is listed below.

3.1 Convention on Biodiversity (CBD)

South Africa became a signatory to the United Nations Convention on Biological Diversity (CBD) in 1993, which was ratified in 1995. The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14 (a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

3.2 National Environmental Management Act, Act No. 107 of 1998 (NEMA)

NEMA is the framework environmental management legislation, enacted as part of the government's mandate to ensure every person's constitutional right to an environment that is not harmful to his or her health or wellbeing. It is administered by DEA but several functions have been delegated to the provincial environment departments. One of the purposes of NEMA is to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment. The Act further aims to provide for institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state and to provide for the administration and enforcement of other environmental management laws.

NEMA requires, inter alia, that:

- "development must be socially, environmentally, and economically sustainable",
- "disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied." ,
- "a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions".

NEMA states that "the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage."

This report considers the Environmental Impact Assessment (EIA) Regulations of 2014 (NEMA, 2014) as amended in 2017 (NEMA, 2017), under the National Environmental Management Act, (Act No. 107 of 1998). According to these Regulations under Listing Notice 1 (GRN No. 327), Listing Notice 2 (GRN No 325) and Listing Notice 3 (GRN No 324), the activities listed are identified as activities that may require Environmental Authorisation prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of the Act.

3.3 National Environmental Management: Biodiversity Act (Act No 10 of 2004)

As the principal national act regulating biodiversity protection, NEM:BA, which is administered by DEA, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner. The term biodiversity according to the Convention on Biodiversity (CBD) refers to the variability among living organisms from all sources including, inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity in genes, species and ecosystems.

In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

Chapter 4 of the Act relates to threatened or protected ecosystems or species. According to Section 57 of the Act, "Restricted activities involving listed threatened or protected species":

- (1) A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7.

Such activities include any that are "of a nature that may negatively impact on the survival of a listed threatened or protected species".

3.3.1 Alien and Invasive Species

Chapter 5 of NEM:BA relates to species and organisms posing a potential threat to biodiversity. The Act defines alien species and provides lists of invasive species in regulations. The Alien and Invasive Species (AIS) Regulations, in terms of Section 97(1) of NEM:BA, was published in Government Notice R598 in Government Gazette 37885 in 2014 (NEM:BA, 2014). The Alien and Invasive Species (AIS) lists were subsequently published in Government Notice R 864 of 29 July 2016 (NEM:BA, 2016).

According to Section 75 of the Act, "Control and eradication of listed invasive species":

- (1) Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.
- (2) Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.
- (3) The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

The National Environmental Management: Biodiversity Act (NEMBA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Chapter 5 of the Act relates to species and organisms posing a potential threat to biodiversity. The purpose of Chapter 5 is:

a) to prevent the unauthorized introduction and spread of alien species and invasive species to ecosystems and habitats where they do not naturally occur;
b) to manage and control alien species and invasive species to prevent or minimize harm to the environment and to biodiversity in particular;
c) to eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats;

According to Section 65 of the Act, "Restricted activities involving alien species":

1) A person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7. Restricted activities include the following:
    a. Importing into the Republic, including introducing from the sea, any specimen of a listed invasive species.
    b. Having in possession or exercising physical control over any specimen of a listed invasive species.
    c. Growing, breeding or in any other way propagating any specimen of a listed invasive species, or causing it to multiply.
    d. Conveying, moving or otherwise translocating any specimen of a listed invasive species.
    e. Selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any other way acquiring or disposing of any specimen of a listed invasive species.
    f. Spreading or allowing the spread of any specimen of a listed invasive species.
    g. Releasing any specimen of a listed invasive species.

h. Additional activities that apply to aquatic species.

2) A permit referred to in subsection (1) may be issued only after a prescribed assessment of risks and potential impacts on biodiversity is carried out.

3)

An "**alien species**" is defined in the Act as:

a) a species that is not an indigenous species; or

b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by means of migration or dispersal without human intervention.

According to Section 71 of the Act, "Restricted activities involving listed invasive species":

1) A person may not carry out a restricted activity involving a specimen of a listed invasive species without a permit issued in terms of Chapter 7.

2) A permit referred to in subsection (1) may be issued only after a prescribed assessment of risks and potential impacts on biodiversity is carried out.

An "**invasive species**" is defined in the Act as any species whose establishment and spread outside of its natural distribution range:

a) threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and

b) may result in economic or environmental harm or harm to human health.

A "**listed invasive species**" is defined in the Act as any invasive species listed in terms of section 70(1).

According to Section 73 of the Act, "Duty of care relating to listed invasive species":

2) A person who is the owner of land on which a listed invasive species occurs must-

a) notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;

b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and

c) take all the required steps to prevent or minimize harm to biodiversity.

According to Section 75 of the Act, "Control and eradication of listed invasive species":

- (1) Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.
- (2) Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.
- (3) The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

3.3.2 Government Notice No. 1002 of 2011: National List of Ecosystems that are Threatened and in need of protection

Published under Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). This Act provides for the listing of threatened or protected ecosystems based on national criteria. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the National Spatial Biodiversity Assessment (2004).

The EIA Regulations (2014, as amended) include three lists of activities that require environmental authorisation:

- Listing Notice 1: activities that require a basic assessment (GNR. 327 of 2014, as amended),
- Listing Notice 2: activities that require a full environmental impact assessment report (EIR) (GNR. 325 of 2014, as amended),
- Listing Notice 3: activities that require a basic assessment in specific identified geographical areas only (GNR. 324 of 2014, as amended).

3.3.3 GNR 151: Critically Endangered, Endangered, Vulnerable and Protected Species List

Published under Section 56(1) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).

3.3.4 GNR 1187: Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List

Published under Section 56(1) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).

3.3.5 Government Notice No. 40733 of 2017: Draft National Biodiversity Offset Policy

Published under the National Environmental Management Act (Act No. 107 of 1998). The aim of the Policy is to ensure that significant residual impacts of developments are remedied as required by NEMA, thereby ensuring sustainable development as required by section 24 of the Constitution of the Republic of South Africa, 1996. This policy should be taken into consideration with every development application that still has significant residual impact after the Mitigation Sequence has been followed. The mitigation sequence entails the consecutive application of avoiding or preventing loss, then at minimizing or mitigating what cannot be avoided, rehabilitating where possible and, as a last resort, offsetting the residual impact. The Policy specifies that one impact that has come across consistently as unmitigatable is the rapid and consistent transformation of certain ecosystems and vegetation types, leading to the loss of ecosystems and extinction of species. The Policy specifically targets ecosystems where the ability to reach protected area targets is lost or close to being lost. However, the Policy states that "*[w]here ecosystems remain largely untransformed, intact and functional, an offset would not be required for developments that lead to transformation, provided they have not been identified as a biodiversity priority*". Biodivesity offsets should be considered to remedy residual negative impacts on biodiversity of 'medium' to 'high' significance. Residual impacts of 'very high' significance are a fatal flaw for development and residual biodiversity impacts of 'low' significance would usually not require offsets. The Policy indicates that impacts should preferably be avoided in protected areas, CBAs, verified wetland and river features and areas earmarked for protected area expansion.

3.4 National Forests Act (Act no 84 of 1998)

Protected trees
According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any *protected tree*, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.

Forests
Prohibits the destruction of indigenous trees in any natural forest without a licence.

3.5 National Water Act (Act 36 of 1998)

Wetlands, riparian zones and watercourses are defined in the Water Act as a water resource and any activities that are contemplated that could affect the wetlands requires authorisation (Section 21 of the National Water Act of 1998). A "watercourse" in terms of the National Water Act (Act 36 of 1998) means:

- River or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and

Any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

3.6 Conservation of Agricultural Resources (Act No. 43 of 1983) as amended in 2001

Declared Weeds and Invaders in South Africa are categorised according to one of the following categories:

- Category 1 plants: are prohibited and must be controlled.
- Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.
- Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands.

3.7 National Veld and Forest Fire Act (Act No. 101 of 1998)

Provides requirements for veldfire prevention through firebreaks and required measures for fire-fighting. Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all landowners to acquire equipment and have available personnel to fight fires.

3.8 Nature and Environmental Conservation Ordinance, No. 19 of 1974

This Ordinance provides for the protection of nature and matters relating to environmental conservation. It originally covered the geographical areas of the Western Cape Province, Eastern Cape Province (excluding the former Ciskei and Transkei) and parts of North West Province (excluding the former Boputhatswana) but is being repealed by Provincial Acts. It is proposed in the Western Cape Biodiversity Draft Bill, 2019, that the Ordinance is repealed in so far as it relates to the Western Cape Province. It is currently still in force and includes a list of protected species.

3.9 Draft Western Cape Biodiversity Bill, 2019

The stated purpose of the Draft Western Cape Biodiversity Bill, 2019 is to provide for the framework and institutions for nature conservation and the protection, management and sustainable use of biodiversity and ecosystems in the Province; and for matters incidental thereto. If passed, the Bill will repeal various pieces of legislation to the extent set out in the below:

- Sea Shore Act, 1935 (21 of 1935): the whole
- Mountain Catchment Areas Act, 1970 (63 of 1970): The whole in so far as it has been assigned to the Province by Proclamation R28 of 1995
- Nature Conservation Ordinance, 1974 (19 of 1974): The whole
- Nature Reserves Validation Ordinance, 1982 (23 of 1982): The whole
- Western Cape Nature Conservation Board Act, 1998 (15 of 1998): The whole
- Western Cape Nature and Environmental Conservation Ordinance Amendment Act, 1999 (8 of 1999): The whole
- Western Cape Conservation Laws Amendment Act, 2000 (3 of 2000): The whole
- Western Cape Biosphere Reserves Act, 2011 (6 of 2011): The whole

4 STUDY AREA

4.1 Broad vegetation patterns

There are two regional vegetation types in the study area, namely Gamka Karoo and Southern Karoo Riviere (Figure 3). There are likely to be floristic and vegetation structural influences from any of these vegetation types at any location on site, depending on local ecological conditions. The vegetation types that occur on site and nearby areas are briefly described below.

4.2 Gamka Karoo (NKl1)

Distribution

Western Cape and Eastern Cape Provinces and marginally into the Northern Cape Province: Large basin between the Great Escarpment (Nuweveld Mountains) in the north and northwest and Cape Fold Belt Mountains (mostly Swartberg Mountains) in the south. From approximately the edge of the Gamka basin catchment area (i.e. of the Dwyka River tributary) in the west to about the Kariega River in the east. Altitude varies mostly from 500–1 100 m.

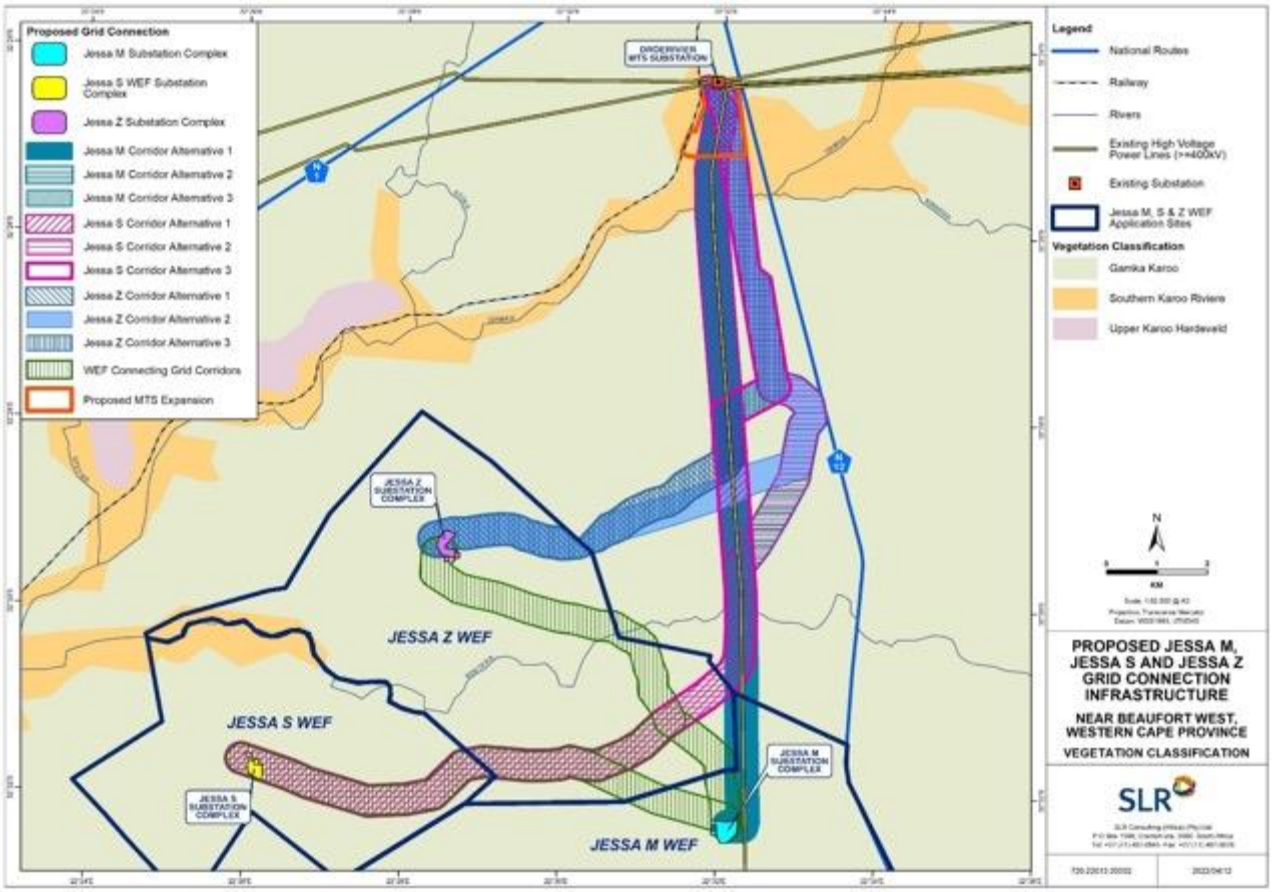

Figure 5: Regional vegetation types of the Jessa WEFs and Grid Corridor areas

Vegetation & Landscape Features

Extremely irregular to slightly undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs (e.g. *Chrysocoma ciliata, Eriocephalus ericoides*) with rare low trees (e.g. *Euclea undulata*). Dense stands of drought-resistant grasses (*Stipagrostis, Aristida*) cover (especially after abundant rains) broad sandy bottomlands.

Geology and soils

Mudstones and sandstones of the Beaufort Group (Adelaide Subgroup) with some Ecca (Fort Brown Formation) shales supporting very shallow and stony soils of the Glenrosa and/or Mispah forms, typical of Fc land type.

Climate

One of the most arid units of the Nama-Karoo Biome. Rainfall mainly in autumn and summer, with a marked peak in March and low levels of cyclonic rain in winter. This region is in the rainshadow of Cape Fold Belt mountains in the south, MAP ranging from about 100 mm in some areas between the Dwyka and Gamka Rivers to about 240 mm against the Great Escarpment. Mean maximum and minimum monthly temperatures in Beaufort West are 38.7°C and –3.2°C for January and July, respectively. Strong northwesterly winds occur in winter. See also climate diagram for NKl 1 Gamka Karoo.

Important Taxa

Tall Shrubs	*Lycium cinereum* (d), *L. oxycarpum* (d), *Rhigozum obovatum* (d), *Acacia karroo*, *Cadaba aphylla*, *Lycium schizocalyx*, *Rhus burchellii*, *Sisyndite spartea*.
Low Shrubs	*Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Felicia muricata* (d), *Galenia fruticosa* (d), *Limeum aethiopicum* (d), *Pentzia incana* (d), *Pteronia adenocarpa* (d), *Rosenia humilis* (d), *Aptosimum indivisum*, *Asparagus burchellii*, *Blepharis mitrata*, *Eriocephalus microphyllus* var. *pubescens*, *Felicia filifolia* subsp. *filifolia*, *F. muricata* subsp. *cinerascens*, *Galenia secunda*, *Garuleum bipinnatum*, *G. latifolium*, *Gomphocarpus filiformis*, *Helichrysum lucilioides*, *Hermannia desertorum*, *H. grandiflora*, *H. spinosa*, *Melolobium candicans*, *Microloma armatum*, *Monechma spartioides*, *Pentzia pinnatisecta*, *Plinthus karooicus*, *Polygala seminuda*, *Pteronia glauca*, *P. sordida*, *P. viscosa*, *Selago geniculata*, *Sericocoma avolans*, *Zygophyllum microcarpum*, *Z. microphyllum*.
Succulent Shrubs	*Ruschia intricata* (d), *Aridaria noctiflora* subsp. *straminea*, *Crassula muscosa*, *Drosanthemum lique*, *Galenia sarcophylla*, *Kleinia longiflora*, *Ruschia spinosa*, *Salsola tuberculata*, *Sarcocaulon patersonii*, *Trichodiadema barbatum*, *Tripteris sinuata* var. *linearis*.
Semiparasitic shrub	*Thesium lineatum*.
Herbs	*Gazania lichtensteinii* (d), *Chamaesyce inaequilatera*, *Dicoma capensis*, *Galenia glandulifera*, *Lepidium africanum* subsp. *africanum*, *L. desertorum*, *Lessertia pauciflora* var. *pauciflora*, *Leysera tenella*, *Osteospermum microphyllum*, *Sesamum capense*, *Tetragonia microptera*, *Tribulus terrestris*, *Ursinia nana*.
Geophytic herbs	*Drimia intricata*, *Moraea polystachya*.
Graminoids	*Aristida congesta* (d), *A. diffusa* (d), *Fingerhuthia africana* (d), *Stipagrostis ciliata* (d), *S. obtusa* (d), *Aristida adscensionis*, *Cenchrus ciliaris*, *Digitaria argyrograpta*, *Enneapogon desvauxii*, *Enneapogon scaber*, *Eragrostis homomalla*, *E. lehmanniana*, *E. obtusa*, *Tragus berteronianus*, *T. koelerioides*.

