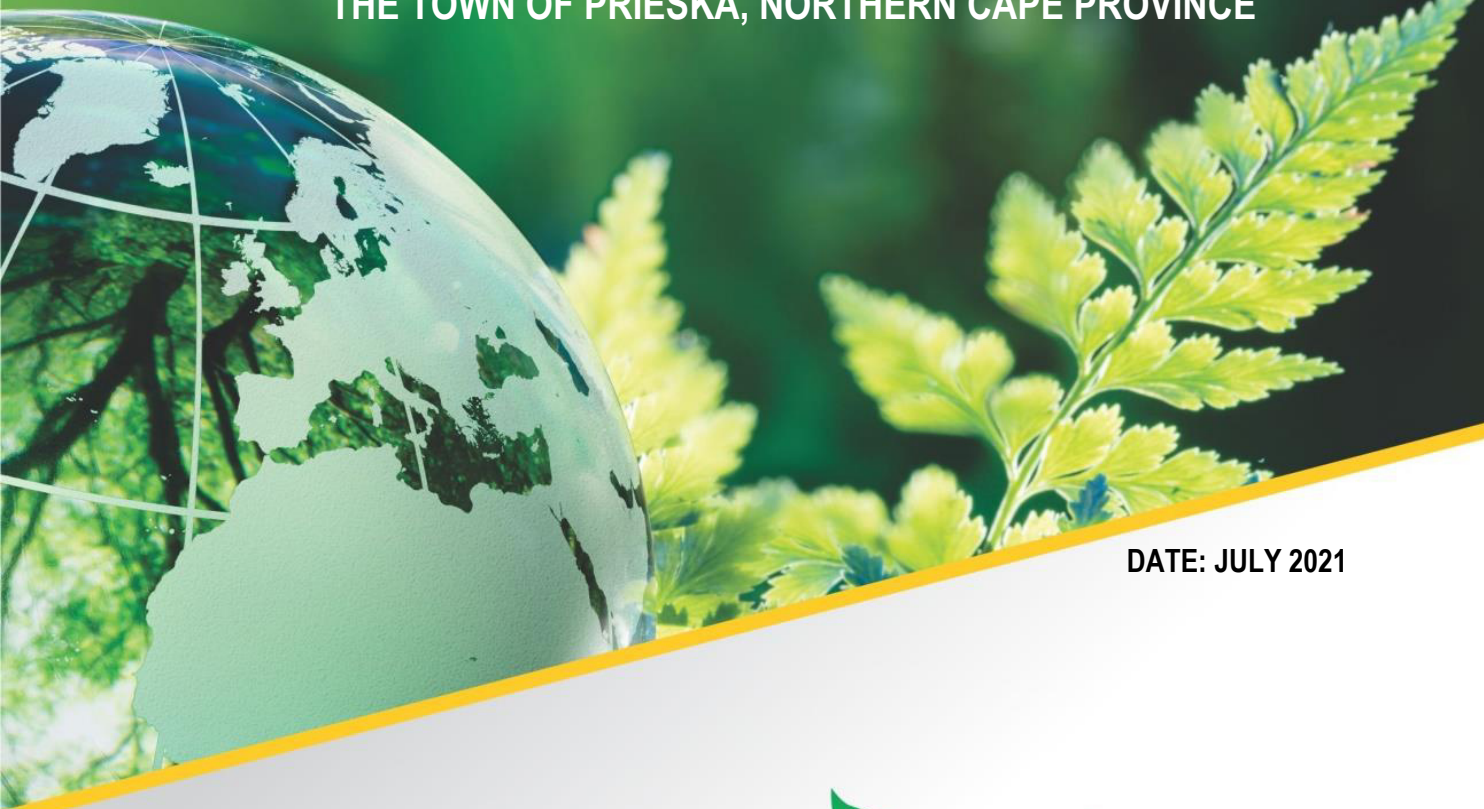
ESKOM CUPRUM BESS

ECOLOGICAL IMPACT ASSESSMENT

TERRESTRIAL ECOLOGICAL ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF A BATTERY ENERGY STORAGE SYSTEM (BESS) AND ASSOCIATED INFRASTRUCTURE AT THE CUPRUM SUBSTATION LOCATED WITHIN COPPERTON, NEAR THE TOWN OF PRIESKA, NORTHERN CAPE PROVINCE



DATE: JULY 2021

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01 August 2022

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To whom it may concern

SUBJECT: THE PROPOSED ESKOM CUPRUM BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT, ESKOM CUPRUM SUBSTATION, COPPERTON, NORTHERN CAPE PROVINCE.

The findings and recommendations as stipulated in the Aquatic verification, Avifauna Impact Assessment and Ecological reports for the above mentioned project, dated 04th of June 2021, are still valid.

Regards,

Johannes Maree (Pr.Sci.Nat)
Ecologist
MSc & MBA
Cell: 082 564 1211

DOCUMENT INFORMATION

Item	Description
Proposed development and location	Proposed development of a Battery Energy Storage System (BESS) and associated infrastructure at the Cuprum Substation located within Copperton, near the town of Prieska, Northern Cape Province
Purpose of the study	The purpose of the study is to conduct a terrestrial ecological assessment to determine the ecological sensitivities and habitats of the study area. To investigate the fauna and flora and determine if there are any priority species present.
Coordinates	29°57'37.63"S 22°18'0.76"E (Approximate centre of the study site)
Map Reference	2922 Prieska
Municipalities	Siyathemba Local Municipality, Pixley ka Seme District Municipality
Predominant land use of surrounding area	Mining, Distribution lines, Distribution substation, Solar and Wind farms
Applicant	**Eskom**
EAP	**AECOM** 263A West Ave Centurion, South Africa 0157 Tel: +27 12 421 3500 Email: dalian.govender@aecom.com
Consultant	**Sativa Travel and Environmental Consultants (Pty) Ltd** Constantia Park, Building 16-2, 546 16th Road Midrand, 1685 Cell: 076 328 1558 Fax: 086 652 9774 Email: info@sativatec.co.za
Author	Johannes Oren Maree, MSc. MBA; *Pr. Sci. Nat.* (SACNASP Reg. No: 400077/91)
Date of Report	13/07/2021

EXECUTIVE SUMMARY

PROJECT OVERVIEW

The existing Eskom network in the Prieska area is not constrained, but the Eskom grid as a whole is and the Cuprum BESS (Battery Energy Storage System) will therefore be for business ancillary services and energy support. The proposed development will therefore aim to achieve the following:

- Strengthen the electricity distribution network and address current voltage and capacity constraints;
- Integrate a greater amount of renewable energy into the electricity grid; and
- Reduce the requirement for investment in new conventional generation capacity (i.e. gas, nuclear, coal) and new distribution substations and powerlines to strengthen networks

Generally, the BESS will be expected to charge during the low load period at night (23hoo to 4h59)

and be available to provide ancillary and energy services during the day (5h00 to 22h5 9). The BESS shall have capability to be operated to provide capacity to meet the energy demand on the grid.

Primary Plant Scope of Work

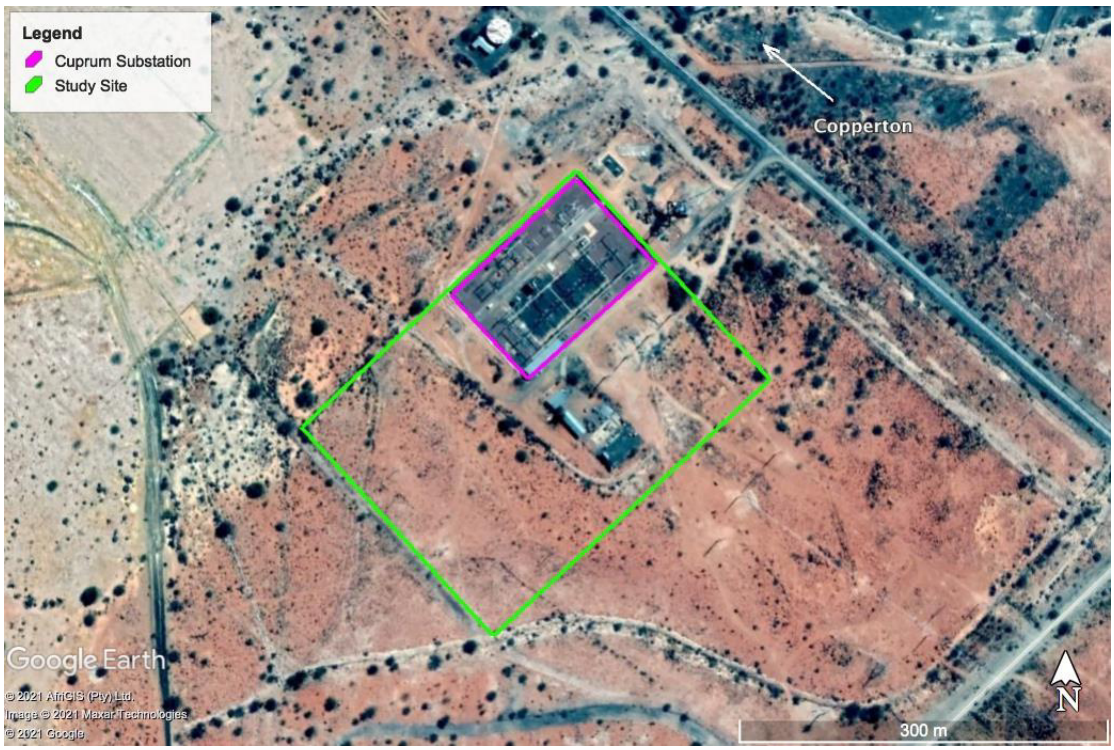
- At Cuprum substation extend the substation footprint by 92x81m.
- Relocate existing lighting mast next to the busbar coupler.
- Extend the existing 132kV busbar using tubular bar.
- Install 5 x 21m lighting and lightning masts.
- Build oil holding dam that will cater for the future transformers.
- Install transformer bay consists of the following equipment.
  - ✓ 132kV Busbar 1 Isolator and Busbar 2 Isolator.
  - ✓ 132kV Breaker
  - ✓ 132kV Current Transformer.
  - ✓ 1 x 80MVA 132/22kV transformer
  - ✓ 1 x 22kV NECRT.
  - ✓ 1 x 22kV Combo Kiosk.
  - ✓ 1 x 22kV busbar Isolator
  - ✓ 22kV Busbar.
  - ✓ 22kV Busbar Isolator
  - ✓ 22kV Combo Kiosk
  - ✓ 22kV Line Isolator with Surge Arrestor.
  - ✓ Cable end support.
- Join new run-away road with the existing run-away.
- Install 2 x 5m slide gates and 1 x 1.5m gate.
- The Control room is enough to accommodate an additional future feeder bays.

Sativa Travel and Environmental Consultants (Pty) Ltd was appointed as the independent specialist consultancy to conduct an ecological impact assessment for the proposed project. Field investigations were conducted on 23 April 2021.

LOCATION OF THE STUDY AREA

The study site is located at the existing Eskom Cuprum Substation. The study site is at Copperton, which is north of the R357 and approximately 54km southwest of the Town of Prieska. The site is within the Siyathemba Local Municipality of the Pixley ka Seme District Municipality, Northern Cape Province.

LOCALITY MAP



COMPONENTS OF THE PROJECT

WATERCOURSES IN THE STUDY AREA

There are no watercourses in the study area, including dry drainage lines and saltpans.

VEGETATION

The study site is situated within the original extent of Bushmanland Basin Shrubland, which is in the Nama-Karoo Biome. The veld type is not a threatened ecosystem.

Much of the vegetation in the study site was badly disturbed to moderately disturbed, with no areas of good quality shrubland present. This is to be expected as the study site is situated within and adjacent to a substation, and within a mining area, which is highly degraded and impacted. During field investigations no sensitive habitats or priority plant species were observed. It is highly unlikely that any RDL or ODL plant species are present on site. The vegetation on site is mostly scattered low shrubs and grasses, with open sandy and dolomitic stone areas. A few large shrubs and trees are also scattered throughout the area.

SENSITIVITY ANALYSES

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature.

ECOLOGICAL SENSITIVITY ANALYSIS

Ecological community	Floristic sensitivity	Faunal sensitivity	Ecological sensitivity
Shrubland	Medium	Medium	Medium
Transformed Land	Low	Medium/Low	Medium/Low

Dry Drainage Lines	Medium	Medium	Medium

High: 80% – 100%; Medium/high: 60% – 80%; Medium: 40% – 60%; Medium/low: 20% – 40%; Low: 0% – 20%

In reality the overall or combined ecological sensitivity of the study area is 'Medium/Low'. This is because much of the site is disturbed and within a built-up environment within the substation grounds. The fact that the site is within a very disturbed area with large mining operations north and south and a solar photovoltaic operation to the southeast, further reduces sensitivity in terms of movement of wild fauna through the area, loss of vegetation due to fringe impacts and general anthropogenic activities.

PRIORITY AREAS

The study site is not situated within or close to any national priority areas, including Important Bird Areas (IBAs) and Protected Areas. There are no priority areas, including protected areas within a 10km radius of the study site.

FATAL FLAWS

There are no obvious fatal flaws and it is the opinion of the specialist that the project should be authorised and allowed to proceed.

SENSITIVITY MAP OF THE STUDY SITE

The sensitivity of the biodiversity (fauna, flora, aquatic, etc.) for the study site was determined to be mostly 'Low', with some areas being 'Medium'. There were no 'High' sensitivity areas within the study site.

CONCLUSIONS

- The conclusions of the ecological study are as follows:

- The study site is within the original extent of the veldtype known as Bushmanland Basin Shrubland, which is within the Nama-Karoo Biome.
- The veld type is not a threatened ecosystem.
- Most of the study area is transformed or degraded shrubland.
- There are no watercourses, including dry drainage lines and saltpans in the study area. There are also no saltpans within a 500m radius of the site.
- There are no protected trees, RDL plants or RDL animal species present in the study area.
- The study site is not within a CBA or ESA.
- The study site is not within any priority areas, including Important Bird Areas (IBAs).
- The DFFE screening desktop assessment shows the study area as 'High Sensitivity' in terms of the aquatic theme and combined biodiversity theme. During site investigations (ground-truthing / verification) this was found not to be the case. The sensitivities on site and the immediate surroundings are 'Low Sensitivity' in terms of aquatic theme and 'Low / Medium' in terms of combined biodiversity as shown in the calculated ecological sensitivities.
- The impact assessment calculated the overall negative impact of the project on the study site, during the Construction Phase and the Operational Phase to both be 'Low' with the implementation of mitigating and management measures. The impact assessment also calculated the risk of negative impacts on the fringes of the study area / project area to be 'Low', with the implementation of mitigating measures. There are no positive impacts arising from the proposed project in terms of the natural environment.

There are no obvious fatal flaws.

RECOMMENDATIONS

The recommendations of the study are as follows:

- There are no obvious fatal flaws and it is the opinion of the specialist that the project should be authorised and allowed to proceed to the next phase.
- All recommended mitigating measures should be implemented and strictly adhered to.

SPECIALIST EXPERTISE & EXPERIENCE

EXPERTISE OF AUTHOR

Qualifications & Expertise in: Terrestrial Ecology, Aquatic Ecology and Avifaunal Assessments.

- 2 Masters degrees (MSc & MBA); 2 Diplomas (Business & Public Speaking).
- Co-Authored two books: Cut Flowers of the World. 2010 (1st ed) & 2020 (2nd ed), Briza, Pretoria.
- SAQA accreditation and qualifications in training, assessing & service provision (AgriSeta).
- Registered with South African Council for Natural Scientific Professions (SACNASP) since 1991. Registration number: 400077/91
- 21 years experience in technical and managerial positions, project management and consultancy.
- 19 years experience in writing of articles, books, training material, training & presentations.
- 13 years direct experience in EIAs.
- Has conducted hundreds of field investigations and compiled hundreds of technical speciaist reports for EIAs, including ecological assessments (fauna & flora), wetland assessments and avifauna impact assessments.
- Projects involved in include power lines, roads, quarries, housing developments, mines and wind farms.

DECLARATION

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017).

I, **Johannes Oren Maree**, do hereby declare that I:

- Act as an independent specialist in compiling this report;
- Do not have any financial interests, or stand to gain in any way in the undertaking of this activity, other than remuneration for work performed;
- Do not have, nor will have, any vested interest in the proceeding activity or project;
- Have no, neither will engage in, conflicting interests in the undertaking of this activity;
- 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; and
- Will provide competent authority access to my information regarding the report and investigations, whether such information is favourable to the applicant or not.

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LIST OF ACRONYMS

BESS	Battery Energy Storage System
CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
DEA	Department of Environmental Affairs (Old name for DEFF)
DEFF	Department of Environment, Forestry & Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EIS	Ecological Importance & Sensitivity
EMC	Environmental Management Class
HGM	Hydrogeomorphic
IBA	Important Bird Area(s)
MAP	Mean Annual Precipitation
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
ODL	Orange Data Listed
PDA	Primary Drainage Area
QDA	Quaternary Drainage Area
RDL	Red Data Listed
REC	Recommended Ecological Category (or Class)
REMC	Recommended Ecological Management Category (or Class)
SANBI	South African National Biodiversity Institute
SWSA	Strategic Water areas of South Africa
WMA	Water Management Areas

1 BACKGROUND

1.1 PROJECT OVERVIEW

The existing Eskom network in the Prieska area is not constrained, but the Eskom grid as a whole is and the Cuprum BESS (Battery Energy Storage System) will therefore be for business ancillary services and energy support. The proposed development will therefore aim to achieve the following:

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The project involves the following:

Primary Plant Scope of Work

- At Cuprum substation extend the substation footprint by 92x81m.
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- The Control room is enough to accommodate an additional future feeder bays.

Civil scope of work

- Deviate 185m of 32mm diameter water pipeline
- Build 170m of 32mm diameter water pipeline.
- Build the road length of 180m excluding runway inside the substation and width of 5m except the turning points at the corners.

HV line scope of work

- Deviate +-800m of 66kV Hare line, between CUKA01 and CUKA 04.

MV line scope of work

- MV Line Route
    - ✓ Reroute the 11kV 3Ph Mink conductor Cuprum Kronos Line outside Cuprum Substation as according to span plan.

Sativa Travel and Environmental Consultants (Pty) Ltd was appointed as the independent specialist consultancy to conduct an Ecological Assessment for the proposed project.
Field investigations were conducted on 23 April 2021.

1.2 PURPOSE FOR THE STUDY

The purpose of the study is to conduct a terrestrial ecological assessment to determine the ecological sensitivities and habitats of the study area. To investigate the fauna and flora and determine if there are any priority species present. Furthermore, the purpose of the study is to identify any possible fatal flaws, assess impacts, delineated buffer zones (if required), and to recommend mitigating measures aimed at reducing any potential negative impacts arising from the project and related activities on the natural environment.