Geographically Important Taxa
(Endemic to Great Karoo Basin)

Succulent Shrubs	*Hereroa latipetala** (also found in Prince Albert Succulent Karoo), *H. odorata** (also found in Koedoesberge-Moordenaars Karoo), *Pleiospilos compactus* (southern and western limits of distribution), *Rhinephyllum luteum**, *Stapelia engleriana**.
Geophitic herb	*Tritonia tugwelliae**.
Low Shrub	*Felicia lasiocarpa**.
Succulent Herbs	*Piaranthus comptus**, *Tridentea parvipuncta* subsp. *parvipuncta**.
Graminoid	*Oropetium capense* (westernmost limit of distribution).

Endemic Taxa

Succulent Shrubs	*Chasmatophyllum stanleyi*, *Hereroa incurva*, *Hoodia dregei, Ruschia beaufortensis*.
Low shrub	*Jamesbrittenia tenuifolia*.
Herb	*Manulea karrooica*.
Succulent Herb	*Piaranthus comptus*.

4.3 Southern Karoo Riviere (Azi6)

Distribution

Western and Eastern Cape Provinces: Alluvia of the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega, and Sundays Rivers and their tributaries), east of Laingsburg as far west as Graaff-Reinet and Jansenville. This vegetation unit is embedded within the Koedoesberge-Moordenaars Karoo, Prince Albert Succulent Karoo, Gamka Karoo, Eastern Lower Karoo, and southern parts of the Eastern Upper Karoo as well as some parts of the Albany Thicket Biome south of Cradock. Altitude ranging from 250–1 550 m.

Vegetation & Landscape Features

Narrow riverine flats supporting a complex of *Acacia karroo* or *Tamarix usneoides* thickets (up to 5 m tall), and fringed by tall *Salsola*-dominated shrubland (up to 1.5 m high), especially on heavier (and salt-laden) soils on very broad alluvia. In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. Mesic thicket forms in the far eastern part of this region (see Van der Walt 1980: Table 4) may also contain *Leucosidea sericea*, *Rhamnus prinoides* and *Ehrharta erecta.*

Geology, Soil & Hydrology

Recent sandy-clayey alluvial deposits rich in salt occurring on mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup) that support soils typical of Ia land type. Torrential convectional rains in summer cause sudden flood surges which remodel the riverbed and adjacent alluvium.

Climate

Transitional, bimodal (equinoctial) rainfall patterns with peaks in March (major) and November (minor). Climate is subarid on the whole, with overall MAP of 243 mm (range from 165 mm in the Gamka Karoo basin to 430 mm in the vicinity of Bedford). Overall warm-temperate regime, with MAT of 16.3°C, ranging from 14.6°C (Upper Karoo) to 18.3ºC (upper reaches of Sundays River). Frost occurs frequently in winter. See also climate diagram for AZi 6 Southern Karoo Riviere (Figure 13.2).

Important Taxa

Riparian Thickets

Small Trees	*Acacia karroo* (d), *Rhus lancea* (d).
Tall shrubs	*Diospyros lycioides* (d), *Tamarix usneoides* (d), *Cadaba aphylla*, *Euclea undulata*, *Grewia robusta*, *Gymnosporia buxifolia*, *Melianthus comosus*.
Low Shrub	*Asparagus striatus*.
Succulent shrub	*Lycium cinereum* (d), *Amphiglossa callunoides*, *Lycium hirsutum*, *L. oxycarpum*.
Rocky slopes of river canals	
Graminoid	*Stipagrostis namaquensis* (d).
Alluvial shrublands & herblands	
Low Shrubs	*Ballota africana*, *Bassia salsoloides*, *Carissa haematocarpa*, *Pentzia incana*.
Succulent shrubs	*Malephora uitenhagensis* (d), *Salsola aphylla* (d), *S. arborea* (d), *Drosanthemum lique*, *Salsola geminiflora*, *S. gemmifera*.
Graminoids	*Cynodon incompletus* (d), *Cenchrus ciliaris*, *Cyperus marginatus*.
Reed beds	

Megagraminoid	*Phragmites australis* (d).

Endemic Taxon
Alluvial shrubland & herbland

Graminoid	*Isolepis expallescens*.

4.4 Conservation status of broad vegetation types

According to scientific literature (Driver *et al*., 2005; Mucina *et al*., 2006), as shown in Table 2, the vegetation types are both listed as Least threatened.

The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), lists national vegetation types that are afforded protection on the basis of rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in the scientific literature.

The vegetation types are not listed in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011).

Table 3: Conservation status of different vegetation types occurring in the study area.

Vegetation Type	Conservation status	
	Driver *et al*. 2005; Mucina *et al*., 2006	National Ecosystem List (NEM:BA)
Gamka Karoo	Least Threatened	Least Concern
Southern Karoo Riviere	Least Threatened	Least Concern

It is therefore verified that the site does not occur within a Listed Ecosystem, as listed in The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011) and therefore has LOW sensitivity with respect to this attribute.

4.5 Biodiversity Conservation Plans

The Western Cape Biodiversity Spatial Plan (WCBSP) classifies the habitats of the province according to conservation value in decreasing value, as follows:

1. Protected Areas (PA);
2. Critical Biodiversity Areas 1 (CBA1);
3. Critical Biodiversity Areas 2 (CBA2);
4. Ecological Support Area 1 (ESA1);
5. Ecological Support Area 2 (ESA2);

This shows features within the study area within three of these classes (Figure 6), as follows:

1. CBA1 Areas: broad bands following the main drainage systems in the area. The Droerivier MTS is entirely within this CBA1 area as well as the northern end of all the grid corridors for all proposed projects.

2. ESA1 Areas: all small drainage lines on site
3. ESA2 Areas: tiny fragments within small drainage lines

This verifies the output from the Online Screening Tool in concept and spatial placement and confirms that parts of the site have VERY HIGH sensitivity from a Terrestrial Biodiversity perspective.

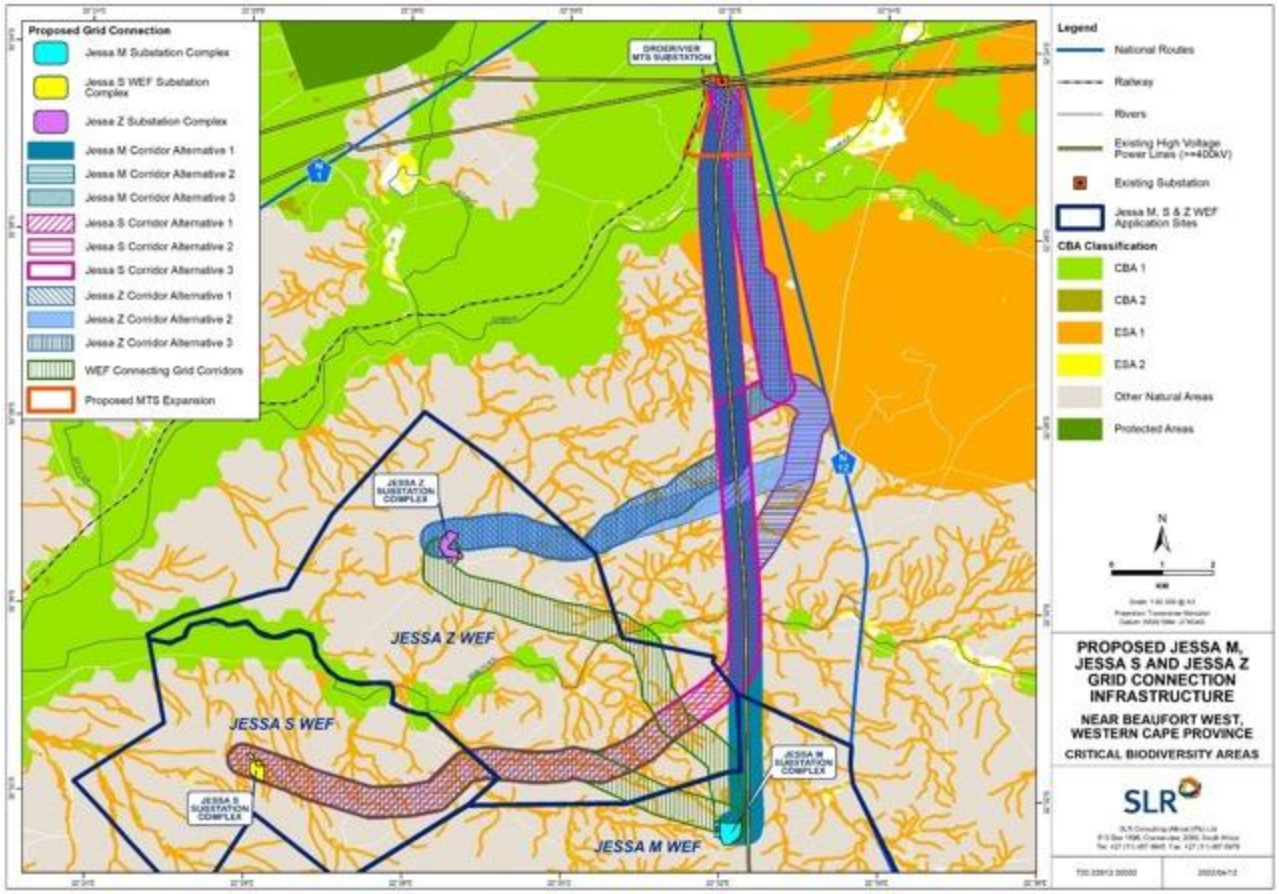

Figure 6: Critical Biodiversity Areas within the broad study area that includes the proposed infrastructure.

4.6 Habitats on site

A broad habitat map was produced to provide context for the general occurrence of plant and animal species, as well as likely habitat for plant and animal species of concern, which are usually restricted to specific habitat types. The habitat map is shown in Figure 7. The habitat map also identifies areas that are no longer in a natural state, since these would have low sensitivity for any theme. No significant areas of transformation occur on site.

The site is separated into two terrestrial units, namely “broken veld” and “plateaux”. These two areas are separated primarily on the topography, the first being in rugged landscapes with variable topography whereas the plateaux areas are more flat. Other than this distinction, the drought affecting the area made it impossible to distinguish vegetation communities with distinct flora. It is assumed that both units mapped here are similar to that described for the regional vegetation type, Gamka Karoo; sufficient data was collected to indicate that this was the case (see Appendix 1 for checklist of plant species recorded on site).

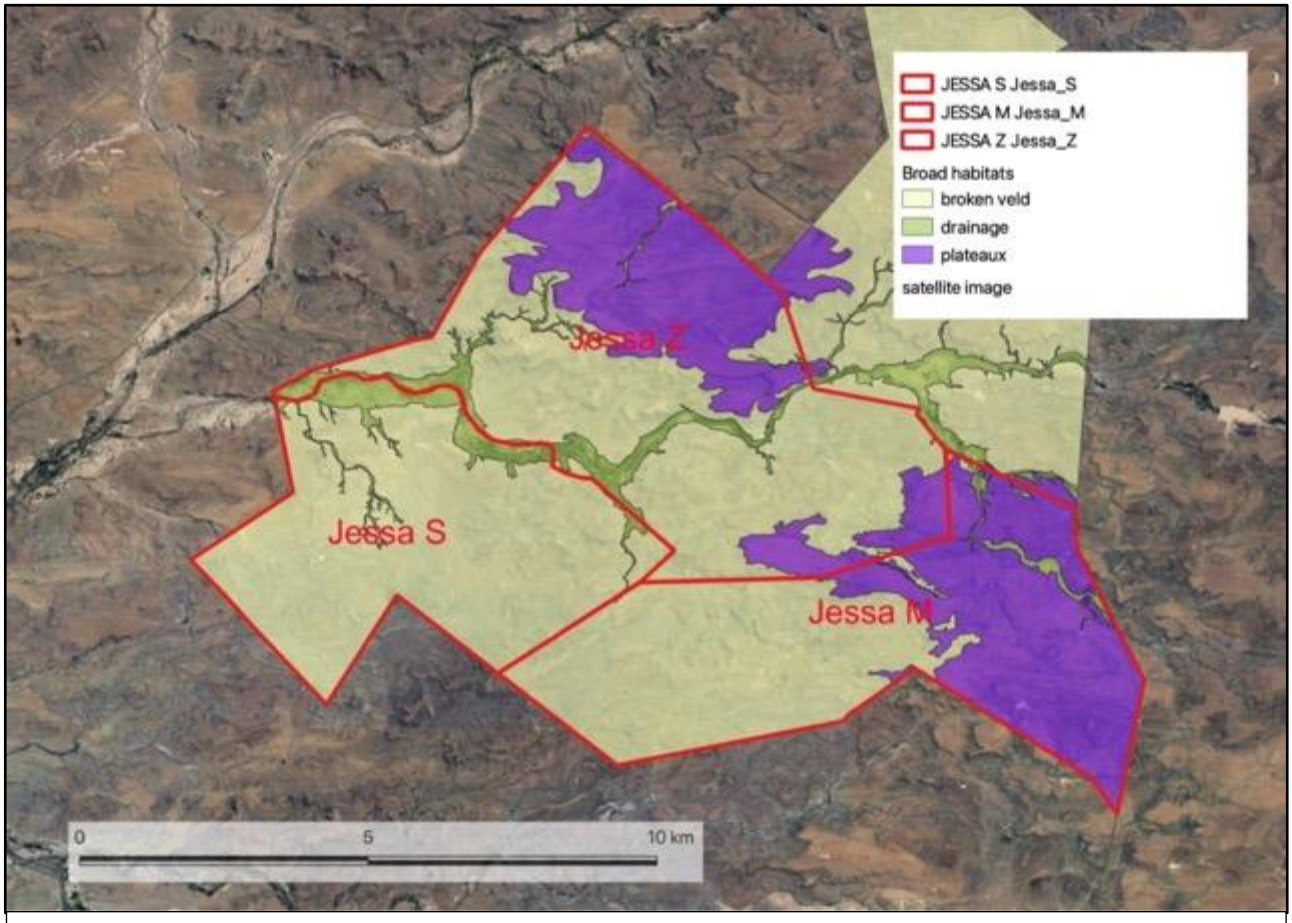

Figure 7: Broad habitat types on site.

4.7 Plant species flagged for the study area

According to the National Web-Based Environmental screening tool, 5 plant species have been flagged as of concern for the area the current project is in, these are listed below. A description of each species is provided.

Ruschia beaufortensis (Aizoaceae)
Vulnerable
Poorly known species only recorded in the arid mountains near Beaufort West. Two to five locations exist, subpopulations occurring outside the Karoo National Park are potentially threatened by uranium mining. Endemic to South Africa. Provincial distribution in the Western Cape. Nama Karoo is the major habitat. Stable population trend. Known records include the plains south of Beaufort West, including the one grid in which the project is located. There is therefore a risk of it occurring on site, although it is likely to be very localised, if it occurs there.

Peersia frithii (Aizoaceae)
Vulnerable
This species was collected widely throughout the Southern Karoo in the past. Only recorded seven times since 1990. Occurs in the Nama Karoo on slopes or flats of finely weathered Ecca shales from Laingsburg to Aberdeen in the Eastern Cape, Northern Cape and Western Cape. Endemic to South Africa. Limited data on population trends, significant decline suspected. Population decline due to livestock overgrazing. Known observation records show that it definitely occurs in the type of habitat that includes the study area and that the site is within the distribution range. It was recorded to the south of the site in habitat that is virtually identical to that found on site. There is therefore a moderate to high probability that it occurs on site, although the exact locations where it could occur are difficult to determine on the basis of existing data. It is likely to have a localised distribution with specific habitat requirements.

Tritonia florentiae (Iridaceae)
Rare
This species occurs as small subpopulations and is known from nine sites where it is only found scarcely. Endemic to South Africa and distributed through the Northern and Western Cape from Roggeveld to Prince Albert and Beaufort West. The habitats this species occupies is the Nama Karoo and Succulent Karoo on dry stony clay flats in a variety of vegetation types. Known observations include a number of sites in the areas surrounding the project area. It includes one observation that is either on site or in close proximity. There is therefore a high probability that it occurs on site.

Sensitive species 383
A succulent known from five locations. It is endemic to the karoo, occurring in the area between Merweville and Klaarstroom, and from there towards Beaufort West. It is possible, based on the habitat requirements and distribution, that the species could occur on site.

Sensitive species 1212
A succulent listed as Vulnerable that occurs on quartz flats in karroid shrubland from Willowmore to Beaufort West and Aberdeen. It has been previously recorded in one of the grids in which the site is located. There is therefore a moderate to high probability that it occurs on site within any significant quartz patches.

Additional listed plant species for the study area
A database search identifies a number of additional listed plant species that could possibly occur on site that are not flagged in the Screening Tool output. This includes the following:

- *Acanthopsis hoffmannseggiana* (DDT): A relatively widespread species found in southern Namibia and the Bushmanland region of the Northern Cape, also occurring in the Great Karoo between Fraserburg, Beaufort West and Prince Albert. It occurs on sandy plains, stony hillsides and ridges, usually associated with weathered quartzite and granite, but also occurs on mudstone (in Prince Albert area) and limestone (Asbestos Mountains), usually at an elevation between 650 and 1000 m. It probably occurs on site.
- *Anisodontea malvastroides* (Rare): This species is endemic to the mountains of the Great Karoo, where it occurs in the Nuweveld and Sneeuberg mountains between Beaufort West and Middelburg in arid grassland on summit plateaus and escarpments. It is not likely to occur on site.
- *Colchicum karooparkense* (Rare) has only previously been recorded in the Karoo National PArk north of Beaufort West. It is therefore unlikely to occur on site.
- *Euryops zeyheri* (CR PE) is known from a single collection along the Gamka River, where it is expected to have occurred in clays associated with river beds.

- *Hereroa concava* (VU) appears to be endemic to a small area in the Great Karoo between Beaufort West, Richmond and De Aar, where it occurs sheltered among shrubs on flats and plateaus with shale outcrops. There is little information on this species so the preferred habitat and the risk of it occurring on site are unknown.
- *Hoodia dregei* (VU) is a rare species known from only five locations between Merweville, Beaufor West and Prince Albert. It is found on stony slopes of hills or stony flat areas, which is a fairly good description of the entire study area. It resembles *Hoodia gordonii* but is described as being unusually small, consisting of only a few stems and rarely exceeding 200mm in height. The plants grow partly under bushes, or in the open among stones. It has been previously recorded about 10 km outside the western boundary of the site, so it could easily occur on site.
- *Stapelia engleriana* (DDT) is known from the Northern and Western Cape Provinces. There is little information on its habitat preferences but collection data seems to suggest that it is found in mountainous areas, either in the arid parts of the Cape Fold mountains, or in the Karoo escarpment mountains. On this basis, it is unlikely to occur on site.
- *Astroloba herrei* (VU) occurs from Matjiesfontein to Prince Albert, which is outside the area in which the site is found. The known habitat is rocky slopes derived from Bokkeveld shale, Dwyka tillite or Witteberg quartzite.

4.8 Plant species recorded in the study area

A total of only 46 plant species were recorded during the field survey (Appendix 1), after three days of searching a topographically diverse landscape (see Figures 4 and 5). This is a very poor checklist for an area this size and reflects the extremely dry conditions at the time of the field survey (see Figures 6 and 7). Some of these species are listed for the vegetation type, but they do not represent a typical example of the vegetation type.

Interesting observations were some succulent species, including *Aloe claviflora*, *Astroloba robusta*, *Euphorbia baunsii*, and the protected *Hoodia gordonii* (Figure 8). It suggests that there may possibly be other succulent species on site, including some of the listed species.

One of the only habitats that had any green vegetation was the drainage lines (Figure 8), but this was dominated overwhelmingly by *Vachellia karroo* and *Searsia lancea*. Small pockets of substrate with some moisture supported species such as *Afroscirpoides dioeca* and *Isolepis* sp., but few other species were seen in this habitat.

Figure 8: Typical landscape on site.

Figure 9: Topographical and substrate variability on site.

Figure 10: Very dry condition of vegetation at time of field survey.

Figure 11: View towards Beaufort West showing very dry vegetation condition.

Figure 12: Protected *Hoodia gordonii* seen on site.

Figure 13: Typical riparian vegetation in larger drainage lines.

4.9 Animal species flagged for the study area

According to the National Web-Based Environmental Screening Tool, one mammal and one reptile species has been flagged as of concern for the current project, as well as three bird species. Birds are assessed in a separate specialist assessment and are not included here.

Felis nigripes
The Black-footed Cat is listed as Vulnerable
The species is endemic to the arid grasslands, dwarf shrub, and savannah of the Karoo and Kalahari in southern Africa. It is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds. It inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m asl. The site is within the core range of this species, habitats on site are suitable, and there are previous records from nearby.

Chersobius boulengeri
The Karoo Dwarf Tortoise is listed as Endangered
It occurs in association with dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes, and peripherally in the Albany Thicket biome in the southeast, at altitudes of approximately 800 to 1,500 m. Occurs in dwarf shrubland that often contains succulent and grassy elements. The site is within the geographical range of this species and there is suitable habitat on site.

4.10 Animal species assessment

Mammals
The following species are red data listed and a short discussion on each is given to indicate current and potential future threats if the proposed development is allowed.

- *Hippotragus equinus* (EN). Although the species is listed for the study area, it must be noted that this area falls outside its natural distribution range and its presence are related to stocking by farmers for commercial purposes. Threats to the species in its natural distribution rage is over exploitation and loss of migration opportunities (fences) between subpopulations (Kruger et al., 2016).
- *Hippotragus niger niger* (VU). A similar situation exist with this species, as the study area falls well outside its natural distribution range (Parrini et al., 2016) and any animals present were introduced for commercial purposes.
- *Pelea capreolus* (NT). The species utilise rocky areas, slopes of mountain and hills and the plateau areas associated with the mountains and hills. The population is believed to be in decline and loss of habitat and illegal hunting are some of the most important contributing factors.
- *Felis nigripes* (VU). This species is a ground dwelling cat that is strictly crepuscular and nocturnal and are active throughout the night. It utilises the open short grassland and karroo shrub habitat and prefers to make its den in termite mounds (will use old burrows if present). Threats include, but not limited to, intraguild predation, diseases, declining Springhare populations and unsuitable farming practices. In the Karroo area, the species have a very low population density and therefore will be more vulnerable to the listed threats, especially a loss of foraging and living habitat and the associated loss of food. The species is known to be a prolific hunter of all rodents (Wilson et al., 2016).
- *Crocuta crocuta* (NT). The study area falls within the historic distribution range of the species. Long term hunting has dessimated the broad distribution and for many years the last remaining populations where restricted to large conservation areas in the north and northeast of South Africa. Some re-introduction have been done and the animals are contained in protected areas (some escapes occur). For the natural populations, threats are persecution, poaching for the traditional medicine trade and trophy hunting (mostly illegal) (Hunnicutt et al., 2016).

- *Hyaena brunnea* (NT). The species is widespread across southern Africa and is found in the following habitat types: desert areas with annual rainfall less than 100 mm (particularly along the Skeleton Coast in Namibia), semi-desert, open scrub and open woodland savannah. outside protected areas it come into conflict with humans where they are often shot, poisoned, trapped, snared and hunted with dogs in an attempt to reduce livestock predation events (Yarnell et al., 2016).
- *Bunolagus monticularis* (CR). The study area falls outside the known (documented) distribution range of the species. The species inhabits dense the riparian growth along seasonal rivers in the central Karoo (Nama-Karoo shrubland) and prefer areas where the riverine vegetation occur on alluvial soils adjacent to these water courses rivers. The habitat is highly fragmented and transformed. The main threats to the species are habitat quantity and quality decline as a result of overgrazing by livestock which results in reduced cover from predators and lack of sufficient forage. In addition the over grazing is changing the plant community structure (poor food resources as result) and a reduction in streamflow (construction of dams upstream) has reduced habitat quality (Collins et al., 2016). Although the screening tool listed the area as potential habitat for *Bunolagus monticularis*, the conclusion at this point is that the habitat associated with the proposed WEF project is not suitable for the endangered species.
    - It however doesn't mean that the species are not present, but under the current climatic conditions, it was clear that suitable foraging material was absent along most of the water courses.
    - The development for the wind turbines at present exclude any areas near the river courses and will therefore have no direct impact on *Bunolagus monticularis*.
    - The impacts to the Boeteka River (most probable habitat) will be at crossings, but it will be important to lower any habitat modification (e.g. erosion and vegetation loss).

As some of the farm portions are used for game farming, a number of species of Bovidae were observed and include *Antidorcas marsupialis, Oryx gazelle, Pelea capreolus* (NT)*, Raphicerus campestris, Redunca fulvorufula, Sylvicapra grimmia, Taurotragus oryx, Hippotragus niger niger* (VU - introduced to the area) and *Tragelaphus strepsiceros*. Other mammals noted were *Procavia capensis, Chlorocebus pygerythrus, Papio ursinus, Cynictis penicillata, Herpestes pulverulentus, Suricata suricatta, Ictonyx striatus* and *Lepus saxatilis*.

- Some of the photographs (camera traps set for *Bunolagus monticularis* survey) showed rodents, but it is difficult to identify to species level. The rodents observed include some Muridae (most likely *Desmodillus auricularis*), Macroscelididae (most likely *Macroscelides proboscideus*) and Nesomyidae.
    - The construction of the wide roads to accommodate the long transport trucks and trailers will impact on habitat for the numerous rodents (important food resource to e.g. birds of prey and small canine species in the area (e.g. jackal, fox and cats).
- Activities of other mammals observed include *Cryptomys hottentotus, Otocyon megalotis, Vulpes chama, Proteles cristata* and *Hystrix africaeaustralis* and the scat and burrows of a number of rodents were noted.
    - Impacts to these organisms will include loss of habitat and food resources.

Amphibians

- Due to the extreme dry conditions, no amphibians were observed.
- Most of the species listed, need flowing water or standing pools for a few weeks to ensure its life cycle can be completed. With the exception of a few small weirs in the Boeteka River, no other suitable habitat was noted in the study area.
    - The main impacts that can be listed to the frogs will be water quality changes e.g. siltation as a result of stream crossings (high probability) – high traffic volumes during the construction phase and water quality changes (low probability).
    - Although *Pyxicephalus adspersus* is listed as possibly being present, no suitable habitat was observed during the survey. The species require shallow pans that will have water for at least 30 days (Minter et al., 2004).
    - The other species will be associated with the Gamka and Boeteka rivers.
        - If the developments are restricted to the higher areas (placement of wind turbines) impacts will be associated with river crossings e.g. erosion and siltation.
    - Some of the other species that are listed need the flowing habitats:

- *Amietia fuscigula* needs permanent water as breeding takes place throughout the year (Channing, 2004a) and its presence will therefore be very low on the study site.
- Both *Cacosternum boettgeri* and *C. karooicum* need seasonal water. *C. boettgeri* aestivates in mud banks, mud cracks, burrows of other animals, disused termitaria and under stones and needs 3 weeks to complete is life cycle (multiple spawning events if conditions allow) (Scott, 2004a). In the case of *C. karooicum* is an opportunistic breeder, taking advantage of rainfall of sufficient magnitude, regardless of the season in which it occurs and needs approximately 30 days to complete the life cycle in the water environment (Scott, 2004b). A low to moderate probability of occurring in the Boeteka River and some of the weirs in it.
- *Tomopterna delalandii* occurs along the seasonal streams or artificial impoundments (earth dams) and after aestivating underground during the dry season it will emerge with the onset of rains to spawn (Channing, 2004b). There is a low to moderate change of the species occurring in the Boeteka River and some of the earth impoundments on the study site.

Reptiles

- *Goggia braacki* (NT). The species occur in rocky areas in cracks and under the flakes of exfoliating rock. Threats are the loss of habitat related to grazing, as it occurs only in a narrow band in its distribution range (Bates et al., 2014). The study sites falls outside its formal distribution range to the north (Karroo National Park), but it can occur and therefore the construction of wind turbines on the hills and mountains will result in a potential loss of habitat. In addition, as many other nocturnal animals, it is attracted to lights where insects and present and this will increase predator pressure on the species.
- *Chersobius boulengeri* (EN). The species was listed as "Near Threatened" in 2014 (SARCA) but after a review the status was changed to "Endangered" (SANBI, 2016). Surveys conducted between 2005 and 2017 indicated that most localities (30 of 35) where populations previously occurred no longer harbour viable populations and that the species is no longer being found by farmers. Habitat destruction and degradation maps of South Africa show that nearly 50% of the range of *C. boulengeri* is either moderately or severely degraded, which may explain the species' decline. *Chersobius boulengeri* is associated with rocky outcrops in specific vegetation types, qualifying it as a habitat specialist, which increases its risk of extinction. The documented population declines will be exacerbated by the effects of climate change and associated vegetation change (Hofmeyer et al., 2017). It is therefore clear that the construction of the turbines and access roads will have a potential impact of the habitat of the species.
- The most specimens were observed in the rocky outcrops a mountain areas of the study with a few on the open sandy karroo areas and include Agama aculeata aculeata, Agama atra, *Pedioplanis spp. (*laticeps?), *Pedioplanis lineoocellata pulchella, Pedioplanis namaquensis, Trachylepis sulcata sulcata, Trachylepis variegata* and *Stigmochelys pardalis* .
    - The rocky habitat types are the areas targeted for the construction of the turbines and will impact on the reptiles, including the snakes.
        - These habitats are important refugia and foraging areas as the prey of the reptiles mostly occur in these areas as well.
        - It must be noted that the mountains and rocky outcrops are the most important habitat for most of the reptiles e.g. crevices for habitation.
    - In addition, broad access roads will be constructed for the long vehicles and cranes for the transport and assembly of the turbines.
        - The activities will have a negative impact on the reptiles, as there will be habitat destruction (low impact).

5 PROPOSED INFRASTRUCTURE

The proposed layout of the main infrastructure for the Jessa M Grid Connection project is as shown in Figure 14, Jessa S Grid Connection project (Figure 15) and Jessa Z Grid Connection project in (Figure 16).

The substation complex on each WEF site as well as the MTS expansion area will require clearing of a relatively significant local area of land.

Impacts of BESS, laydown area, O&M building and 33kV Internal overhead and underground cables (*Operation and Maintenance Complex)* are assessedas part of the separate Jessa WEF applications.