1.3 QUALITY AND AGE OF THE BASE DATA USED

The latest data sets were used for the report in terms of background information for veldtypes, ecosystems, threatened ecosystems, red data listed (RDL) fauna and flora species, priority areas (including protected areas, strategic expansion areas, wetlands, watercourses, etc.
The source and age of data used is as follows:

- Threatened ecosystems: Latest datasets obtained from the SANBI website (www.bgis.sanbi.org).
- Protected areas: Protected Areas Register (PAR): DEFF – (https://portal.environment.gov.za).
- RDL species: Red List of South Africa Plants (latest update) – (www.redlist.sanbi.org).
- Veldtypes and ecosystems: Mucina & Rutherford, 2006, 2010. Updated 2012, 2018.
- SANBI data sets – latest updated website data (www. bgis.sanbi.org).
- Department of Forestry, Fisheries and the Environment (DFFE) – Screening Tool (www.screening.environment.gov.za).
- Northern Cape Critical Biodiversity Areas (2016) and Provincial Spatial Plans.

1.4 ASSUMPTIONS AND LIMITATIONS

The assumptions and limitations for the assessment were as follows:

- All information regarding the project as provided by the Client are taken to be accurate;
- Note: this study focuses on the terrestrial ecology (fauna and flora). However, the avifaunal assessment was conducted separately.
- Field investigations were undertaken on the 23rd of April 2021, which forms part of the summer (wet) season investigations.
- Due to the nature of the project, the small footprint and state of the site, no additional site investigations are required, including a winter (dry) season assessment.
- Precise buffer zones or exact GPS positions cannot be made using generalised corridors or KML files on Google Earth. However, the buffer zones drawn are accurate to within 2-3m;
- Standard and acceptable methodologies as required in South Africa were used.
- The latest data sets were used in terms of obtaining and establishing background information and desktop reviews for the project. The data sets were taken to be accurate but were verified and refined during field investigations (ground-truthing).
- No specific or highly specialised scientific equipment was used except standard soil augers, hand-held Garmin GPS instruments, relevant computer programmes, etc.
- There were no significant limitations encountered that hindered the project or potentially impacted on the outcomes of the study.

2 METHODOLOGY

2.1 DESKTOP ASSESSMENT

An initial desktop assessment was conducted regarding the main fauna and flora of the region and study site. The primary sources used were those as mentioned above in Section 1.3. Red data listed (RDL) and other priority species listed by the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), as well as in other authoritative publications were also consulted. Alien invasive species and their different Categories (1, 2 & 3) as listed by the Conservation of Agricultural Resources Act (Act No. 43 of 1983), The Northern Cape Conservation Act, 2009 (Act No. 9 of 2009) and the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) were taken into account, along with a number of other relative acts and guidelines.

2.2 FIELD SURVEYS

During field surveys (site investigations) cognisance was taken of the following environmental features and attributes: Biophysical environment; Regional and site specific vegetation; Habitats iGI for potential red data fauna species; Sensitive floral habitats; Red data fauna and flora species; Protected fauna and flora species; Watercourses and other open water bodies.

Digital photographs and GPS reference points of importance were recorded and used in the report where applicable.

2.3 FLORISTIC SENSITIVITY

The methodology used to estimate the floristic sensitivity is aimed at highlighting floristically significant attributes and is based on subjective assessments of floristic attributes. Floristic sensitivity is determined across the spectrum of communities and habitats that typify the study area. Phytosociological attributes (species diversity, presence of exotic species, etc.) and physical characteristics (human impacts, size, fragmentation, etc.) are important in assessing the floristic sensitivity of the various communities.

Criteria employed in assessing the floristic sensitivity vary in different areas, depending on location, type of habitat, size, etc. The following factors were considered significant in determining floristic sensitivity:

- Habitat availability, status and suitability for the presence of Red Data species.
- Landscape and/or habitat sensitivity.
- Current floristic status.
- Floristic diversity.
- Ecological fragmentation or performance.

2.4 FAUNAL SENSITIVITY

Determining the full faunal component of a study area during a short time scale of a few field trips can be highly limiting. Therefore, the different habitats within the study area and nearby surrounding areas were scrutinised for attributes that are deemed to be suitable for high diversity of fauna, as well as for Red Data species. Special consideration was given to habitats of pristine condition and high sensitivity.

Areas of faunal sensitivity were calculated by considering the following parameters:

- Habitat status – the status or ecological condition of the habitat. A high level of habitat degradation will often reduce the likelihood of the presence of Red Data species.
- 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 surrounding habitats and adequacy of these linkages are evaluated for the ecological functioning of Red Data species within the study area
- Potential presence of Red Data species – Areas that exhibit habitat characteristics suitable for the potential presence of Red Data species are considered sensitive.

2.5 RATING SCALE FOR FLORAL AND FAUNAL SENSITIVITY

Floristic and/or Faunal Sensitivity Values are expressed as a percentage of the maximum possible value and placed in a particular class or level, namely:

- High: 80 – 100%
- Medium/high: 60 – 80%
- Medium: 40 – 60%
- Medium/low: 20 – 40%
- Low: 0 – 20%

High Sensitivity Index Values indicate areas that are considered pristine, unaffected by human influences or generally managed in an ecological sustainable manner. Nature reserves or even well managed game farms typify these areas.
Low Sensitivity Index Values indicate areas of poor ecological status or importance in terms of floristic attributes, including areas that have been negatively affected by human impacts or poor management.
Each unit is subjectively rated on a scale of **1 to 10 (Sensitivity Values)** in terms of the influence that the particular Sensitivity Criterion has on the floristic or faunal status of the plant or animal community / habitat.

2.6 FAUNAL ASSESSMENT – SPECIES OF CONSERVATION CONCERN

Literature was reviewed and relevant experts contacted to determine which faunal species of conservation concern (which include Red Data Listed (RDL) species) are present, or likely to be present, in the study area.
A snapshot investigation of an area presents limitations in terms of locating and identifying RDL fauna species. Particular emphasis was therefore placed on the identification of habitat deemed suitable for the potential presence of RDL fauna species by associating available habitat to known habitat types of RDL species. The verification of the presence or absence of these species from the study area is not perceived as a complete or fundamental part of site investigation as a result of project limitations.

2.7 FAUNA RED DATA SENSITIVITY INDEX SCORE (RDSIS)

Field investigations limited to a few days can seldom, if ever, be comprehensive in terms of identifying all faunal species, let alone Red Data Listed (RDL) Species and/or priority species. Included is the reality that many faunal species are highly mobile and might be moving in and out of an area, which makes observing these species sometimes incidental and fortunate, depending largely on time and chance. Added to this are the species that are primarily nocturnal in nature.
For the above reasons, the Red Data Sensitivity Index Scoring (RDSIS) method for fauna is widely used by specialists involved in EIAs, specialist studies, etc. The RDSIS methodology provides a calculated indication for the potential of certain red data or priority species occurring in the study area. The index is based on historical data, present presence of ideal habitat and food sources, general inferences on the landuses of the region and the Specialist's knowledge and experience.

2.7.1 PROBABILITY OF OCCURRENCE (POC)

Known distribution range (D), habitat suitability of the site (H) and availability of food sources (F) on site is determined for each of the species. Each of these variables is expressed a percentage (where 100% is a perfect score). The average of these scores provides a POC score for each species.
The POC is calculated as follows:
POC = (D+H+F) / 3
The POC value is then categorised as follows:

- 0-20% = Low

- 21-40% = Low / Medium
- 41-60% = Medium
- 60-80% = Medium/High
- 81-100% = High

2.7.2 TOTAL SPECIES SCORE (TSS)

Species with a POC score of more than 60% (Medium/High) are considered when applying the RDSIS. A weighting factor is assigned to the different IUCN categories providing species with a higher conservation status, a higher score. This weighting factor is then multiplied with the POC to calculate the total species score (TSS) for each species.

The weighting assigned to each category rating is as follows:

Status Category	Abbreviation	Weighting
Data deficient	DD	0,2
Rare	RA	0,5
Near Threatened	NT	0,7
Vulnerable	VU	1,2
Endangered	EN	1,7
Critically Endangered	CR	2,0

The TSS is calculated as follows:

TSS = (IUCN weighting x POC) where POC is > 60%.

2.7.3 AVERAGE TOTAL SPECIES & AVERAGE THREATENED TAXA SCORE

The average of the Total Species (TSS) potentially occurring on the site is calculated. The average of all the Threatened Taxa (TT) (Near threatened, Vulnerable, Endangered and Critically Endangered) TSS scores are also calculated. The average of these two scores (Av.TSS and Av.TT) is then calculated in order to add more weight to threatened taxa with POC higher than 60%.

The average is calculated as follows:
Average = (Avg. TSS [TSS / Tot. Species] + Av.TT [TTS / No. of species]) / 2

2.7.4 RED DATA SENSITIVITY INDEX SCORE (RDSIS)

The average score obtained above and the sum of the percentage of species with a POC of >60% of the total number of Red Data Listed species listed for the area is then calculated. The average of these two scores, expressed as a percentage, gives the RDSIS for the area investigated.
The RDSIS is calculated as follows:
RDSIS = (Average + [Spp. with POC >60% / Total No. of Spp*100]) / 2

The RDSIS Category ratings are as follows:

RDSIS Score	Category Rating
0 – 20%	LOW
21 – 40%	LOW / MEDIUM

41 – 60%	MEDIUM
61 – 80%	MEDIUM / HIGH
81 – 100%	HIGH

2.8 IMPACT ASSESSMENT

2.8.1 Scoring Method

The impact assessment takes into account the nature, scale and duration of the effects on the natural environment and whether such effects are positive (beneficial) or negative (detrimental). A scoring method (rating system) is applied to the potential impact on the affected environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each issue the following criteria are used and points awarded as shown in the table below (Table 1)

Table 1: Scoring Method for Impact Assessment

Magnitude (Intensity)	**Duration**
10 - Very high/unknown	5 - Permanent
8 - High	4 - Long-term*
6 - Moderate	3 - Medium-term (5-15 years)
4 - Low	2 - Short-term (0-5 years)
2 - Minor	1 - Immediate
0 - None	0 - None
Scale (Extent)	**Probability**
5 – International	5 – Definite / Unknown
4 – National	4 – Highly probable
3 – Regional	3 – Medium probability
2 – Local	2 – Low probability
1 - Site only	1 – Improbable
0 – None	0 – None

* Impact ceases after operational life of the activity

Once the above factors had been ranked for each impact, the overall risk (environmental significance) of each impact will be assessed using the following formula:

SP = [Magnitude (M) + Duration (D) + Scale(S)] x Probability (P).