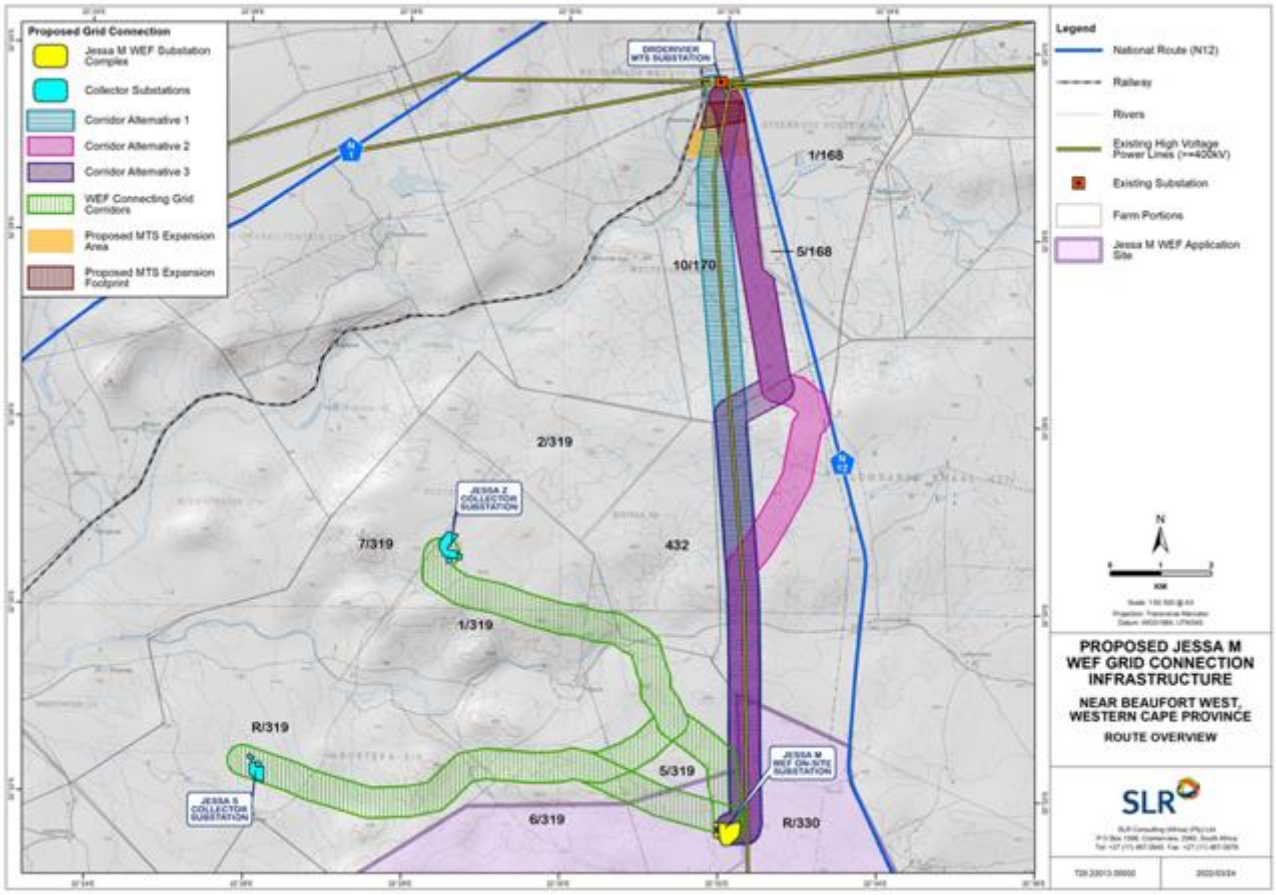

Figure 14: ***Proposed layout for Jessa M Grid Connection***

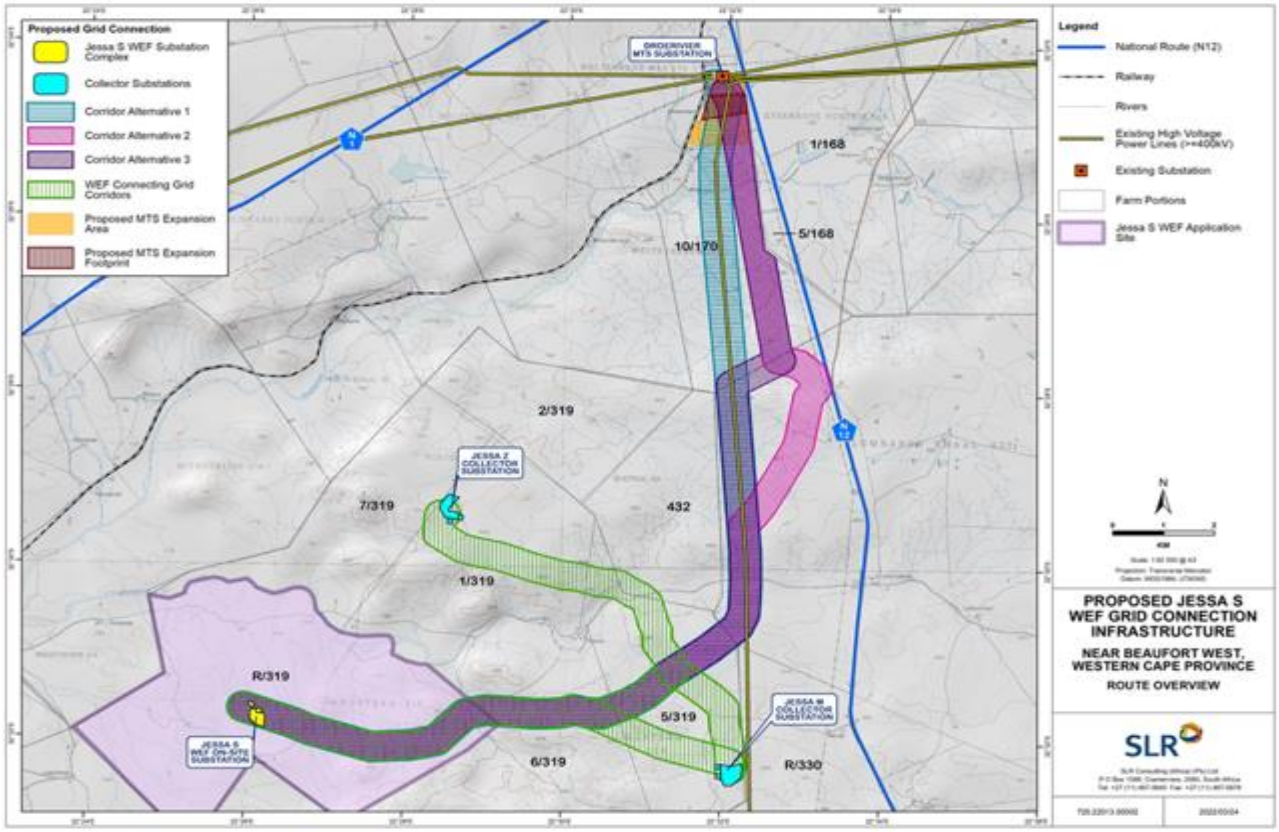

Figure 15: ***Proposed layout for Jessa S Grid Connecitons***

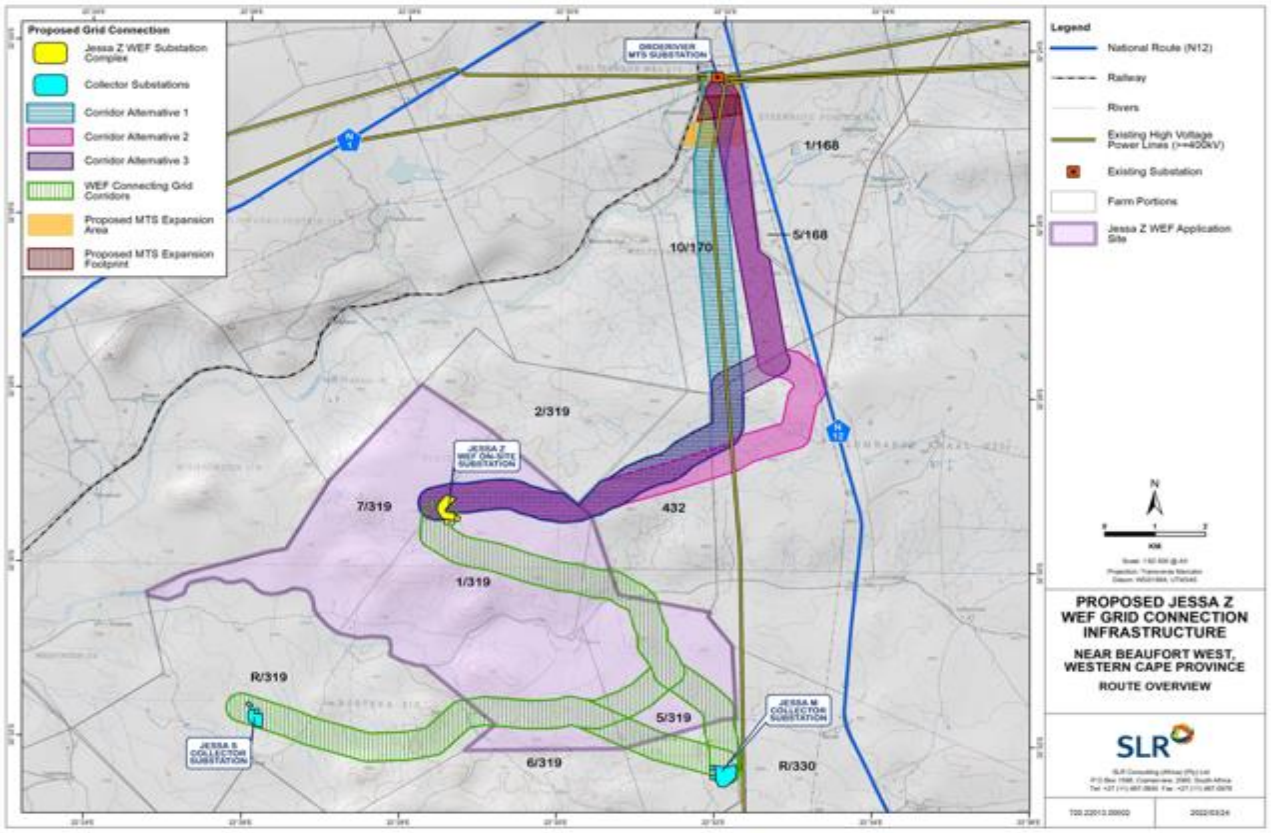

Figure 16: Proposed layout for Jessa Z Grid Connecitons

Project alternatives:

Three (3) 132kV powerline route alternatives will be assessed as a grid connection alternative to link the WEFs to the Eskom Droerivier MTS. Both powerline route alignments will be assessed within a 1km wide assessment corridor. Corridor Altertnative 1 as indicated in each separate map is the preferred option for each project – Jessa M Grid Corridor, Jessa S Grid Corrisor and Jessa Z Grid Corridor.

No other site alternative has been assessed for the potential MTS expansion as the expansion can only be carried out adjacent to the existing Eskom MTS.

No-Go Alternative

The 'no-go' alternative is the option of not constructing the three Jessa Wind Farms and the associated grid connection infrastructure. This alternative would result in no additional impact on the receiving environment. The alternative also bears the opportunity cost of missed socio-economic benefits to the local community that would otherwise realise from establishing the farms. The option of not developing also entails that the bid to provide renewable/clean energy to the national grid and contribute to meeting the country's energy demands will be forfeited.

6 DESCRIPTION OF POTENTIAL IMPACTS

Potential issues relevant to impacts on the ecology of the study area include the following:

- Impacts on biodiversity: this includes any impacts on populations of individual species of concern (flora and fauna), including protected species, and on overall species richness. This includes impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of concern.
- Impacts on sensitive habitats: this includes impacts on any sensitive or protected habitats, including indigenous grassland and wetland vegetation that leads to direct or indirect loss of such habitat.
- Impacts on ecosystem function: this includes impacts on any processes or factors that maintain ecosystem health and character, including the following:
    - disruption to nutrient-flow dynamics;
    - impedance of movement of material or water;
    - habitat fragmentation;
    - changes to abiotic environmental conditions;
    - changes to disturbance regimes, e.g. increased or decreased incidence of fire;
    - changes to successional processes;
    - effects on pollinators; and
    - increased invasion by alien plants.

Changes to factors such as these may lead to a reduction in the resilience of plant communities and ecosystems or loss or change in ecosystem function.

- Secondary and cumulative impacts on ecology: this includes an assessment of the impacts of the proposed project taken in combination with the impacts of other known projects for the area or secondary impacts that may arise from changes in the social, economic or ecological environment.
- Impacts on the economic use of vegetation: this includes any impacts that affect the productivity or function of ecosystems in such a way as to reduce the economic value to users, e.g. reduction in grazing capacity, loss of harvestable products. It is a general consideration of the impact of a project on the supply of so-called ecosystem goods and services.

6.1 Potential sensitive receptors in the general study area

A summary of the potential ecological issues for the study area is as follows (issues assessed by other specialists, e.g. on birds and on freshwater function, are not included here as this has been dealt with by the relevant specialist in those fields):

- Presence of natural vegetation on site, some of which is within Critical Biodiversity Areas or Ecological Support Areas. All-natural vegetation on site is vulnerable to disturbance, especially direct habitat loss and habitat fragmentation.
- Presence of dry stream beds and associated riparian vegetation on site, assessed as being sensitive to impacts associated with development as well as being important habitat for various plant and animal species.
- Potential presence of protected plant species, namely *Hoodia gordonii*, protected according to the National Environmental Management: Biodiversity Act (Act 10 of 2004).
- Potential presence of plant species of conservation concern (SCC). The identity of these species is difficult to determine due to incomplete scientific information of the vegetation and flora of the study area. There have been some general vegetation studies, but knowledge of which species of concern could potentially occur on site is not completely known.
- Presence of various plant species protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974. Most of the species that are likely to be affected have been identified during the field surveys, but the exact number and location of affected plants needs to be determined during a detailed walk-down survey of the final infrastructure footprint.

- Potential presence of two (2) reptile species of concern, namely *Goggia braacki*, listed as Near Threatened, and *Chersobius boulengeri*, listed as Endangered.
- Presence or potential presence of various mammal species of concern, including *Hippotragus niger niger, Pelea capreolus, Felis nigripes, Crocuta crocuta Hyaena brunnea* and *Bunolagus monticularis*, all listed and/or protected according to the National Environmental Management: Biodiversity Act (Act 10 of 2004).
- For all mammal species, the impact during construction will be related to increased activity (noise and traffic), illegal hunting (mostly snares), dust settling on plants (food sources), light pollution that can affect insect behaviour and a general loss of habitat. One must further factor in the long-term effects of climate change on the region which can affect the total food web in the area.
    - The isolated nature of the *Hippotragus niger niger* and other similar species is a threat to inbreeding. Small populations limit the genepool and therefore inbreeding is a real problem if genetic material is not constantly exchanged. Only one (1) animal was noted in the camera trap footage.
    - For *Pelea capreolus* the development of wind turbine sites on the mountain ridges will result in a loss of habitat. In addition, there is no indication what the noise factor will be on a secretive species such as this.
    - *Felis nigripes* Impacts to these animals will be related to a negative impact of food resources and habitat as a result of access roads for the large transporter vehicles. The associated dust pollution can further impact on the species food resources.
    - *Crocuta crocuta* can occur (introduced in the area) on site, but it is highly unlikely, as the areas where they are introduced are normally well fenced to keep the predators and other valued species contained.
    - The natural distribution of *Hyaena brunnea* is over the larger region and free roaming animals are still present. Threats during the development of the proposed project will be loss of habitat and food resources (minimal).
    - For *Bunolagus monticularis* a detailed assessment was conducted and more detail is supplied in this assessment. When looking at the potential habitat and food sources, it is clear that the study site doesn't have the best resources to ensure that the species will occur. Concerns with its potential habitat is the impacts to drainage lines and river riparian vegetation when constructing the wide haul roads for the transporter vehicles.
- Potential invasion of natural habitats by alien invasive plants, thus causing additional impacts on biodiversity features.

6.2 Construction Phase Impacts

6.2.1 Direct impacts

Direct impacts include the following:

1. Loss and/or fragmentation of indigenous natural vegetation due to clearing;
2. Loss of individuals of plant species of conservation concern and/or protected plants;
3. Loss of faunal habitat and refugia;
4. Direct mortality of fauna due to machinery, construction and increased traffic;
5. Displacement and/or disturbance of fauna due to increased activity and noise levels;
6. Increased poaching and/or illegal hunting due to improved access to area;
7. Effects on physiological functioning of vegetation due to dust deposition;
8. Impact on integrity of Critical Biodiversity Areas and/or Ecological Support Areas.

6.2.2 Indirect impacts

Indirect impacts during the construction phase include the following:

1. Establishment and spread of alien invasive plants due to the clearing and disturbance of indigenous vegetation;
2. Changes to behavioural patterns of animals, including possible migration away or towards the project area; and

3. Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to changes in downslope areas.

6.3 Operational Phase Impacts

6.3.1 Direct impacts

Ongoing direct impacts will include the following:

1. Continued disturbance to natural habitats due to general operational activities and maintenance; and
2. Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure.

6.3.2 Indirect impacts

These will include the following:

1. Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors;
2. Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape;
3. Changes to behavioural patterns of animals, including possible migration away or towards the project area;

6.4 Decommissioning Phase Impacts

6.4.1 Direct impacts

These will include the following:

1. Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites;
2. Direct mortality of fauna due to machinery, construction and increased traffic;
3. Displacement and/or disturbance of fauna due to increased activity and noise levels; and
4. Effects on physiological functioning of vegetation due to dust deposition.

6.4.2 Indirect impacts

These will occur due to renewed disturbance due to decommissioning activities, as follows:

1. Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors;
2. Changes to behavioural patterns of animals, including possible migration away or towards the project area.

6.5 Cumulative impacts

These include the following:

1. Cumulative impacts on indigenous natural vegetation due to clearing;
2. Cumulative impacts on individuals of plant species of conservation concern and/or protected plants;
3. Cumulative impacts on ecological processes;
4. Cumulative impacts on fauna;
5. Cumulative impacts due to establishment and spread of alien invasive plant species;
6. Cumulative impacts on Critical Biodiversity Areas and conservation planning.

The projects listed in Table 4 have been identified within a 35 km radius of the Jessa Cluster of Wind Energy Facilities and are included in the Cumulative Impact Assessment. There are 4 projects listed within 35 km of the current project.

Table 4: Projects within a 35 km radius of the Jessa cluster of wind energy facilities.

Project	Distance away
Beaufort West Wind Farm	35km
Trakas Wind Farm	35km
Beaufort West Solar Power Plant Site 2	10km
Beaufort West Photovoltaic Park	20km
KOUP1 AND KOUP2 Wind Energy Facilities	Within 35 km

7 ASSESSMENT OF SIGNIFICANCE OF ECOLOGICAL IMPACTS

A detailed assessment, as per the requirements the protocol for the specialist assessment and minimum report content requirements of environmental impacts on on terrestrial biodiversity for activities requiring environmental authorisation, (20 March 2020), of the significance of all impacts during all phases of the project (Construction, Operation, Decommissioning and Cumulative) is provided below. This also includes all proposed mitigation measures and provides assessment before and after the implementation of proposed mitigation measures.

The proposed site is identified by the national web-based environmental screening tool as being very high sensitivity for Terrestrial Biodiversity, and the protocol therefore requires that the level of assessment must be written up in a Terrestrial Biodiversity Impact Assessment Report.

Note that the impact assessment methodology requires placing a potential impact within a category of extent, probability, duration, etc. There are many cases where mitigation measures will have a clear effect on reducing an impact, but not to the degree that it would result in an assessed impact being placed in a lower category. The impact assessment methodology is categorical in nature and incremental improvements in design and implementation may possibly not lead to a change in the category in which a potential impact is placed. In the current case, mitigation measures can potentially reduce by approximately half the extent of the potential impact (loss of vegetation), which is a significant reduction, but the extent remains “Site”, because there is no lower category. This does not reduce the value of proposed measures, even if it gives the appearance in the assessment that no improvement is realized.

Detailed discussion of each impact, including justification for assigned scores, is provided below.

All imapcts are identical for all three WEFs (Jessa M, Jessa S, and Jessa Z), except where specifically indicated.

7.1 Design Phase Impacts

No impact occurs during the Design Phase of the project. Nevertheless, measures taken during the Design Phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the Construction Phase.

7.2 Construction Phase Impacts

7.2.1 Loss and/or fragmentation of indigenous natural vegetation due to clearing

The regional vegetation type in the broad study area is primarily Gamka Karoo, classified in the scientific literature as Least Threatened (Mucina *et al.*, 2008) and not listed in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011). Any areas of natural habitat within this regional vegetation type are therefore considered to have moderate conservation value.

Vegetation on site is within a very arid region and consists of slow-growing dwarf shrubs, some of which are partially succulent. These species are slow to grow, and individuals are probably much older than they appear from their size. Disturbed areas are not likely to recover to any natural state and clearing must therefore be kept to an absolute minimum to avoid habitat degradation issues.

Habitat loss refers to physical disturbance of habitats through clearing, grading and other permanent to semi-permanent loss or degradation. Loss of habitat on site could lead to loss of biodiversity as well as habitat important for the survival of populations of various species. For power lines, the footprint is restricted to the location /base of

eachpylon, as well as a maintenance road, which is typically a jeep track under the lines. Substations require local clearing that is total, but this is located at a single site, not distributed across the landscape.

All infrastructure components will require clearing of vegetation prior to construction. The substations, monopole pylon bases and MTS will also require vegetation clearing, but the nature of the effect is different between these components. A separate assessment is therefore undertaken below for (1) power line and (2) switching stations and MTS expansion.

Impact 1A Loss and/or fragmentation of indigenous natural vegetation: power line

Issue	Clearing of natural habitat for construction	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Probable
Significance	Low -	Low -
Degree to which impact can be reversed	Local disturbance around footprint of towers is partially reversible.	
Degree to which impact may cause irreplaceable loss of resources	Impact will cause some local loss of natural habitat.	
Degree to which impact can be mitigated	Mitigation can reduce likelihood of impact spreading into surrounding areas but cannot change the immediate impact.	
Mitigation actions		
The following measures are recommended:	The following mitigation measures would help to limit impacts: 1. Restrict impact to development footprint only and limit disturbance creeping into surrounding areas. 2. As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores. 3. Avoid sensitive features and habitats when locating infrastructure. 4. Compile a Rehabilitation Plan. 5. Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. 6. Where possible, access roads should be located along existing farm and district roads. 7. Access to sensitive areas should be limited during construction. 8. Undertake monitoring to evaluate whether further measures would be required to manage impacts.	
Monitoring		
The following monitoring is recommended:	As per management plans.	
Cumulative impacts		
Nature of cumulative impacts	Cumulative loss of habitat	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

Impact 1B Loss and/or fragmentation of indigenous natural vegetation: switching stationand MTS

Issue	Clearing of natural habitat for construction	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Very Low
Duration	Permanent	Permanent
Extent	Site	Site
Consequence	Medium	Low
Probability	Definite / Continuous	Definite / Continuous
Significance	Medium -	Low -
Degree to which impact can be reversed	Not reversible - habitat will be permanently lost, but only within footprint area.	
Degree to which impact may cause irreplaceable loss of resources	Impact will cause permanent loss of natural habitat in a localised area.	
Degree to which impact can be mitigated	Mitigation can reduce likelihood of impact spreading into surrounding areas but cannot change the immediate impact.	
Mitigation actions		
The following measures are recommended:	It is not possible to completely avoid impacts on indigenous vegetation for this project. The following mitigation measures would help to limit impacts: 1. Restrict impact to development footprint only and limit disturbance creeping into surrounding areas. 2. As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores. 3. Avoid sensitive features and habitats when locating infrastructure. 4. Compile a Rehabilitation Plan. 5. Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. 6. Where possible, access roads should be located along existing farm and district roads. 7. Access to sensitive areas should be limited during construction. 8. Undertake monitoring to evaluate whether further measures would be required to manage impacts.	
Monitoring		
The following monitoring is recommended:	As per management plans.	
Cumulative impacts		
Nature of cumulative impacts	Cumulative loss of habitat (ALL infrastructure components for ALL projects)	

Rating of cumulative impacts	Without Mitigation	With Mitigation
	High -	High -

7.2.2 Impacts on listed or protected plant species

Plant species are especially vulnerable to infrastructure development due to the fact that they cannot move out of the path of the construction activities, but are also affected by overall loss of habitat within which metapopulation dynamics occur (dispersal, recruitment, pollination, etc.).

There is one (1) species protected according to the National Environmental Management: Biodiversity Act, *Hoodia gordonii*, that could potentially occur on site. There are a number of species protected according to Provincial legislation. There are threatened plant species that could potentially occur on site.

Impact 2 Impacts on listed or protected plant species

Issue	Loss of individuals of listed or protected plant species	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat, including loss of individual plants within that area.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Low	Low
Probability	Possible / frequent	Conceivable
Significance	Very Low -	Very Low -
Degree to which impact can be reversed	Not reversible - individuals will be permanently lost.	
Degree to which impact may cause irreplaceable loss of resources	Mitigation can reduce likelihood of impact happenning but cannot change the immediate impact.	
Degree to which impact can be mitigated	Can be mitigated to some degree through collection of information, avoidance (where possible).	
Mitigation actions		
The following measures are recommended:	1. It is a legal requirement to obtain permits for any protected specimens that will be lost or relocated. 2. A detailed pre-construction walk-through survey will be required during a favourable season to locate any protected plants. This survey must cover the footprint of all proposed infrastructure, including internal access roads. 3. Plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas. This will reduce the irreplaceable loss of resources as well as the cumulative effect. 4. A Plant Rescue Plan must be compiled to be approved by the appropriate authorities. 5. Where large populations of affected species are encountered, consideration should be given to shifting infrastructure to avoid such areas.	

Monitoring		
The following monitoring is recommended:	As per management plans.	
Cumulative impacts		
Nature of cumulative impacts	Cumulative loss of individuals of species.	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2.3 Loss of faunal habitat and refugia

Construction activities will lead to direct loss of habitat favourable for various faunal species, including sites where mobile fauna would obtain refuge and sedentary fauna would have permanent homes. The total loss of habitat will be a relatively small proportion of the available habitat on site. Loss of habitat could potentially affect all animal species occurring on site, although threatened and protected species are of greater concern.

Impact 3 Loss of faunal habitat and refugia

Issue	Loss of faunal habitat and refugia	
Description of Impact		
Loss of faunal habitat and refugia		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Very Low
Duration	Permanent	Permanent
Extent	Site	Site
Consequence	Medium	Low
Probability	Definite / Continuous	Definite / Continuous
Significance	Medium -	Low -
Degree to which impact can be reversed	Not reversible - habitat will be permanently lost.	
Degree to which impact may cause irreplaceable loss of resources	Impact will cause permanent loss of natural habitat.	
Degree to which impact can be mitigated	Mitigation can reduce likelihood of impact spreading into surrounding areas but cannot change the immediate impact.	
Mitigation actions		
The following measures are recommended:	As per Impact 1. Undertake walk-through survey for fauna of concern, particularly within habitats suitable for the Karoo Dwarf Tortoise.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Cumulative loss of faunal habitat and refugia	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Medium -	Medium -

7.2.4 Direct mortality of fauna due to machinery, construction and increased traffic

There is a possibility that animals will be killed by machinery during construction, especially sedentary or relatively sedentary species, and those that move too slowly to move out of the path of construction. This will inevitably lead to mortality of individuals of such animals. There is also a possibility of collisions with vehicles due to increased traffic along roads and within the project area. Faunal mortalities may also be caused by electric fences, ingestion of waste material and/or accidental ensnarement.

Impact 4 Direct mortality of fauna due to machinery, construction and increased traffic

Issue	Direct mortality of fauna due to machinery, construction and increased traffic	
Description of Impact		
Direct mortality of fauna due to machinery, construction and increased traffic		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Medium
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Possible / frequent	Conceivable
Significance	Very Low -	Very Low -
Degree to which impact can be reversed	Can be partly reversed.	
Degree to which impact may cause irreplaceable loss of resources	May cause loss of individuals of species of concern.	
Degree to which impact can be mitigated	Partly	
Mitigation actions		
The following measures are recommended:	1. Undertake targeted small mammal and amphibian assessments to determine whether any of these species do or could occur on site or not. 2. If any of the species are found to occur on site, the habitat requirements of the species on site needs to be determined. Infrastructure must then avoid sensitive areas or else measures must be put in place to minimise impacts.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Direct mortality of fauna due to machinery, construction and increased traffic	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2.5 Displacement of mobile terrestrial fauna

Construction activities, loss of habitat, noise, dust and general activity associated with the construction phase of the project are likely to cause all mobile species to move away from the site. Mobile terrestrial species usually have a large home range and the ability to travel long distances in short periods of time. Individuals may be locally displaced, but

this will have little effect on the overall range of the species nor is it expected that any overall impacts will result from local displacement.

Impact 5 Displacement of mobile terrestrial fauna

Issue	Displacement of mobile terrestrial fauna	
Description of Impact		
Displacement of mobile terrestrial fauna		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Probable
Significance	Low -	Low -
Degree to which impact can be reversed	Reversible	
Degree to which impact may cause irreplaceable loss of resources	No loss of resources	
Degree to which impact can be mitigated	Partly	
Mitigation actions		
The following measures are recommended:	None	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Displacement of mobile terrestrial fauna	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.
Probability	The impact may possibly happen.
Reversibility	Partly reversible with time.
Irreplaceable loss of resources	No or low loss of resources will occur.
Duration	The impact will be short-term (construction phase).
Intensity/magnitude	Low. May impact on population processes.

7.2.6 Increased poaching and/or illegal collecting due to increased access to the area

The site is in a relatively remote area with moderately low access to the public. More importantly, access to remote areas is limited due to it being on private land. There is therefore a relatively low risk of opportunistic or targeted

poaching of plants or animals. The construction of roads into the project area and the increased amount of traffic from outside areas will increase the opportunity for poaching or illegal collecting.

From a botanical perspective, there are a number of plants in succulent or geophyte groups that are attractive to collectors. There are also animals, such as lizards and tortoises that may be attractive to collectors or vulnerable to opportunistic collection. Many of these groups are protected under national and/or provincial legislation, but this does not necessarily prevent ill-informed or determined collectors.

Poaching of animals or plants for meat or medicinal purposes is a separate risk that is also more likely to occur where physical access is created.

Impact 6 Increased poaching and/or illegal collecting due to increased access to the area

Issue	Increased poaching and/or illegal collecting due to increased access to the area	
Description of Impact		
Increased poaching and/or illegal collecting due to increased access to the area		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Conceivable	Conceivable
Significance	Very Low -	Very Low -
Degree to which impact can be reversed	Partly reversible	
Degree to which impact may cause irreplaceable loss of resources	Some loss of resources	
Degree to which impact can be mitigated	Possible	
Mitigation actions		
The following measures are recommended:	1. Strict access control. 2. Education of contractors and workers regarding illegality of poaching and/or collecting. 3. Strict law enforcement and or disciplinary action for contraventions. 4. Communication with Cape Nature regarding any contraventions, as well as further measures that they recommend.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Increased poaching and/or illegal collecting due to increased access to the area	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2.7 Effects on physiological functioning of vegetation due to dust deposition

There is a high probability during construction that dust will be created that will settle on surrounding vegetation. This will be due to earth-moving equipment as well as vehicles moving around on site as well as into and out of the site. There will be a definite increase in the amount of traffic on access roads to the site that will also affect surrounding areas.

Dust deposited on vegetation directly screens incoming radiation as well as affects stomatal gas-exchange. The combined effect is a reduction in fitness of affected vegetation which will lead to reduced potential growth rates, damage to leaves, and possibly reduced ability to resist pathogens.

In addition to direct effects on the vegetation, there is also a possibility that grazing animals will be affected through a reduction in palatability of plants, and increased silica on surfaces of edible plants that will possibly affect dental wear-and-tear.

Impact 7 Effects on physiological functioning of vegetation due to dust deposition

Issue	Effects on physiological functioning of vegetation due to dust deposition	
Description of Impact		
Effects on physiological functioning of vegetation due to dust deposition		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Possible / frequent
Significance	Low -	Very Low -
Degree to which impact can be reversed	Highly reversible	
Degree to which impact may cause irreplaceable loss of resources	Possible but unlikely	
Degree to which impact can be mitigated	Highly reversible	
Mitigation actions		
The following measures are recommended:	1. Dust suppression measures on roads and at construction sites. 2. Enforce speed limits on access roads.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Effects on physiological functioning of vegetation due to dust deposition	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2.8 Impact on integrity of Critical Biodiversity Areas

Some parts of the site are included in Critical Biodiversity Areas for the Western Cape. Small parts of the powerline corridors at the northern end are within CBA1 areas (Jessa M, Jessa S, Jessa Z). There are extensive areas of Ecological Support Areas, in the form of drainage lines, that could potentially be affected directly by proposed infrastructure, depending on detailed layout plans and layout options. In addition, the entire MTS is located within the CBA1 area. The existing Dröerivier MTS may potentially be expanded..

For the power lines, they will only have local impacts at the base of each pylon structure, which is assessed above (Impact 1A) as having an impact of Low significance. This applies to the impact on the CBA1 area as well. There is an existing power line (and access road) along this general route (Figure 17), which has a total of 6 pylon structures within the CBA1 area. This is the approximate expectation for any new power line. These pylons have minimal impact locally (see Figure 17) and are difficult to detect on aerial imagery due to this lack of impact. The new power lines will be similar and it is assessed that the impact of these on the CBA1 area will be negligible.

For the potential MTS expansion, the expansion will be immediately adjacent to the existing MTS (to the south), and in an area situated between a railway line and a main road. This position minimizes fragmentation effects. The planned area for the footprint is approximately 20 -30 ha, which is small compared to the overall extent of the CBA1 area affected. The 20 ha is equivalent in size to the existing MTS. The assessment below (Impact 8) is ONLY for the MTS expansion.

The draft Biodiversity Offset guidelines[1] stipulate that impacts that have a residual significance of Medium or higher require consideration of an offset. However, the problem with this approach is that the impact assessment methodology actually drives the determination of residual significance and some methods cannot easily reduce residual significance, particularly if impact duration is permanent. In the current project, the potential loss of habitat within the CBA has been shown to be minor and is unlikely to disrupt the ecological functioning of the CBA. The expansion of the MTS is also unlikely to fragment the CBA since there is an existing structure within the CBA. While avoidance of the impact is not possible, the minimization option of the mitigation hierarchy has been applied by reducing the footprint to 20 ha. Given the minor impact the footprint is likely to have on the CBA, an offset should not be required, even though the impact assessment methodology does not reduce residual significance below medium.