The maximum value is 100 significance points (SP). Environmental impacts will be rated as either that of High, Moderate or Low significance on the following basis:

- SP ≥60: Indicates **high** environmental significance;
- SP 31 ≥ 59: Indicates **moderate** environmental significance;
- SP ≤ 30: Indicates **low** environmental significance.

2.8.2 Criteria for the classification of an impact

Extent (Scale)

Considering the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- Site: Within the construction site
- Local: Within a radius of 2 km of the construction site
- Regional: Provincial (and parts of neighboring provinces)
- National: The whole of the country
- International: Impact is across countries

Duration

Indicates what the lifetime of the impact will be.

- Immediate: The impact will either disappear with mitigation or will be mitigated through natural process in a time span shorter than the construction phase.
- Short-term: The impact will either disappear with mitigation or will be mitigated through natural process within 0 – 5 years.
- Medium-term: The impact will either disappear with mitigation or will be mitigated through natural process within 5 – 15 years.
- Long-term: The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. Impact ceases after the operational life of the activity.
- Permanent: The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

Intensity / Magnitude

Describes whether an impact is destructive or benign.

- Low: Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.
- Medium: Effected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way.
- High: Natural, cultural and social functions and processes are altered to extent that they temporarily cease.
- Very high / Unknown: Natural, cultural and social functions and processes are altered to extent that they permanently cease.

Probability

Probability is the description of the likelihood of an impact actually occurring.

- Improbable: Likelihood of the impact materialising is very low.
- Low probability / possible: The impact may occur.
- Medium probability: It is more than likely that the impact will occur.
- Highly probable: High likelihood that the impact will occur.

- Definite / Unknown: The impact will definitely (most certainly) occur, or is unknown and therefore needs to be afforded a high probability score.

Significance
Significance (environmental significance) constitutes the overall risk and is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both the physical extent and the time scale and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Status
Status gives an indication of the perceived effect of the impact on the area.

- Positive (+): Beneficial impact.
- Negative (-): Harmful or adverse impact.
- Neutral Impact (0): Neither beneficial nor adverse.

It is important to note that the status of an impact is assigned based on the *status quo.* That is, should the project not proceed. Therefore not all negative impacts are equally significant. The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented

3 RECEIVING ENVIRONMENT

3.1 STUDY SITE LOCATION

The study site is located at the existing Eskom Cuprum Substation. The study site is at Copperton, which is north of the R357 and approximately 54km southwest of the Town of Prieska. The site is within the Siyathemba Local Municipality of the Pixley ka Seme District Municipality, Northern Cape Province (Figure 1, Figure 2).

- Study Site (Approximate centre): 29°57'37.95"S; 22°18'0.80"E.
- Eskom Cuprum Substation: 29°57'33.44"S; 22°18'1.08"E.
- Quarter Degree Square (QDS): 2922CD.
- Quaternary Drainage Area (QDA): D54D.

Figure 3, below, shows the position of the main project components within the impact area (study site). The Cuprum Substation will be extended slightly in a westerly direction and the Battery Energy Storage System (BESS), will be constructed and placed south of the substation and west of offices and other buildings.

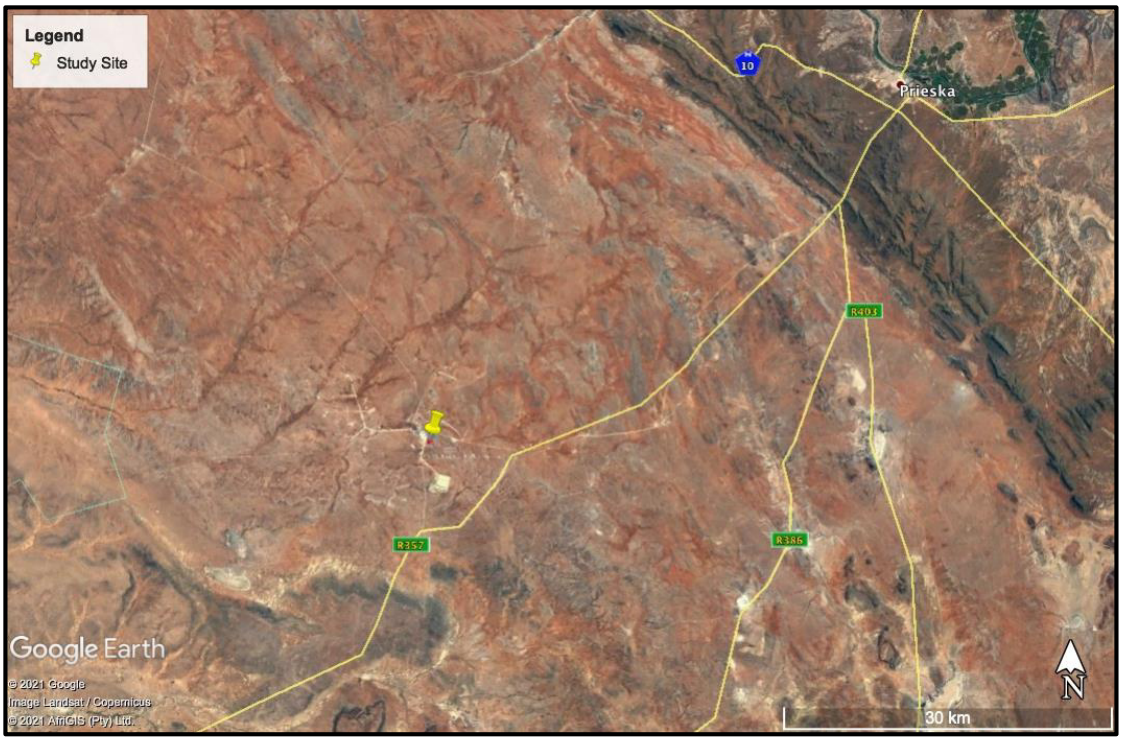


Figure 1: Site location

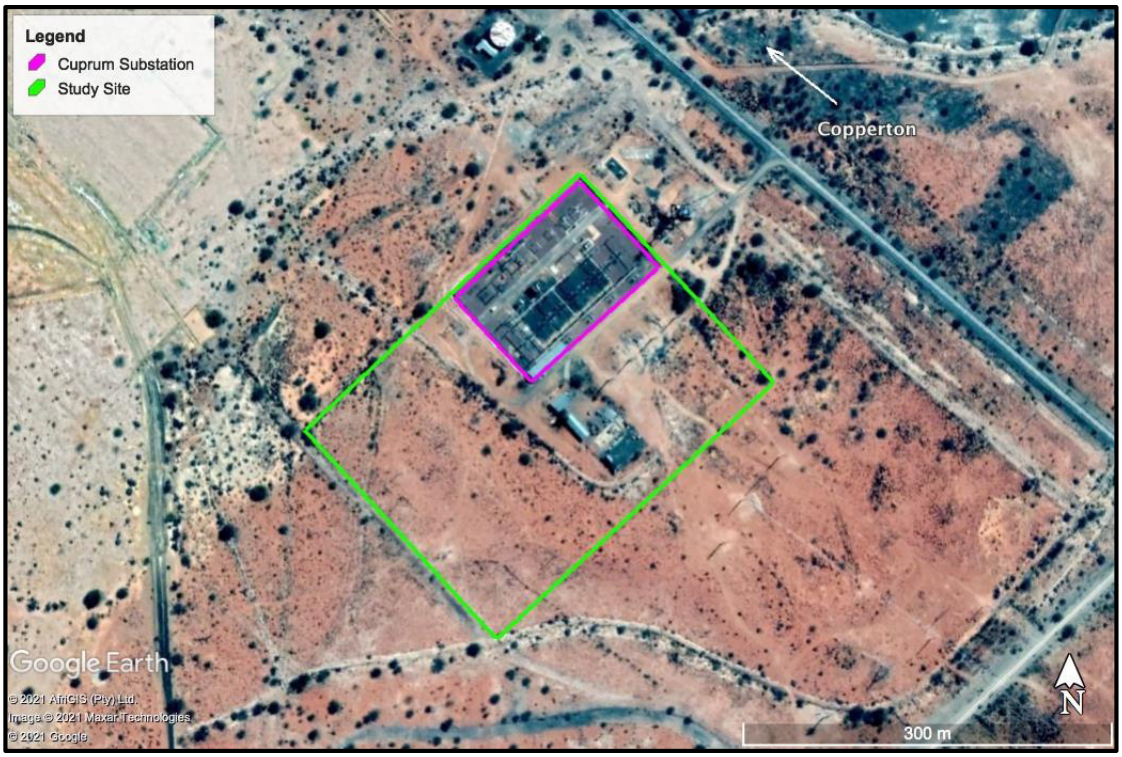


Figure 2: Study Site

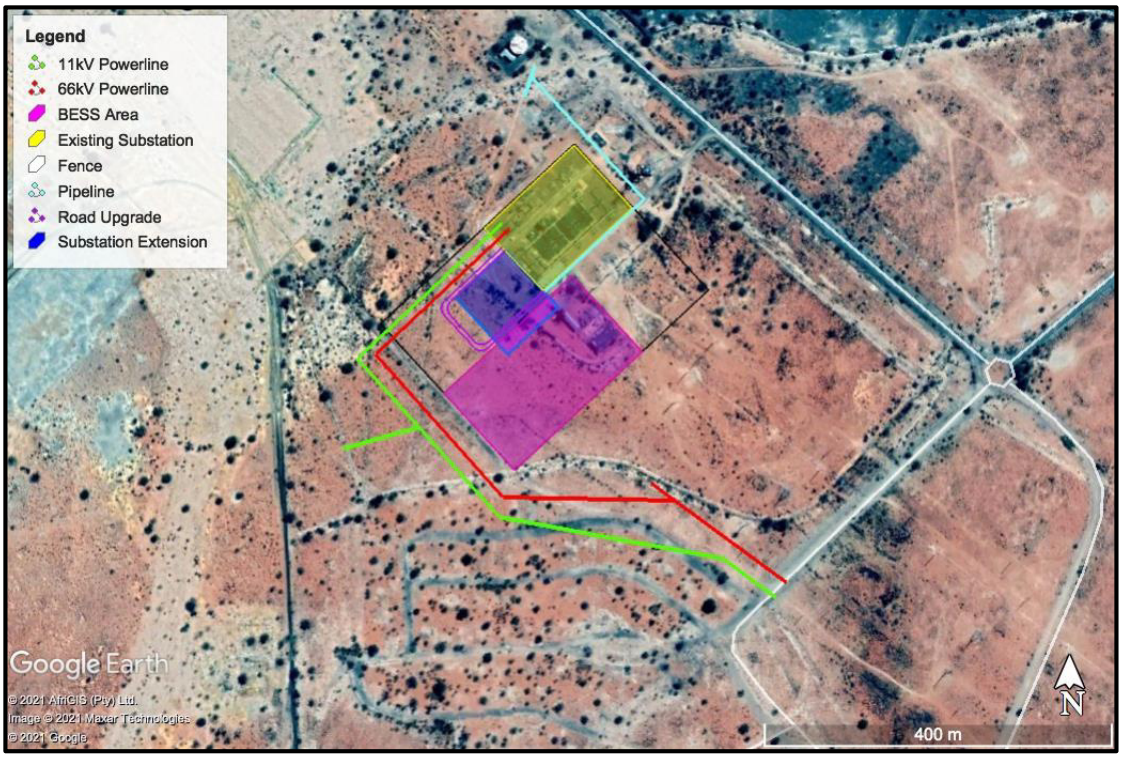


Figure 3: Study Site showing actually project areas

3.2 TOPOGRAPHY

The topography of the area is that of very flat to slightly undulating open Karoo plains. There are no significant rocky outcrops (koppies), rocky ridges, hills or valleys within the study area or immediate surrounding areas. The average height above sea level of the study site is about 1 081m, with a maximum and minimum of 1 082m and 1 079m, respectively. The average downward gradient (slope) is from southeast to northwest and only varies between 1,2% to 0,8%.

3.3 GEOLOGY AND SOILS

The geology of the surrounding Bushmanland Basin is that of mudstones and shales of the Ecca Group (Prince Albert and Volksrust Formations) and Dwyka tillites. About 20% of rock outcrop is formed by Jurassic intrusive dolerite sheets and dykes. Soils are shallow Glenrosa and Mispah forms, with lime generally present in the entire landscape and, to a lesser extent, red-yellow apedal, freely drained soils with a high base status and usually <15% clay. The salt content in these soils is very high (Mucina & Rutherford, 2006). The general soil description is that of strongly saline soils, which generally occur in relatively deep deposits in low lying arid areas. The soils are mostly freely drained, structureless soils (www.bgis.sanbi.org).

3.4 CLIMATE

The study site is situated within the broad low rainfall region of 201mm – 400mm per annum (Figure 4). The average annual rainfall at Copperton and the study site is approximately 224mm per year, which is on the arid, semi-desert side of the rainfall spectrum compared to the east at 400mm per year. The rainfall is however unpredictable within the region.

The site is within the Arid Interior Climatic Zone of South Africa, where the summers are hot to very hot and the winter nights cold to very cold, but with sunny and temperate to warm winter days.
Average summer temperatures range between 22^0C – 33^0C, while winter temperatures range between 7^0C – 17^0C

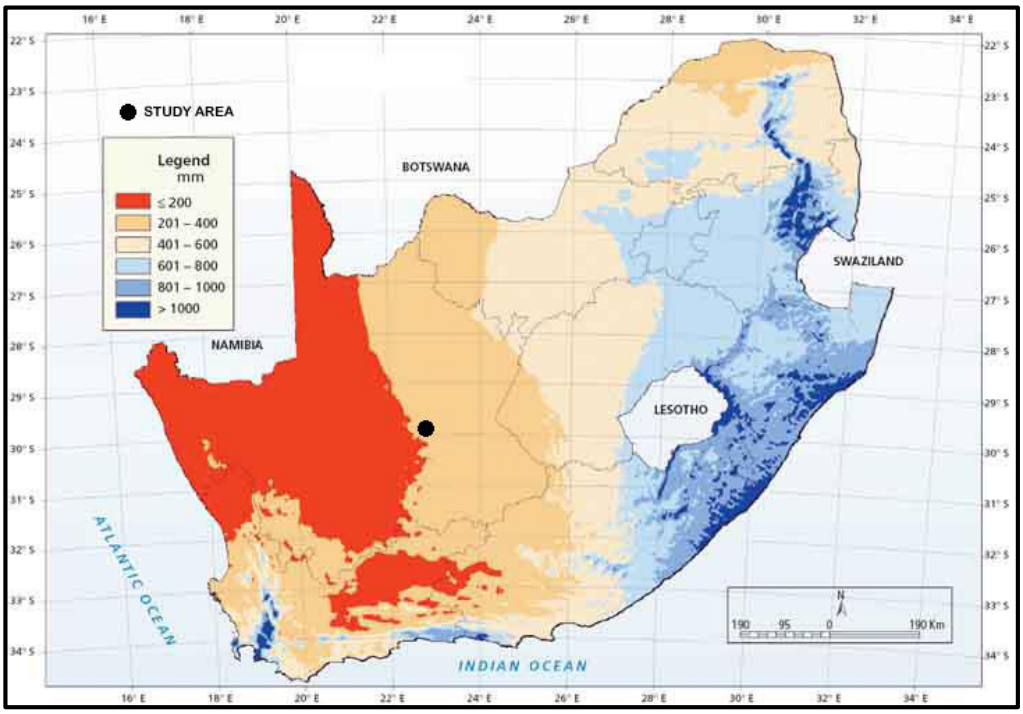


Figure 4: Rainfall zones of South Africa

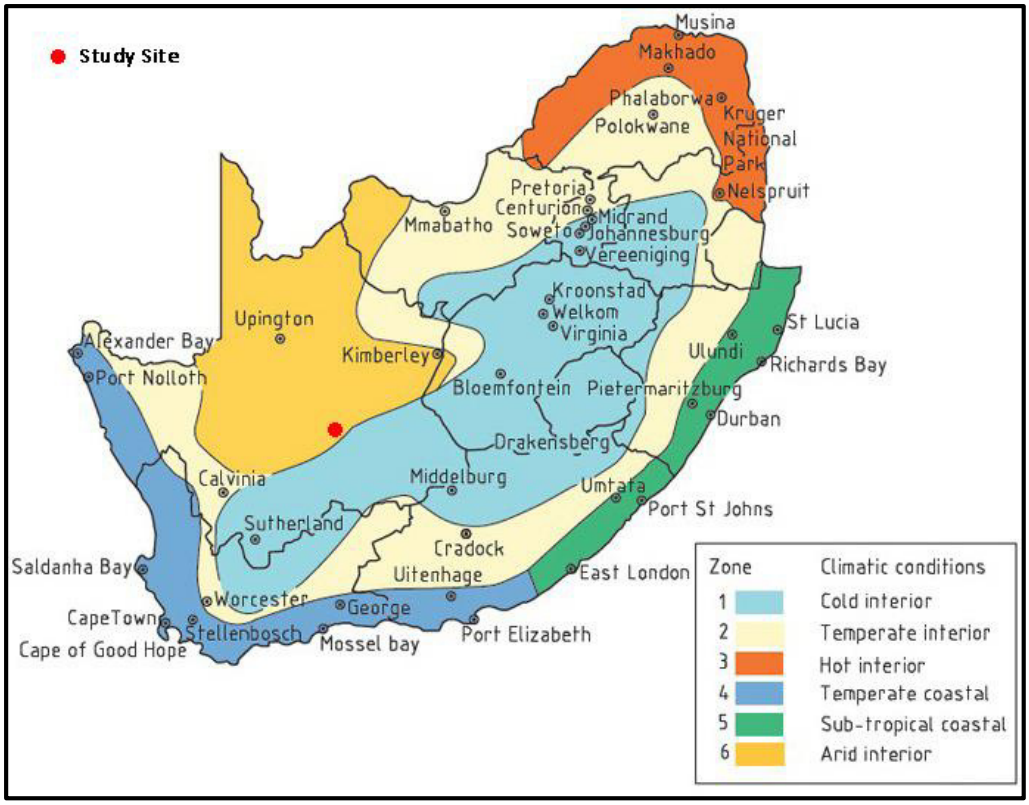


Figure 5: Climatic Zones of South Africa

3.5 LANDCOVER

The landcover or landuse of the region is predominantly that of large open grazing farmlands for livestock (especially sheep), mines and low levels of urbanisation, except for the small towns. The landuse of the study area and immediate surroundings is that of extensive mining operations to the immediate north, a solar farm to the south east, a wind farm to the east, and the Eskom Substation with associated buildings at the study site itself.

3.6 WATERCOURSES IN THE STUDY AREA

There are no watercourses in the study area.