Impact 8 Impact on integrity of Critical Biodiversity Areas: MTS Expansion Area

Issue	Impact on integrity of Critical Biodiversity Areas	
Description of Impact		
Impact on integrity of Critical Biodiversity Areas		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Very Low
Duration	Permanent	Permanent
Extent	Site	Site
Consequence	Medium	Low
Probability	Definite	Definite
Significance	Medium -	Low -
Degree to which impact can be reversed	Irreversible	
Degree to which impact may cause irreplaceable loss of resources	Marginal	

[1] Government Notice 1924 of Government Gazette No. 46088, 25 March 2022

Degree to which impact can be mitigated	Partially	
Mitigation actions		
The following measures are recommended:	As per impact 1 In addition, the MTS footprint expansion should be kept as close to 20 ha as possible, rather than the option of 30 ha	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Impact on integrity of Critical Biodiversity Areas	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

Figure 17: View along existing power line towards Dröerivier MTS.

7.2.9 Establishment and spread of declared weeds and alien invader plants due to the clearing and disturbance of indigenous vegetation

Major factors contributing to invasion by alien invader plants includes *inter alia* high disturbance (such as clearing for construction activities) and negative grazing practices (Zachariades *et al.* 2005). Exotic species are often more prominent near infrastructural disturbances than further away (Gelbard & Belnap 2003, Watkins *et al.*, 2003). Consequences of this may include:

1. loss of indigenous vegetation;
2. change in vegetation structure leading to change in various habitat characteristics;
3. change in plant species composition;
4. change in soil chemical properties;
5. loss of sensitive habitats;
6. loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
7. fragmentation of sensitive habitats;

8. change in flammability of vegetation, depending on alien species;
9. hydrological impacts due to increased transpiration and runoff; and
10. impairment of wetland function.

No existing populations of alien plants were see on site, but areas of farm infrastructure were not investigated during the field survey. There is a high possibility that alien plants could be introduced to areas within the footprint of the proposed activities from surrounding areas in the absence of control measures. The potential consequences may be of moderate seriousness for affected natural habitats. Control measures could prevent the impact from occurring. These control measures are relatively standard and well-known. Known alien invasive species recorded in the general geographical area that includes the site are as follows:

- *Agave americana*
- *Argemone ochroleuca*
- *Atriplex lindleyi*
- *Atriplex nummularia*
- *Cenchrus setaceus*
- *Cylindropuntia fulgida*
- *Cylindropuntia imbricata*
- *Datura ferox*
- *Datura stramonium*
- *Myoporum montanum*
- *Nerium oleander*
- *Opuntia elata*
- *Opuntia engelmannii*
- *Opuntia ficus-indica*
- *Opuntia robusta*
- *Prosopis glandulosa*
- *Salsola kali*
- *Solanum elaeagnifolium*
- *Tamarix ramosissima*
- *Tephrocactus articulatus*
- *Trichocereus spachianus*
- *Xanthium spinosum*

Impact 9 Establishment and spread of declared weeds and alien invader plants

Issue	Establishment and spread of declared weeds and alien invader plants	
Description of Impact		
Establishment and spread of declared weeds and alien invader plants		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Local	Local
Consequence	Low	Low
Probability	Possible / frequent	Possible / frequent
Significance	Very Low -	Very Low -
Degree to which impact can be reversed	Reversivle if managed early	
Degree to which impact may cause irreplaceable loss of resources	Initially low loss of resources	

Degree to which impact can be mitigated	High -	
Mitigation actions		
The following measures are recommended:	1. Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. 2. Undertake regular monitoring to detect alien invasions early so that they can be controlled. 3. Implement control measures.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Establishment and spread of declared weeds and alien invader plants	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2.10 Changes to behavioural patterns of animals, including possible migration away or towards the project area

The increased human presence and/or construction operations will increase noise levels as well as light levels at night. The increased human presence, elevated noise and light levels, loss of animal habitat and compaction of soils may alter the behavioural patterns of some animals. Some of these changes may favour certain species and negatively affect others and consequently change the composition of the animal communities. Some of these changes could possibly increase levels of predation. Territorial species such as steenbok, grey duiker and klipspringer will be negatively affected as well as species that live or move in the soil. These species might undergo a local reduction in their population size.

Impact 10	Changes to behavioural patterns of animals, including possible migration away or towards the project area

Issue	Changes to behavioural patterns of animals, including possible migration away or towards the project area	
Description of Impact		
Changes to behavioural patterns of animals, including possible migration away or towards the project area		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Probable
Significance	Low -	Low -
Degree to which impact can be reversed	Reversible	
Degree to which impact may cause irreplaceable loss of resources	No loss of resources	
Degree to which impact can be mitigated	Partly	
Mitigation actions		

The following measures are recommended:	None	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Changes to behavioural patterns of animals, including possible migration away or towards the project area	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2.11 Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to changes in downslope areas

Increased erosion (water and wind) and water run-off will be caused by the clearing of indigenous vegetation, creation of new hard surfaces and compaction of soil. The construction site, substation sites and MTS will furthermore be levelled and compacted causing additional run-off and erosion. Increased run-off and erosion could affect hydrological processes in the area and will change water and silt discharge into drainage lines and streams.

Impact 11 Increased runoff and erosion

Issue	Increased runoff and erosion	
Description of Impact		
Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to changes in downslope areas		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Probable
Significance	Low -	Low -
Degree to which impact can be reversed	Partly reversible	
Degree to which impact may cause irreplaceable loss of resources	Some loss of habitat	
Degree to which impact can be mitigated	High	
Mitigation actions		
The following measures are recommended:	1. Compile and implement a stormwater management plan. 2. Keep gradients of roads adequately low to minimise erosion. 3. Align roads to avoid steep slopes and avoid the necessity for significant cuts and fills. 4. Monitor road surfaces for erosion and repair or upgrade, where necessary.	
Monitoring		
The following monitoring is recommended:	As per management plans	

Cumulative impacts		
Nature of cumulative impacts	Increased runoff and erosion	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.3 Operational Phase impacts

7.3.1 Continued disturbance to natural habitats due to general operational activities and maintenance

During the operational phase of the project, there will be continuous activity on site, including normal operational activities, maintenance and monitoring. There may also be minor additional construction. Rehabilitation of various sites, such as the construction camps, will also take place. These activities all have the potential to cause additional direct and/or indirect damage to natural habitat and vegetation.

Impact 12 Continued disturbance to natural habitats due to general operational activities and maintenance

Issue	Continued disturbance to natural habitats due to general operational activities and maintenance	
Description of Impact		
Continued disturbance to natural habitats due to general operational activities and maintenance		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Probable
Significance	Low -	Low -
Degree to which impact can be reversed	Partially, can be avoided	
Degree to which impact may cause irreplaceable loss of resources	Possible	
Degree to which impact can be mitigated	High	
Mitigation actions		
The following measures are recommended:	As per impact 1	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Continued disturbance to natural habitats due to general operational activities and maintenance	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.3.2 *Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure*

There are various animal species of particular concern for this project, including the Karoo Dwarf Tortoise and the Armadillo Girdled Lizard. There are also other more mobile species that are protected by legislation, including the Honey Badger, Black-footed Cat, Leopard and Cape Fox. It is possible that individuals of these species may suffer mortality or removal of individuals through road kills, encounters with infrastructure, illegal hunting, illegal collecting (especially for the tortoise and lizard) and possible damage to habitats.

Impact 13 Direct mortality of fauna due to machinery, construction and increased traffic

Issue	Direct mortality of fauna due to machinery, construction and increased traffic	
Description of Impact		
Direct mortality of fauna due to machinery, construction and increased traffic		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Medium
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Possible / frequent
Significance	Low -	Low -
Degree to which impact can be reversed	Can be partly reversed.	
Degree to which impact may cause irreplaceable loss of resources	May cause loss of individuals of species of concern.	
Degree to which impact can be mitigated	Partly	
Mitigation actions		
The following measures are recommended:	1. Enforce speed limits on acess roads. 2. Fence areas dangerous to fauna.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Direct mortality of fauna due to machinery, construction and increased traffic	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.3.3 *Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors*

The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.

Impact 14 Establishment and spread of declared weeds and alien invader plants

Issue	Establishment and spread of declared weeds and alien invader plants	
Description of Impact		
Establishment and spread of declared weeds and alien invader plants		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Long-term	Long-term
Extent	Local	Local
Consequence	Medium	Medium
Probability	Probable	Possible / frequent
Significance	Medium -	Low -
Degree to which impact can be reversed	Reversivle if managed early	
Degree to which impact may cause irreplaceable loss of resources	Initially low loss of resources	
Degree to which impact can be mitigated	High -	
Mitigation actions		
The following measures are recommended:	1. Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. 2. Undertake regular monitoring to detect alien invasions early so that they can be controlled. 3. Implement control measures.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Establishment and spread of declared weeds and alien invader plants	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Medium -	Low -

7.3.4 Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape

Increased erosion (water and wind) and water run-off will be caused by the clearing of indigenous vegetation, creation of new hard surfaces and compaction of soil. The internal access roads will be the main source of disturbance and erosion if not properly constructed and provided with water run-off structures. The construction site, substation site and MTS will furthermore be levelled and compacted causing additional run-off and erosion. Increased run-off and erosion could affect hydrological processes in the area and will change water and silt discharge into drainage lines and streams.

Impact 15 Continued runoff and erosion

Issue	Continued runoff and erosion
Description of Impact	

Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to changes in downslope areas		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Medium	Low
Probability	Probable	Probable
Significance	Medium -	Low -
Degree to which impact can be reversed	Partly reversible	
Degree to which impact may cause irreplaceable loss of resources	Some loss of habitat	
Degree to which impact can be mitigated	High	
Mitigation actions		
The following measures are recommended:	1. Compile and implement a stormwater management plan. 2. Keep gradients of roads adequately low to minimise erosion. 3. Align roads to avoid steep slopes and avoid the necessity for significant cuts and fills. 4. Monitor road surfaces for erosion and repair or upgrade, where necessary.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Increased runoff and erosion	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Medium -	Low -

7.3.5 Changes to behavioural patterns of animals, including possible migration away or towards the project area

The increased human presence and/or construction operations will increase noise levels as well as light levels at night. The increased human presence, elevated noise and light levels, loss of animal habitat and compaction of soils may alter the behavioural patterns of some animals. Some of these changes may favour certain species and negatively affect others and consequently change the composition of the animal communities. Some of these changes could possibly increase levels of predation. Territorial species such as steenbok, grey duiker and klipspringer will be negatively affected as well as species that live or move in the soil. These species might undergo a local reduction in their population size.

Impact 16	Changes to behavioural patterns of animals, including possible migration away or towards the project area

Issue	Changes to behavioural patterns of animals, including possible migration away or towards the project area
Description of Impact	
Changes to behavioural patterns of animals, including possible migration away or towards the project area	
Type of Impact	Indirect

Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Low	Low
Probability	Probable	Probable
Significance	Low -	Low -
Degree to which impact can be reversed	Reversible	
Degree to which impact may cause irreplaceable loss of resources	No loss of resources	
Degree to which impact can be mitigated	Partly	
Mitigation actions		
The following measures are recommended:	None	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Changes to behavioural patterns of animals, including possible migration away or towards the project area	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.4 Decommissioning Phase impacts

It is expected that the project will operate for a minimum of twenty to twenty-five years (a typical planned life-span for a project of this nature). Decommissioning will probably require a series of steps resulting in the removal of equipment from the site and rehabilitation of footprint areas. It is possible that the site could be returned to a rural nature, but it is unlikely that natural vegetation would become established at disturbed locations on site for a very long time thereafter. The reality is that it is not possible to determine at this stage whether rehabilitation measures will be implemented or not or what the future plans for the site would be nor is it possible at this stage to determine what surrounding land pressures would be. These uncertainties make it difficult to undertake any assessment to determine possible impacts of decommissioning. It is recommended that a closure and rehabilitation plan be compiled near to the stage but in advance of when decommissioning is planned, and that this would be required to be implemented prior to closure of the project. Possible impacts are described below.

7.4.1 Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites

During the decommissioning phase of the project, there will be a flurry of activity on site over a period of time, similar to during the construction phase, including dismantling and removal of equipment and rehabilitation. There may also be minor additional construction. Rehabilitation of various sites will also take place. These activities all have the potential to cause additional direct and/or indirect damage to natural habitat and vegetation.

Impact 17	Loss and/or disturbance of indigenous natural vegetation during removal of infrastructure

Issue	Disturbance of natural habitat during infrastructure removal	
Description of Impact		
Decommissioning activities may cause disturbance of natural habitat. This may result in permanent local loss of habitat.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Permanent	Permanent
Extent	Site	Site
Consequence	Medium	Medium
Probability	Possible / frequent	Conceivable
Significance	Low -	Low -
Degree to which impact can be reversed	Not reversible - habitat will be permanently lost.	
Degree to which impact may cause irreplaceable loss of resources	Impact will cause permanent loss of natural habitat.	
Degree to which impact can be mitigated	Mitigation can reduce likelihood of impact spreading into surrounding areas but cannot change the immediate impact.	
Mitigation actions		
The following measures are recommended:	1. Restrict impact to infrastructure footprint only and limit disturbance creeping into surrounding areas. 2. As far as possible, locate activities within areas that have been previously disturbed or in areas with lower sensitivity scores. 3. Avoid sensitive features and habitats during activities. 4. Compile a Rehabilitation Plan. 5. Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. 6. Only use existing access, farm and district roads. 7. Access to sensitive areas should be limited during decommissioning. 8. Undertake monitoring to evaluate whether further measures would be required to manage impacts.	
Monitoring		
The following monitoring is recommended:	As per management plans.	
Cumulative impacts		
Nature of cumulative impacts	Cumulative loss of habitat	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.4.2 Direct mortality of fauna due to machinery, decommissioning and increased traffic

It is possible that individuals of species of concern, as well as other species, may suffer mortality or removal of individuals through road kills, encounters with infrastructure, illegal hunting, illegal collecting (especially for the tortoise and lizard) and possible damage to habitats. The animal species of particular concern for this project include the Karoo Dwarf Tortoise and the Armadillo Girdled Lizard. There are also other more mobile species that are protected by legislation, including the Honey Badger, Black-footed Cat, Leopard and Cape Fox.

Impact 18	Direct mortality of fauna due to machinery, construction and increased traffic

Issue	Direct mortality of fauna due to machinery, construction and increased traffic	
Description of Impact		
Direct mortality of fauna due to machinery, construction and increased traffic		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Decommissioning	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Medium
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Possible / frequent	Conceivable
Significance	Very Low -	Very Low -
Degree to which impact can be reversed	Can be partly reversed.	
Degree to which impact may cause irreplaceable loss of resources	May cause loss of individuals of species of concern.	
Degree to which impact can be mitigated	Partly	
Mitigation actions		
The following measures are recommended:		
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Direct mortality of fauna due to machinery, construction and increased traffic	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.4.3 Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors

The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.

Impact 19	Establishment and spread of declared weeds and alien invader plants

Issue	Establishment and spread of declared weeds and alien invader plants	
Description of Impact		
Establishment and spread of declared weeds and alien invader plants		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**

Intensity	Medium	Low
Duration	Long-term	Long-term
Extent	Local	Local
Consequence	Medium	Medium
Probability	Probable	Possible / frequent
Significance	Medium -	Low -
Degree to which impact can be reversed	Reversivle if managed early	
Degree to which impact may cause irreplaceable loss of resources	Initially low loss of resources	
Degree to which impact can be mitigated	High -	
Mitigation actions		
The following measures are recommended:	1. Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. 2. Undertake regular monitoring to detect alien invasions early so that they can be controlled. 3. Implement control measures.	
Monitoring		
The following monitoring is recommended:	As per management plans	
Cumulative impacts		
Nature of cumulative impacts	Establishment and spread of declared weeds and alien invader plants	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Medium -	Low -

7.5 Cumulative impacts

Significance values for these impacts are included in the assessment of impacts in the sections above for Construction, Operation and Decommisioning, under the section for "Cumulative impacts".

7.5.1 Cumulative impacts on indigenous natural vegetation

The regional terrestrial vegetation types in the broad study area are listed as Least Threatened and generally have large areas. Loss of habitat will definitely occur for each project, each of which will be a small area in comparison to the total area of the vegetation type. The total loss of habitat due to a number of projects together will be greater than for any single project, so a cumulative effect will occur. However, the area lost in total will be small compared to the total area of the vegetation type concerned. Of more concern is the total degree of fragmentation and/or edge effects due to the combination of all projects, which will be much more significant than gross loss of habitat, measured in hectares. Direct loss of habitat will not result in a change in the conservation status of the vegetation types, but overall degradation due to fragmentation effects may be a greater cause for concern. The cumulative effect will therefore be low for vegetation loss, but possibly significant for fragmentation. In addition, the current project is located in a rural area with the no existing infrastructure nearby, as is the case with all the other proposed projects. This will fundamentally change the character of this area in terms of its remoteness and natural state.

Extent	The impact will affect natural vegetation in a broad area (within 50 km of the site) and is rated as **local/district**.
Probability	Loss and/or disturbance of vegetation will **definitely** happen for all of the projects.
Reversibility	In all projects, loss of vegetation is effectively **irreversible** within the immediate footprint of permanent infrastructure, since construction of roads and other hard surfaces completely removes vegetation and modifies the substrate upon which it grows. For all the projects, in other areas (crane pads, construction camp and disturbed areas adjacent to construction activities) the impact is partially reversible in the sense that secondary vegetation in disturbed areas will probably never resemble the original vegetation found on site.
Irreplaceable loss of resources	For each project, there will locally be marginal to significant loss of resources. Assessed over a wider area (the combined footprint of all projects), there will probably only be marginal loss of resources (in relation to all biodiversity resources within the area).
Duration	Within the immediate footprint of the permanent infrastructure (turbine foundations, roads and substation) the impact will be **Permanent** (mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient). In other areas (crane pads, construction camp and disturbed areas adjacent to construction activities) the impact will be of long-term duration. The assessment here is for the permanently affected areas.

Impact 20	Cumulative impacts on indigenous natural vegetation	
Issue	Clearing of natural habitat for construction	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat, multiplied across multiple projects.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Medium

Duration	Permanent	Permanent
Extent	Regional	Regional
Consequence	High	Medium
Probability	Definite / Continuous	Definite / Continuous
Significance	High -	High -

7.5.2 Cumulative impacts on plant species of concern and protected plant species

There are various plant species of conservation concern and protected plant species that may occur in the study area, all of which are relatively widespread. A distinction is made here between protected species, which are often widespread, and threatened species, which are often rare. Constructing the current project as well as all other renewable energy projects increases the likelihood of individuals being affected, but unless large numbers of individuals are directly affected, there will only be small to moderate cumulative effects. In principle, no development should allow loss of populations of threatened species, so the assessment undertaken below is for protected species (although effects on threatened species are also discussed).

Extent	The impact will affect local populations or individuals of the affected species. The large number of projects taken together make this a regional effect.
Probability	Based on the list of species that are protected or listed, the impact is certain to happen to protected plants and probable for threatened plants.
Reversibility	Partly reversible. Where necessary, individuals can be rescued or else cultivated to replace lost specimens. Unfortunately, this is probably not feasible for threatened plants, which means the impact is barely reversible / irreversible for such species.
Irreplaceable loss of resources	Marginal loss of resources could occur for protected plants and significant loss of resources for threatened plants. The protected species that are likely to occur on site (for all sites) are mostly relatively common throughout their range and they have very wide geographical ranges. With a number of projects, however, the chances of threatened species being affected increases.
Duration	The impact will be long-term for protected plants (for the life of the project) and possibly permanent for threatened plants.
Intensity/magnitude	Possibly medium for protected plants and very high for threatened plants. Loss of some individuals will be insignificant compared to the number that probably occur in nearby natural areas.
Significance	Medium- for protected plants (Low- with mitigation) High- for threatened plants (Low- with mitigation)

Impact 21	Cumultive impacts on protected plant species	
Issue	Loss of individuals of protected plant species	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat, including loss of individual plants within that area.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Long-term	Long-term

Extent	Regional	Regional
Consequence	Medium	Medium
Probability	Probable	Possible / frequent
Significance	Medium -	Low -

Impact 22	Cumulative impacts on threatened plant species	
Issue	Loss of individuals of listed threatened plant species	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat, including loss of individual plants within that area.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Permanent	Permanent
Extent	Regional	Regional
Consequence	High	Medium
Probability	Probable	Possible / frequent
Significance	High -	Low -

7.5.3 Cumulative impacts on ecological processes

There are various ecological processes that may be affected at a landscape level by the presence of multiple projects. This includes obvious processes, such as migration, pollination and dispersal, but also more difficult to interpret factors, such as spatial heterogeneity, community composition and environmental gradients, that can become disrupted when landscapes are disturbed at a high level. Disturbance can alter the pattern of variation in the structure or function of ecosystems. Fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. An important consequence of repeated, random clearing is that contiguous cover can break down into isolated patches. This happens when the area cleared exceed a critical level and landscapes start to become disconnected. Spatially heterogenous patterns can be interpreted as individualistic responses to environmental gradients and lead to natural patterns in the landscape. Disrupting gradients and creating disturbance edges across wide areas is very disruptive of natural processes and will lead to fundamental changes in ecosystem function.

Extent	The number of projects taken together make this a regional effect.
Probability	Based on the number and the nature of the projects (mostly wind-energy projects), the impact may possibly happen.
Reversibility	Partly reversible, where disruptions to specific processes can be identified and rectified.
Irreplaceable loss of resources	Significant loss of resources could potentially occur, but it is more likely that marginal loss of resources will happen.
Duration	The impact will be long-term to permanent, depending on the process and the specific impact.
Intensity/magnitude	Based on the nature and number of projects and the ecological process affected, the impact is most likely to be of medium intensity.

Impact 23	Cumulative impacts on ecological processes
Issue	Disruption of ecological processes at landscape level
Description of Impact	

Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible regional disruption of ecological processes.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Medium
Duration	Long-term	Long-term
Extent	Regional	Regional
Consequence	Medium	Medium
Probability	Possible / frequent	Possible / frequent
Significance	Low -	Low -

7.5.4 Cumulative impacts on fauna

Construction activities, loss of habitat, noise, dust and general activity associated with the construction phase of the project are likely to cause all mobile species to move away from the area. This effect will be increased if there are a number of projects being constructed at the same time or in quick succession, so the effect is likely to be cumulative. However, the geographical ranges of the species of concern is wide and it is considered that the significance of the effect will be low in the long-term, although probably significant during the combined construction phase of the projects. It is possible that some species will be more significantly negatively affected than others, especially shy species, territorial species that get displaced, or those with large territories that get shrunk. It is also possible that some species will benefit from the increased presence of humans and will migrate into the area. This will possibly cause additional shifts in other species that are affected by the increase in numbers or new species.

Extent	Fauna in the general area of all RE projects being considered will be affected, rated as **regional**.
Probability	The impact will probably happen to some extent.
Reversibility	Impact is partly reversible with mitigation measures.
Irreplaceable loss of resources	Marginal loss of resources will occur.
Duration	The impact will be long-term (for the duration of the projects).
Intensity/magnitude	Potentially medium intensity. Population processes likely to continue to function in a moderately modified way with general integrity maintained.

Impact 24	Cumulative impacts on fauna, specifically direct mortality of individuals of threatened species	
Issue	Direct mortality of fauna due to machinery, construction and increased traffic	
Description of Impact		
Direct mortality of fauna due to machinery, construction and increased traffic		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Long-term	Long-term
Extent	Regional	Regional
Consequence	Medium	Medium
Probability	Probable	Possible / frequent

Significance	Medium -	Low -

7.5.5 Cumulative impacts due to spread of declared weeds and alien invader plants

There is a moderate possibility that alien plants could be introduced to areas within the footprint of the proposed infrastructure from surrounding areas in the absence of control measures. The greater the number of projects, the more likely this effect will happen; therefore, the effect is cumulative. For the current site, the impact is predicted to be low due to the current absence of invasive species on site and the high ability to control any additional impact. The significance will therefore be low, especially if control measures are implemented. However, the increased overall disturbance of the landscape will create opportunities and, if new invasions are not controlled, can create nodes that spread to new locations due to the heightened disturbance levels.

Extent	Habitat in the general area of all RE projects being considered will be affected, rated as **regional**.
Probability	The impact will probably happen in the absence of control measures.
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.
Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled invasion can affect all nearby natural habitats.
Duration	The impact will be long-term. With no control measures it could effecgively be permanent, or alternatively, have impacts of high intensity..
Intensity/magnitude	Medium. Severe invasion can alter the functioning of natural ecosystems.

Impact 25	Cumulative impacts due to establishment and spread of declared weeds and alien invader plants	
Issue	Establishment and spread of declared weeds and alien invader plants	
Description of Impact		
Establishment and spread of declared weeds and alien invader plants		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Long-term	Long-term
Extent	Regional	Regional
Consequence	Medium	Medium
Probability	Probable	Probable
Significance	Medium -	Medium -

7.5.6 Cumulative impacts on CBAs and conservation planning

Significant proportions of the site and surrounding sites are included in Critical Biodiversity Areas for the Western Cape. Disruption of these areas means that conservation planners have to find alternative sites to include in future CBAs according to an algorithm that seeks a least-cost outcome for preserving biodiversity, i.e. the least amount of land space for preserving the greatest amount of area of biodiversity importance, as well as meeting specific conservation targets. At some point, the loss of suitable sites leads to a situation where it is no longer possible to plan effective conservation networks or the cost of doing so increases due to a lack of choice. The higher the density of similar projects in a uniform

area, the less chance there is of finding sites suitable for conservation that contain all the attributes that are desired to be conserved, including both ecological processes and ecological patterns. However, at the current stage there is sufficient CBA that can protect these ecological processes while still allowing development to occur as a result this cumulative impact is low.

Extent	The impact will affect natural vegetation on site, but affects defined CBAs that extend regionally, effectively affecting conservation planning for the entire Province.
Probability	Based on the location of other Renewable Energy Projects as well as the Western Cape CBA map, it is probable that areas within CBAs will be affected.
Reversibility	In all projects, loss of vegetation is effectively **irreversible** within the immediate footprint of permanent infrastructure, since construction of roads and other hard surfaces completely removes vegetation and modifies the substrate upon which it grows. For all the projects, in other areas (crane pads, construction camp and disturbed areas adjacent to construction activities) the impact is partially reversible in the sense that secondary vegetation in disturbed areas will probably never resemble the original vegetation found on site.
Irreplaceable loss of resources	For each individual project, **marginal** loss of resources will occur within the footprint of the proposed infrastructure since vegetation clearing is required prior to installation of infrastructure, but the overall loss of resources relative to the entire CBA is less significant.
Duration	Within the immediate footprint of the permanent infrastructure (turbine foundations, roads, FBGF and substation) the impact will be **Permanent** (mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient). In other areas (crane pads, construction camp and disturbed areas adjacent to construction activities) the impact will be of long-term duration. The assessment here is for the permanently affected areas.
Intensity/magnitude	Medium. The functional integrity of vegetation on site will be compromised to some degree (especially in the sense that the quality, integrity and functionality of CBA areas will be affected, which can be limited to some extent by implementation of mitigation measures.

Impact 26	Cumulative impacts on conservation planning	
Issue	Loss of areas within CBAs and ESAs.	
Description of Impact		
Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in possible provincial disruption of conservation planning.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Low
Duration	Long-term	Long-term
Extent	Regional	Regional
Consequence	Medium	Medium
Probability	Probable	Probable
Significance	Medium -	Medium -

7.6 Assessment of No-Go alternative

If the project does not proceed then the current *status quo* will continue. This will involve continued use of the land for livestock production. Current patterns suggest that this will mean that the landscape remains unaltered into the future under an unchanging land-use regime. However, historical evidence has shown that livestock production, especially in arid parts of the country has led to overall degradation of the vegetation, especially in times of drought. This degradation has been shown to accumulate over time, incrementally reducing the productive capacity of the landscape. Indications are that, due to human-induced climate change, the risk of future degradation has increased. The site is in an arid area and, based on the scientific consensus that global climate change is affecting local climate and that South Africa is more significantly affected than other parts of the planet, in terms of a warming effect as well increased risk of drought, the risks to livestock production have probably worsened and will continue to do so into the future. This implies that stocking rates, and therefore profitability, will need to be reduced to avert land degradation, putting financial strain on producers. An alternative income stream associated with financial benefits from hosting renewable energy projects is likely to improve the financial viability of any land manager, which in turn reduces the pressure to carry unsustainable stock numbers. This in turn puts less pressure on the land, which reduces the likelihood of grazing-induced degradation of the land. In summary, the No-Go option could increase the risk of land degradation due to over-grazing under adverse future climate scenarios, whereas there is a possibility of this effect being lessened in the case of the project promoting local economic diversity.

7.7 Summary of mitigation measures

The following mitigation measures are recommended to address known potential impacts (applicable to all three WEFs):

- Use existing stream crossings
- Cross streams and other linear features at right angles, and also near their end-points or where there are natural breaks in the feature of concern.
- Internal access roads should be aligned along existing farm, access and district roads, even if these require upgrading.
- Restrict impact to development footprint only and limit disturbance spreading into surrounding areas.
- Footprints of infrastructure, laydown areas, construction sites, roads and substation sites should be clearly demarcated.
- Ensure all possible steps are taken to limit erosion of surfaces, including proper management of storm-water runoff.
- Compile a Rehabilitation Plan prior to the commencement of construction.
- No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities, unless for maintenance purposes, in which case all reasonable steps should be taken to limit damage to natural areas.
- No driving of vehicles off-road outside of construction areas.
- It is a legal requirement to obtain permits for specimens or protected species that will be lost due to construction of the project.
- A detailed pre-construction walk-through survey will be required during a favourable season to locate any individuals of protected plants, as well as for any populations of threatened plant species. This survey must cover the footprint of all approved infrastructure, including internal access roads (final infrastructure layout). The best season is early to late Summer, but dependent on recent rainfall and vegetation growth.
- It is possible that some plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas, but the description and appropriateness of such measures must be included in a Plant Rescue Plan. Any such measures will reduce the irreplaceable loss of resources as well as the cumulative effect. Note that Search and Rescue is only appropriate for some species and that a high mortality rate can be expected from individuals of species that are not appropriate to transplant.
- A Plant Rescue Plan must be compiled to be approved by the appropriate authorities.
- For any plants that are transplanted, annual monitoring should take place to assess survival. This should be undertaken for a period of three years after translocation and be undertaken by a qualified botanist. The monitoring programme must be designed prior to translocation of plants and should include control sites (areas not disturbed by the project) to evaluate mortality relative to wild populations.
- Limit clearing of natural habitat designated as sensitive, especially rocky outcrops, cliffs and riparian habitats, where possible. This has already been applied during the Design phase of the project where attempts have been made to avoid sensitive habitats.
- Speed limits should be set for all roads on site, as well as access roads to the site. These limits should not exceed 40 km/h, but may be set lower, depending on local circumstances. Strict enforcement of speed limits should occur – install speed control measures, such as speed humps, if necessary.
- Night driving should be strictly limited and, where absolutely required, lower speed limits should apply for night driving.
- Pre-construction walk-through, undertaken in the correct season, in front of construction must be undertaken to move any individual animals, such as tortoises, prior to construction.
- No dogs or other pets should be allowed on site, except those confined to landowners' dwellings.
- Personnel on site should undergo environmental induction training, including the need to abide by speed limits, the increased risk of collisions with wild animals on roads in rural areas..
- Proper waste management must be implemented, ensuring no toxic or dangerous substances are accessible to wildlife. This should also apply to stockpiles of new and used materials to ensure that they do not become a hazard.
- No collecting, hunting or poaching of any plant or animal species.
- Report any mortality of protected species to conservation authorities
- Personnel to be educated about protection status of species, including distinguishing features, to be able to identify protected species.

- Implement strict access control for the site.
- Report any illegal collection to conservation authorities.
- Excessive dust can be controlled by using appropriate dust-control measures.
- Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled, as per the Alien Management Plan.
- Implement control measures, as per the Alien Management Plan.
- Appropriate lighting should be installed to minimize impacts on nocturnal animals, as per visual specialist assessment.
- Construction activities should not be undertaken at night.
- Maintain adequate buffer zones around hydrological features so that these do not become degraded from runoff and erosion.
- Compile and implement a Stormwater Management Plan, which highlights control priorities and areas and provides a programme for long-term control.
- Undertake regular monitoring to detect erosion features early so that they can be controlled.
- Implement erosion control measures.
- Construct proper culverts, bridges and/or crossings at drainage-line crossings, and other attenuation devices to limit overland flow.
- No additional clearing of vegetation should take place during the operational phase without a proper assessment of the environmental impacts and authorization from relevant authorities, unless for maintenance purposes, in which case all reasonable steps should be taken to limit damage to natural areas.
- Surface runoff and erosion must be properly controlled during the operational phase, and any issues addressed as quickly as possible.
- Continued implementation and monitoring of Rehabilitation Plan during operational phase.
- Personnel and vehicles should be restricted to access / internal roads and no off-road driving should occur.
- Prevent unauthorised access to the site – project roads provide access to remote areas that were not previously easily accessible for illegal collecting or hunting.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled. This should include formal monitoring on an annual basis by a qualified botanist for up to five years.
- Implement control measures on an ongoing basis, according to the Alien Management Plan.
- Do NOT use any alien plants during rehabilitation.
- Noise and light pollution should be managed according to guidelines from the noise specialist study and visual specialist assessment respectively.