Basterspu-se-Leegte is the closest stream / river to the site, which is approximately 1,2km north of study site (Figure 6). The 'river' is non-perennial, highly ephemeral in nature, and dry for most of the year and almost never flows from end-to-end. Baster-se-Leegte 'flows' from east to west and has been totally destroyed and cut off where it flows through the mining area in Copperton (Figure 7). Approximately 200m to 250m west and north of the study site are markings of stormwater surface waterflow (sheet flow) over the years. These have created notable white markings, along with dolomitic soils and geology, but are not distinctive watercourses and alter depending on various factors such as construction of roads, houses or mining in the area, such as found north of the site.

There are also no saltpans or other types of wetlands within a 500m radius of the outer boundaries of the study site. Saltpans are common and sensitive features within the greater region. Official guidelines require aquatic assessments investigate whether there are wetlands within a 500m radius of the study site, which is not the case for other watercourses such as rivers or streams.

According to NFEPA (National Freshwater Ecosystem Priority Areas) maps and datasets (www.bgis.sanbi.org) and National Wetland Map 5 (2018), there are no NFEPA watercourses in the study site, with the closest one being the non-perennial and highly ephemeral river, Basterspu-se-Leegte, which is north of the study site (Figure 6).

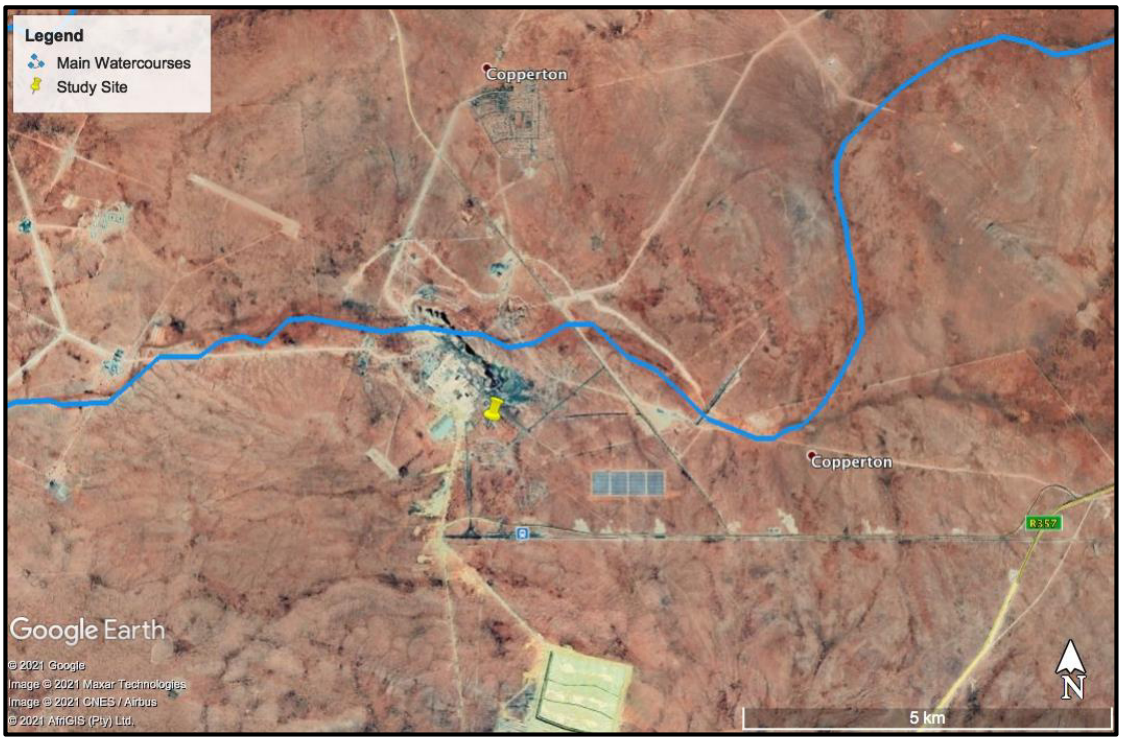


Figure 6: Main Watercourses in the area

Figure 7: Watercourse in the area north of the study site

3.7 VEGETATION

The study site and surrounding areas are within the Nama-Karoo Biome of South Africa (Figure 8). The site is within the Bushmanland Bioregion and within the original extent of the veldtype known as **Bushmanland Basin Shrubland**.

South Africa is divided up into nine Biomes. The vegetation fo the Nama-Karoo Biome is characterised by a dominance of small microphyllous shrubs, particularly from the Asteraceae (Daisy family). The Biome is a complex of extensive plains, dominated by low (dwarf) shrubs (generally <1 m tall) intermixed with grasses, succulents, geophytes and annual forbs. Small trees occur only along drainage lines or on rocky outcrops—habitats with special hydropedological microclimatic characteristics (Mucina & Rutherford, 2006). Grasses form an important component of the ecosystems. As with the Succulent Karoo, the Nama Karoo is too arid for extensive or commercial cultivation, but has been negatively impacted through overgrazing of livestock. Although to date the Nama-Karoo has not been subject to significant levels of transformation, there are significant threats to the Biome presented by potential mining in the minerals and petroleum industries (WCBSPH, 2017). The Nama-Karoo Biome is divided into three broad bioregions, namely: Bushmanland & West Griqualand; Upper Karoo and Lower Karoo.

Table 2, below, shows the hierarchy and classifications of the vegetation of the study area.

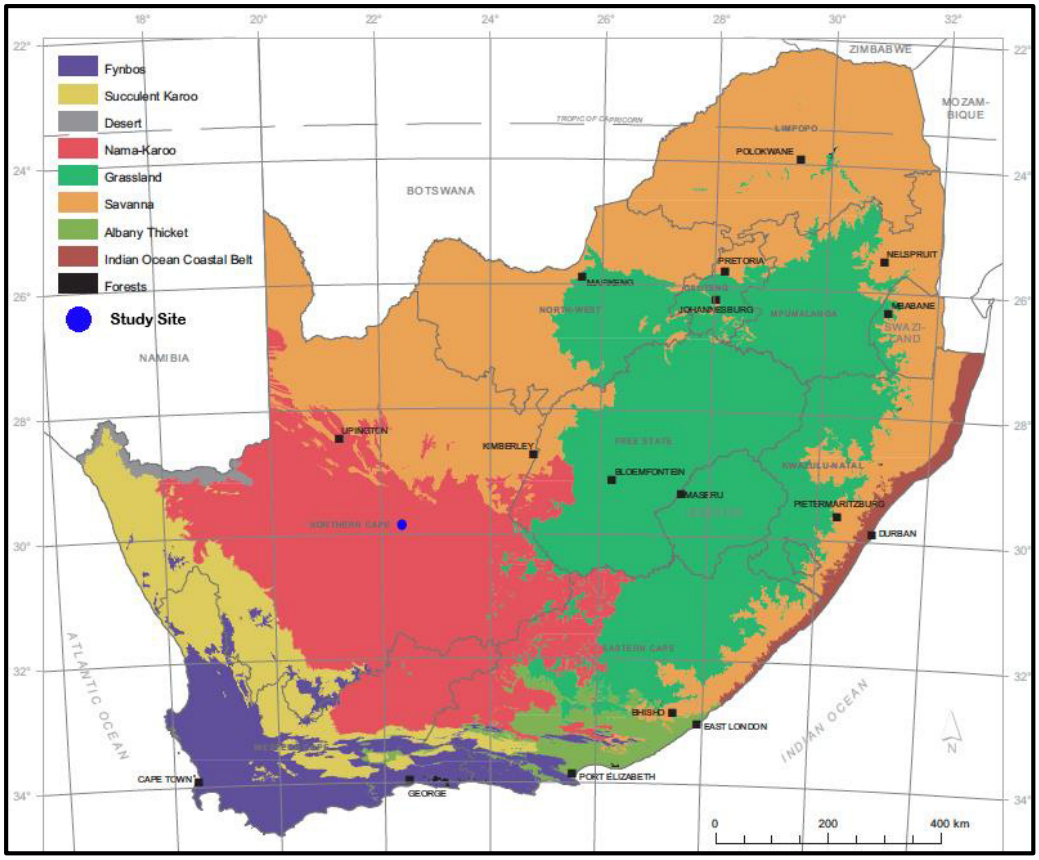


Figure 8: Biomes of South Africa

Table 2: Vegetation classification of the study site

Category Description	Classification
Biome	Nama-Karoo
Bioregion	Bushmanland
Vegetation Types	Bushmanland Basin Shrubland

The veld type, Bushmanland Basin Shrubland, is also known as Bushmanland Nama Karoo (Low & Rebelo, 1998) and Desert False Grassveld (Acocks, 1988).

Bushmanland Basin Shrubland is characterised by slightly irregular plains with dwarf shrubland dominated by a mixture of low sturdy and spiny (and sometimes also succulent) shrubs (*Rhigozum*, *Salsola*, *Pentzia*, *Eriocephalus*), 'white' grasses (*Stipagrostis*) and in years of high rainfall also by abundant annuals such as species of *Gazania* and *Leysera* (Mucina & Rutherford, 2006).

The Bushmanland Basin, in which the study site and veld type (Bushmanland Basin Shrubland) are situated, forms an environment for a number of endorheic pans (Vloere) and extensive systems of intermittent river channels (including that of the Sak River). The vegetation of the large Bushmanland Basin shows increased presence of shrubs (especially succulents) and plant indicators of high salt status of soil.