7.8 Summary of monitoring recommendations

Specific monitoring recommendations should be provided in the Plant Rescue Plan, the Alien Invasive Management Plan, and the Rehabilitation Plan. The following are broad recommendations:

Alien Invasive Species:

- Monitor for early detection, to find species when they first appear on site. This should be annual, and should be conducted by an experienced botanist. Early detection should provide a list of species and locations where they have been detected.
- Monitor for the effect of management actions on target species, which provides information on the effectiveness of management actions. Such monitoring depends on the management actions taking place. It should take place after each management action.
- Monitor for the effect of management actions on non-target species and habitats.

Rescued plants:

- The location of all transplanted rescued plants must be recorded, along with the identity of the plant.
- The health / vigour of each transplanted individual should be monitored annually for a minimum of three years.
- As a scientific control, an equal number of non-transplanted individuals of the same species, within similar habitats, should be monitored in the same way as the transplanted specimens. This will provide comparative data on the survival of wild populations relative to transplanted plants.

Threatened species

- Where populations of threatened species are found to occur on site (flora and fauna), annual monitoring of population health should take place. This should be appropriate to the species concerned.

Rehabilitated areas:

- All management actions associated with rehabilitation must be recorded after each management action has taken place.
- All rehabilitated areas should be monitored to assess vegetation recovery. For each monitoring site, an equivalent comparitive site in adjacent undisturbed vegetation should be similarly monitored. Monitoring data collection should include the following:
    - total vegetation cover and height, as well as for each major growth form;
    - species composition, including relative dominance;
    - soil stability and/or development of erosion features;
    - representative photographs should be taken at each monitoring period.
- Monitoring of rehabilitated areas should take place annually for a minimum of three years, or until vegetation stability has been achieved.

8 CONCLUSION AND COMPLIANCE STATEMENT

Desktop information, field data collection and mapping from aerial imagery confirms patterns provided in the DEA Online Screening Tool for various themes.

1. The two vegetation types that occur on site, Gamka Karoo and Southern Karoo Riviere, are assessed as Least Threatened and no parts of the site are within any listed ecosystem.
2. All of the drainage lines on site are mapped as Ecological Support Areas (ESA1). There is a small area of Critical Biodiversity Area 1 in the northern end of the project.
3. There are at least five plant species of concern that have a known distribution that includes the study area and habitat requirements that are met by those found on site site. This verifies the **MEDIUM** sensitivity for the Plant Species Theme (suspected habitat for SCC). Environmental conditions at the time of the field survey were too poor to determine whether any of these species occur on site or not.
4. The site has habitat that is suitable for the Endangered Karoo Dwarf Tortoise (*Chersobius boulengeri*), as well as for the Vulnerable Black-footed Cat (*Felis nigripes*). Database records indicate that the Black-footed Cat has been previously recorded there or nearby. Eventhugh collection records and habitat requirements suggest that the Karoo Dwarf Tortoise is likely to occur on site it was found that thereis a low probability of it's occurrence on the proposed development area for the Jessa Grid Connection Projects. Refer to the Compliace statement (Hoare, 2022) attached in Appendix 3.
5. A basic camera-trap survey was undertaken in habitats potentially suitable for the Critically Endangered Riverine Rabbit, but no individuals were recorded on site. It is considered unlikely that they currently occur there.
6. The proposed project consists of a number of grid corridors, switching station within the O&M complexe[2] and the possible Eskom MTS expansion.
7. An impact assessment identified the following impacts as potentially of concern for the project:
    - Loss and/or fragmentation of indigenous natural vegetation (low significance after mitigation);
    - Loss of faunal habitat and refugia (medium significance after mitigation);
    - Impact on integrity of Critical Habitat Biodiversity Areas (low significance after mitigation)
    - Establishment and spread of declared weeds and invader plants (low significance after mitigation);
    - Increased runoff and erosion (low significance after mitigation).
8. The extreme northern end of the corridors is within a CBA1 area. The effect of the power lines within these areas is considered to be negligible – each tower structure has only a small local footprint and there will be a maximum of six such structures within this zone. Mitigation measures required are for impacts on other features, such as natural vegetation, and plant and animal species of concern.
9. The proposed MTS is within a CBA1 area, but this is immediately adjacent to the existing MTS, so there is no choice but to locate it here. The impact of this proposed MTS expansion on CBAs was assessed as having Medium significance, only because it is permanent and the impact will definitely occur. The location is adjacent to an existing structure and between a railway line and a main road, so there will be minimal fragmentation. The area in hectares is similar to the existing MTS and small compared to the overall area of habitat within the CBA1 area. Proposed mitigation measures are as for other impacts, especially for impacts on natural vegetation. Given the small impact footprint and since the MTS expansion is unlikely to compromise the ecological functioning of the CBA or further fragment the habitat, there should not be a need for an offset, even though the residual impact significance is medium.
10. The grid corridors projects, including the substation clomplexes and the MTS, are deemed to be acceptable from a Terrestrial Ecology perspective, as no fatal flaws or highly sensitive / 'no-go' areas were identified which

[2] Inclusive onsite substation, BESS, laydown area, O&M building, forms part of the separate Jessa WEF applications

would prevent construction in this area. The effect on the CBA1 area is minimal and there are no options to avoid it due to the current location of the existing Dröerivier MTS.

11. Various mitigation measures are proposed to minimise identified impacts. This includes pre-construction walk-through surveys for specific flora and fauna species of concern that may occur on site.
12. All alternatives are favourable. In principle, the shortest routes are the best, and it is best to align powerlines together rather than in separate corridors, but there are no particular features that eliminate any of the corridors as viable options.

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10 APPENDICES:

Appendix 1: Plant species recorded on site.

Afroscirpoides dioeca
Aloe claviflora
Aptosimum indivisum
Asparagus striatus
Asparagus suaveolens
Astroloba robusta
Berkheya spinosa
Blepharis mitrata
Carissa haematocarpa
Cheilanthes parviloba
Chrysocoma ciliata
Crassothonna cacalioides
Crassula hemisphaerica
Crassula subaphylla
Curio radicans
Cyperus marginatus
Eragrostis lehmanniana
Euphorbia braunsii
Felicia muricata
Fingerhuthia africana
Geus *Drosanthemum*
Gazania
Gymnosporia
Hermannia
Isolepis sp.
Limosella aquatica
Lycium
Mesembryanthemum
Osteospermum
Pteronia
Selago
Gomphocarpus filiformis
Grewia robusta
Hoodia gordonii
Macledium spinosum
Monsonia salmoniflora
Rhigozum obovatum
Ruschia intricata
Schinus molle
Schmidtia kalahariensis
Searsia burchellii
Searsia lancea
Stipagrostis namaquensis
Tragus koelerioides
Vachellia karroo
*Veronica anagallis-aquatica**

Appendix 2: Animal species that could occur on site.

Table 1: A list of the amphibians associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	***Genus and species***	**Common Name**	**Status**
Bufonidae	*Vandijkophrynus gariepensis gariepensis*	Karoo Toad (subsp. gariepensis)	Least concern
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	Least Concern (2017)
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	Least Concern (2017)
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	Least Concern (2013)
Pyxicephalidae	*Cacosternum karooicum*	Karoo Caco	Least Concern (2013)
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog	Least Concern
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	Least Concern
Pyxicephalidae	*Tomopterna delalandii*	Cape Sand Frog	Least Concern

Table 2: A list of the mammals associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	***Genus and species***	**Common Name**	**Status**
Bathyergidae	*Cryptomys hottentotus*	Southern African Mole-rat	Least Concern (2016)
Bovidae	*Aepyceros melampus*	Impala	Least Concern
Bovidae	*Alcelaphus buselaphus*	Hartebeest	Least Concern
Bovidae	*Alcelaphus buselaphus caama*	Red Hartebeest	Least Concern (2008)
Bovidae	*Antidorcas marsupialis*	Springbok	Least Concern (2016)
Bovidae	*Connochaetes gnou*	Black Wildebeest	Least Concern (2016)
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	Least Concern (2016)
Bovidae	*Hippotragus equinus*	Roan Antelope	Endangered (2016)
Bovidae	*Oreotragus oreotragus*	Klipspringer	Least Concern (2016)
Bovidae	*Oryx gazella*	Gemsbok	Least Concern (2016)
Bovidae	*Pelea capreolus*	Vaal Rhebok	Near Threatened (2016)
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern (2016)
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	Least Concern
Bovidae	*Sylvicapra grimmia*	Common Duiker	Least Concern
Bovidae	*Syncerus caffer*	African Buffalo	Least Concern (2008)
Bovidae	*Taurotragus oryx*	Common Eland	Least Concern (2016)
Bovidae	*Taurotragus oryx oryx*	Cape eland	Least Concern (2016)
Bovidae	*Tragelaphus scriptus*	Bushbuck	Least Concern
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern (2016)
Canidae	*Canis mesomelas*	Black-backed Jackal	Least Concern (2016)
Canidae	*Otocyon megalotis*	Bat-eared Fox	Least Concern (2016)
Canidae	*Vulpes chama*	Cape Fox	Least Concern (2016)
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	Least Concern (2016)
Cercopithecidae	*Papio ursinus*	Chacma Baboon	Least Concern (2016)
Chrysochloridae	*Chlorotalpa sclateri*	Sclater's Golden Mole	Least Concern (2016)
Elephantidae	*Loxodonta africana*	African Bush Elephant	Least Concern (2016)
Equidae	*Equus quagga*	Plains Zebra	Least Concern (2016)
Equidae	*Equus zebra zebra*	Cape Mountain Zebra	Least Concern (2016)
Felidae	*Caracal caracal*	Caracal	Least Concern (2016)
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable (2016)
Felidae	*Felis silvestris*	Wildcat	Least Concern (2016)
Felidae	*Panthera leo*	Lion	Least Concern (2016)
Gliridae	*Graphiurus (Graphiurus) ocularis*	Spectacled African Dormouse	Least Concern
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	Least Concern (2016)
Herpestidae	*Herpestes pulverulentus*	Cape Gray Mongoose	Least Concern (2016)

Herpestidae	*Suricata suricatta*	Meerkat	Least Concern (2016)
Hyaenidae	*Crocuta crocuta*	Spotted Hyaena	Near Threatened (2016)
Hyaenidae	*Hyaena brunnea*	Brown Hyena	Near Threatened (2015)
Hyaenidae	*Proteles cristata*	Aardwolf	Least Concern (2016)
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	Critically Endangered (2016)
Leporidae	*Lepus capensis*	Cape Hare	Least Concern
Leporidae	*Lepus saxatilis*	Scrub Hare	Least Concern
Leporidae	*Pronolagus rupestris*	Smith's Red Rock Hare	Least Concern (2016)
Macroscelididae	*Elephantulus edwardii*	Cape Elephant Shrew	Least Concern (2016)
Macroscelididae	*Elephantulus rupestris*	Western Rock Elephant Shrew	Least Concern (2016)
Macroscelididae	*Macroscelides proboscideus*	Short-eared Elephant Shrew	Least Concern (2016)
Muridae	*Aethomys granti*	Grant's Rock Mouse	Least Concern
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	Least Concern
Muridae	*Desmodillus auricularis*	Cape Short-tailed Gerbil	Least Concern (2016)
Muridae	*Gerbilliscus paeba*	Paeba Hairy-footed Gerbil	Least Concern (2016)
Muridae	*Mastomys natalensis*	Natal Mastomys	Least Concern (2016)
Muridae	*Otomys saundersiae*	Saunders' Vlei Rat	Least Concern
Muridae	*Otomys unisulcatus*	Karoo Bush Rat	Least Concern (2016)
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern (2016)
Mustelidae	*Ictonyx striatus*	Striped Polecat	Least Concern (2016)
Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern (2016)
Nesomyidae	*Dendromus melanotis*	Gray African Climbing Mouse	Least Concern (2016)
Nesomyidae	*Malacothrix typica*	Large-eared African Desert Mouse	Least Concern (2016)
Nesomyidae	*Petromyscus collinus*	Pygmy Rock Mouse	Least Concern (2016)
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	Least Concern (2016)
Procaviidae	*Procavia capensis*	Cape Rock Hyrax	Least Concern (2016)
Soricidae	*Myosorex varius*	Forest Shrew	Least Concern (2016)
Soricidae	*Suncus varilla*	Lesser Dwarf Shrew	Least Concern (2016)
Vespertilionidae	*Cistugo lesueuri*	Lesueur's Wing-gland Bat	Least Concern (2016)
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	Least Concern (2016)
Vespertilionidae	*Pipistrellus melckorum*	Melcks' Serotine	Least Concern
Viverridae	*Genetta genetta*	Common Genet	Least Concern (2016)

Table 3: A list of the reptiles associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	***Genus and species***	**Common Name**	**Status**
Agamidae	*Agama aculeata aculeata*	Common Ground Agama	Least Concern (SARCA 2014)
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern (SARCA 2014)
Chamaeleonidae	*Bradypodion ventrale*	Eastern Cape Dwarf Chameleon	Least Concern (SARCA 2014)
Chamaeleonidae	*Chamaeleo namaquensis*	Namaqua Chameleon	Least Concern (SARCA 2014)
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	Least Concern (SARCA 2014)
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern (SARCA 2014)

Colubridae	*Dipsina multimaculata*	Dwarf Beaked Snake	Least Concern (SARCA 2014)
Cordylidae	*Cordylus cordylus*	Cape Girdled Lizard	Least Concern (SARCA 2014)
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	Least Concern (SARCA 2014)
Cordylidae	*Pseudocordylus microlepidotus namaquensis*	Nuweveldberg Crag Lizard	Least Concern (SARCA 2014)
Elapidae	*Aspidelaps lubricus lubricus*	Coral Shield Cobra	Least Concern
Elapidae	*Naja nivea*	Cape Cobra	Least Concern (SARCA 2014)
Gekkonidae	*Chondrodactylus angulifer angulifer*	Common Giant Ground Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Goggia braacki*	Braack's Pygmy Gecko	Near Threatened (SARCA 2014)
Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus geitje*	Ocellated Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus kladaroderma*	Thin-skinned Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus latirostris*	Quartz Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus maculatus*	Spotted Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus mariquensis*	Marico Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus oculatus*	Golden Spotted Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Pachydactylus purcelli*	Purcell's Gecko	Least Concern (SARCA 2014)
Gekkonidae	*Ptenopus garrulus maculatus*	Spotted Barking Gecko	Least Concern (SARCA 2014)
Gerrhosauridae	*Cordylosaurus subtessellatus*	Dwarf Plated Lizard	Least Concern (SARCA 2014)
Lacertidae	*Meroles suborbitalis*	Spotted Desert Lizard	Least Concern (SARCA 2014)
Lacertidae	*Nucras livida*	Karoo Sandveld Lizard	Least Concern (SARCA 2014)
Lacertidae	*Pedioplanis burchelli*	Burchell's Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	*Pedioplanis laticeps*	Karoo Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Least Concern (SARCA 2014)
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	Least Concern (SARCA 2014)
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	Least Concern (SARCA 2014)

Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	Least Concern (SARCA 2014)
Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern (SARCA 2014)
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	Not evaluated
Scincidae	*Acontias meleagris*	Cape Legless Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis capensis*	Cape Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis homalocephala*	Red-sided Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis occidentalis*	Western Three-striped Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	Least Concern (SARCA 2014)
Scincidae	*Trachylepis variegata*	Variegated Skink	Least Concern (SARCA 2014)
Testudinidae	*Chersina angulata*	Angulate Tortoise	Least Concern (SARCA 2014)
Testudinidae	*Chersobius boulengeri*	Karoo Padloper	Endangered (SANBI 2016)
Testudinidae	*Homopus femoralis*	Greater Padloper	Least Concern (SARCA 2014)
Testudinidae	*Psammobates tentorius*	Tent Tortoise	Least Concern (SARCA 2014)
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern (SARCA 2014)
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Least Concern (SARCA 2014)
Viperidae	*Bitis arietans arietans*	Puff Adder	Least Concern (SARCA 2014)

Table 4: A list of the scorpions associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	***Genus and species***	**Common Name**	**Status**
Buthidae	*Parabuthus capensis*	Cape Thicktail Scorpion	Least Concern
Buthidae	*Parabuthus schlechteri*	Burrowing Thick Tail Scorpion	Least Concern
Buthidae	*Uroplectes schlechteri*	Common Lesser-Thicktail Scorpion	Least Concern
Scorpionidae	*Opistophthalmus austerus*		Least Concern
Scorpionidae	*Opistophthalmus crassimanus*		Least Concern
Scorpionidae	*Opistophthalmus karrooensis*	Karoo Burrower	Least Concern

Appendix 3: Compliance Statement