Much of the vegetation in the study site was badly disturbed to moderately disturbed, with no areas of good quality shrubland present. This is to be expected as the study site is situated within and adjacent to a substation, and within a mining area, which is highly degraded and impacted. During field investigations no sensitive habitats or priority plant species were observed. It is highly unlikely that any RDL or ODL plant species are present on site. The vegetation on site is mostly scattered low shrubs and grasses, with open sandy and dolomitic stone areas. A few large shrubs and trees are also scattered throughout the area.
A list of the dominant species observed during field investigations is found in the appendices.

3.8 PRIORITY FLORAL SPECIES

No red data listed (RDL) (Critically endangered, endangered or vulnerable) or orange data listed (ODL) floral species were observed during field investigations within the study area. None are expected to occur.

3.9 CONSERVATION STATUS

Bushmanland Basin Shrubland is not a threatened veld type / ecosystem. The conservation status (or threat status) is that of Least Threatened (LT) (bgis.sanbi.org.za) (Table 3).

Table 3: Veld Type Status

Veldtype	Status	Info
Bushmanland Basin Shrubland	Least Threatened (LT)	None of the veld type is conserved in statutory conservation areas. No signs of serious transformation, but scattered individuals of *Prosopis* sp. (Mesquite bush) occur in some areas (e.g. in the vicinity of the Sak River drainage system), and some localised dense infestations form closed 'woodlands' along the eastern border of the vegetation unit with Northern Upper Karoo (east of Van Wyksvlei). (Mucina & Rutherford, 2006, 2010)

Table 4 below, gives a basic description of the status categories. The Biodiversity Act, 2004 (Act No.10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or protected. The main purpose for the listing of threatened ecosystems is an attempt to reduce the rate of ecosystem and species destruction and habitat loss, leading to extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems (SANBI).

Table 4: Ecosystem Status: Simplified explanation of categories used

STATUS	% Transformed	Effect on Ecosystem
Least Threatened (LT)	0-20% (<20% loss)	No significant disruption of ecosystem functions
Vulnerable (VU)	20-40% (>20% loss)	Can result in some ecosystem functions being altered
Endangered (EN)	40-60% (>40% loss)	Partial loss of ecosystem functions

Critically Endangered (CR)	>60% or BT Index for that specific veldtype	Species loss. Remaining habitat is less than is required to represent 75% of species diversity

Source: South African National Spatial Biodiversity Assessment Technical Report. Volume 1: Terrestrial Component. 2004. SANBI. Mucina & Rutherford (eds) (2010).

Note: BT stands for the Biodiversity Threshold and is an index value that differs for each veldtype. In other words, because the composition, recovery rate, etc. differs for each veldtype there will be a different threshold (in this case percentage transformed) at which species become extinct and ecosystems breakdown. That is, at which point the veldtype is critically endangered.
Figure 9 uses the term 'Least Concern' which is similar to that of 'Least Threatened'.

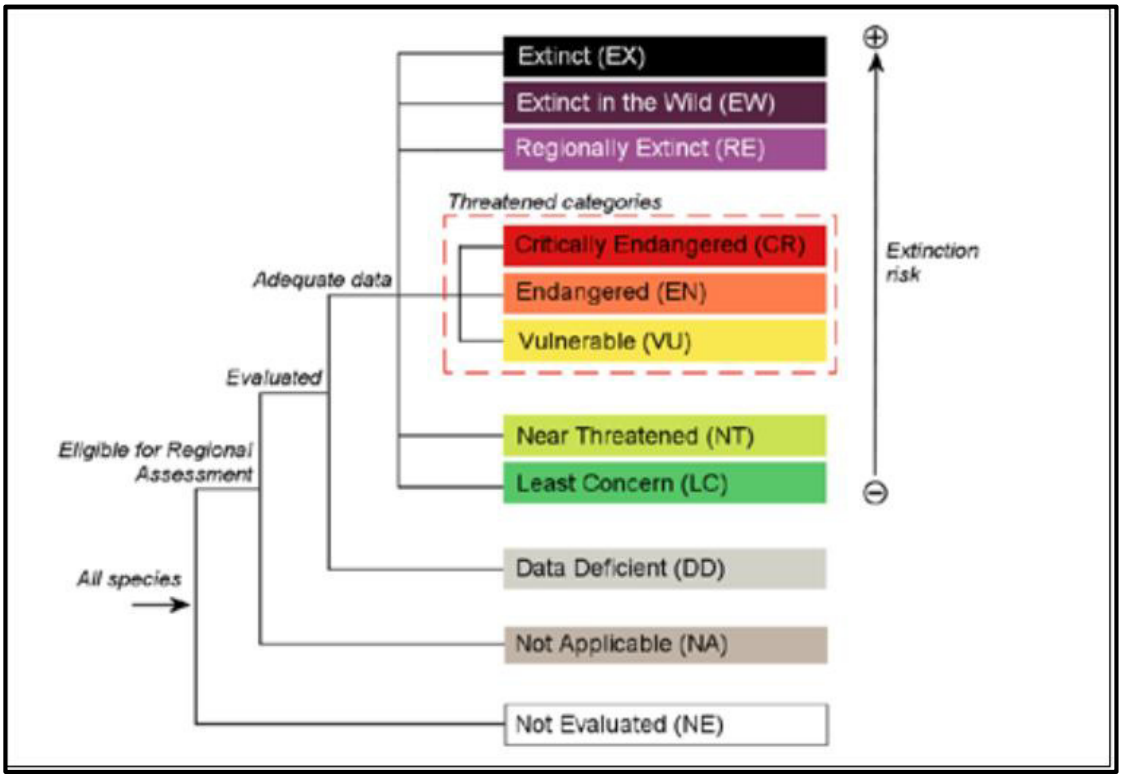


Figure 9: Structure of categories used at the regional level

3.10 PLANTS IDENTIFIED DURING FIELD INVESTIGATIONS

The main and dominant plant species identified during field investigations are listed in the appendices.

3.10.1 Alien plants identified in the Study Area

There is no infestation of alien weeds in the study area. There are only a few scattered common weeds found on site and in the area, including mesquite bush (*Prosopis glandulosa var. torreyana*). Mesquite is a highly invasive alien weed in arid regions. It is found scattered as bushes which can get fairly large. The main alien plant species encountered in the greater and study area are recorded, along with their category rating below, in Table 5. The categories are as set out in the Conservation Act of Agricultural Resources Act, 1983 (CARA) (Act 43 of 1983).

Table 5: Alien plants

Botanical Name	Common Name	Category
Argemone ochroleuca	White-flowered Mexican poppy	1
Malva verticillata	Mallow	-
Prosopis glandulosa	Honey Mesquite	2
Ricinus communis	Castor oil plant	2

3.11 Fauna

Wild, free-roaming fauna most likely to be found in the area and occasional on the study site include small antelope such as Steenbok, Mongoose, Bat-eared Foxes, Black-backed Jackals, Caracal, Aardvark, various common snakes, and various bird species. Animals recorded in the greater area during other ecological studies include Springbok (although unlikely to occur in the study area), Black Korhaan, Meerkat, Pied Crow, and various pipits and larks. Black-Footed Cat (also called the Small Spotted Cat) and Brown Hyena have been seen on rare occasions in the greater area. The IUCN Red List lists the Black Footed Cat as Vulnerable and the Brown Hyena is listed as Near Threatened (IUCN, 2011). The Black-footed Cat is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds, and hence is likely to breed and feed in the area. The Brown Hyena is more likely to be an occasional visitor to the area as its presence would have been noticed by local farmers due to its relatively large size and it is likely the local farmers would have tried to kill any hyena based on common negative perceptions of this animal (Aurecon, 2012).

3.11.1 Mammals

There are approximately 300 mammal species in South Africa, with about 100 species found in the Northern Cape. Species in include lion, cheetah, leopard and hyena, but most of these are found in protected areas (Nature Reserve) in the province. No large- or medium-sized mammals were observed during field investigations. A few small burrows were found scattered in the area, which appear to be used by small field mouse, scrub hare and mongoose. Larger burrows / holes typically dug by Aardvark were not observed in the study area. Aardvark is a protected species (TOPS listed species with NEMBA, but with a regional red listing (2016) of Least Concern). There are a number of common species of wild animals and mammals present in the greater area, but will mostly shy away from the area of the study site due to large mining activities / human activities and noise in the surrounding area.

It is not possible to conduct an accurate survey of faunal species and their presence during limited site investigations. Therefore, standard and acceptable probability assessments were conducted (as mentioned in the methodology and as shown below) for mammals to give an indication of potential presence and sensitivities.

3.11.2 RDSIS for mammals in the study area

The Red Data Sensitivity Index Score (RDSIS) was calculated for the study area using the methodology described above in the chapter on Methodology. The IUCN Red List of Threatened Species was also consulted via the official website (www.iucnredlist.org).

The Probability of Occurrence (POC) is the probability of the faunal species **occurring in the study area**. The calculated POC of the mammal species is calculated by taking the animal's historical distribution, present habitat availability and present food source into account.

The Red Data Sensitivity Index Score (RDSIS) for the study area's potential Red Data Listed (RDL) mammals yielded an average score of 36,5%, indicating a '**Low/Medium**' index score of importance or occurrence with regards to RDL mammal species within the general vicinity of the study area. All species with a Probability of Occurrence (POC) of 60% or more have an increased probability of either permanently or occasionally inhabiting the study area or using the study area as a corridor for movement between habitats and areas. The species with a POC of 100% are those species that were observed during field investigations. Table 6, below, is a summary of the main calculated indices for the RDSIS for the study area in terms of Red Data Listed Mammal Species. The rating levels and descriptions are found in the chapter on Methodology and in the table below

Table 6: RDSIS for Mammals for the study area

RED DATA SENSITIVITY INDEX SCORE (RDSIS)	
Average Total Species Score	29,3%
Average Threatened Taxa Score	84,5%
Average of the combined Total Species and Threatened Taxa Scores	56,9%
% of Species with a Probability of Occurrence of >60%	16%
RDSIS for the Study Site	**36,5&**
RDSIS Category for Study Site	**LOW / MEDIUM**

Table 7: RDSIS Rating & Description (Mammals)

RDSIS Rating	Description
0-20	Low
21-40	Low/Medium
41-60	Medium
61-80	Medium/High
81-100	High

3.11.3 Avifuana

Over 200 bird species, including 15 red-listed species, 66 endemics, and five red-listed endemics potentially occur in the broader region in which the study site is situated. The birds which potentially will be impacted the most in terms of the project and the substation site are likely to be (i) large terrestrial birds foraging on or commuting over the study site and immediate area, such as Ludwig's Bustard (*Neotis ludwigii*), Kori Bustard (*Ardeotis kori*), Northern Black Korhaan (*Afrotis afraoides*) and Karoo Korhaan (*Eupodotis vigorsii*); (ii) raptors foraging and/or nesting in the area, such as Martial Eagle (*Polemaetus bellicosus*), Tawny Eagle (*Aquila rapax*), Lanner Falcon (*Falco biarmicus*), and Secretarybird (*Sagittarius serpentarius*); and (iii) a suite of endemic passerines, including, Red Lark (*Calendulauda burra*) and Sclater's Lark (*Spizocorys sclateri*) (Aurecon, 2012).

However, due to existing impacts of the Eskom substation the study site does not have ideal habitats for nesting, breeding and foraging. The study site and immediate area is not particularly rich in avifauna numbers and diversity due to fairly uniform habitats and more importantly due to surrounding impacts and activities of the nearby Copperton Mine. The lack of open bodies of permanent water and saltpans also limits bird activity and numbers in the immediate area of the study site.

No priority birds were observed on the study site or present in the immediate area during field investigations. However, it must be stressed that field survey times were limited, which will have an impact on observations. A number of previous ecological studies in the area were also reviewed and their findings noted as supplementary data to this study.

It is important to note that they study site is not within an Important Bird Area (IBA) or within close proximity to one. The closest IBA is the Platberg-Karoo Conservancy IBA, which is situated approximately 150km southeast. This been said it is still recognised that many birds, including large raptors (many of which are priority species) are highly mobile and can cover vast distances in flight during foraging and general migration.

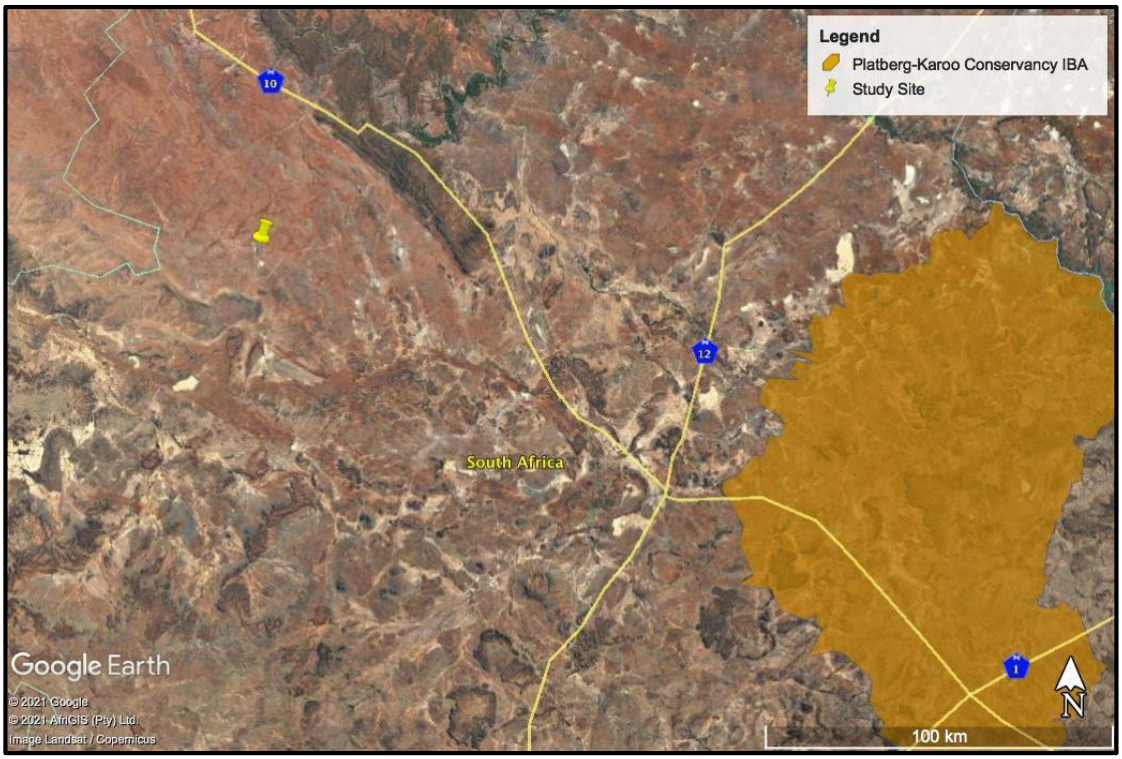


Figure 10: Important Bird Areas (IBAs)

3.11.4 Reptiles

No reptiles were observed during field investigations. Lizards tend to prefer rocky habitats and there are no rocky outcrops (koppies), rocky ridges or areas of large rock sheets directly within the study area. The likelihood is rare that any priority lizard species will be present in the study area, but some common plated lizards and agamas may be present.

No frog species are expected to reside or occur regularly on the study site.

Snakes tend to be more mobile and adaptable to various and altered environments. It is more than likely that a few common species will be present in the area and occasional on the study

site as well. Priority species, such as the African Rock Python (*Python natalensis*) are not found on the study site or immediate surrounding area.

3.11.5 Invertebrates

Invertebrates such as spiders, scorpions and butterflies are important faunal groups, but are very difficult to properly assess in a short time period. During field investigations specific attention was given to priority species such as Mygalomorphae arachnids (Trapdoor and Baboon spiders) and red data butterflies. The nature and scope of the project is such that it will have low to negligible negative impact on these species should they occur. No priority species were observed.

3.11.6 Faunal species of conservation concern

During field investigations no faunal species of conservation concern were encountered. The general habitats of the study site and immediate surroundings are not ideal for most priority faunal species (species of conservation concern). Table 8, below, highlights some of the priority species and their likelihood to occur in the study area and immediate surroundings. The nature of the proposed project will have minimal to negligible negative impact outside of the study area and much of the study area is already within a disturbed environment.

Table 8: Priority Faunal Species likely to occur in the area

Species	Common Name	Red Data Status	Preferred Habitat	Habitat Restrictions	Present in Study area
Frogs					
Pyxicephalus adspersus	Giant bullfrog	Threatened	Grassland; savanna	Temporary floodplains, pans	No
Mammals					
Atelerix frontalis	SA hedgehog	Near threatened	Most, broad	Broad	No
Manis temmincki	Pangolin (Scaly anteater)	Vulnerable	Grassland, savanna	Woody savanna, ants, termites	Unlikely
Mellivora capensis	Honey badger (Ratel)	Near threatened	Most, broad	Broad	Likely
Cloeotis percivali	Short-eared trident bat	Critically endangered	Savanna	Caves and subterranean habitat	No
Pipistrellus rusticus	Rusty bat	Near threatened	Most, broad	Woody savanna, large trees	No
Snakes					
Python natalensis	Southern African python	Vulnerable	Ridges, wetlands	Rocky areas; open water	No

The maps below show the Quarter Degree Squares (QDS) that are hotspots for priority faunal species of butterflies, snakes and lizards in South Africa (Figure 11, Figure 12 & Figure 13). The study site is not situated within any hotspots of these three faunal groups.

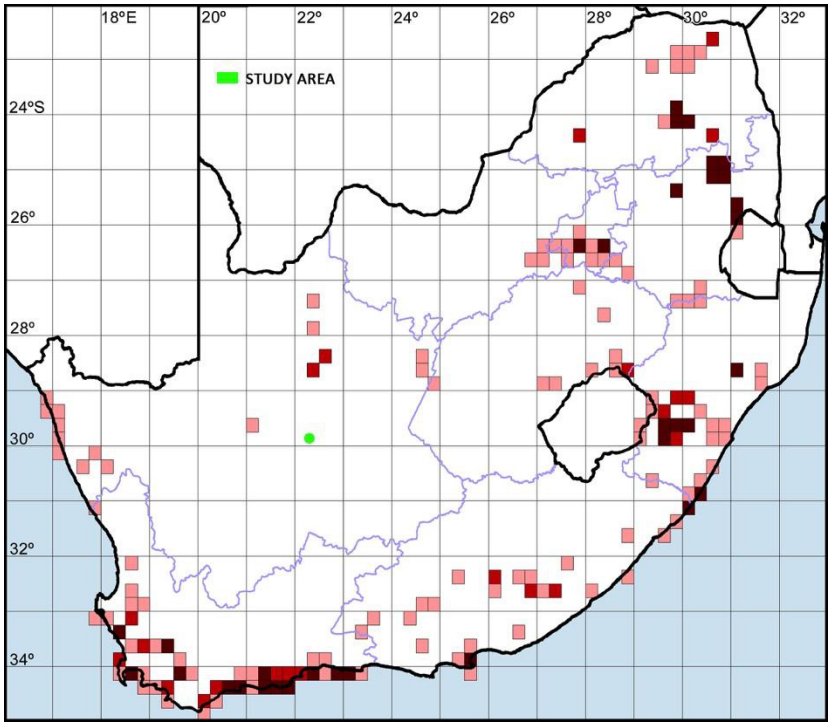


Figure 11: Butterfly hotspots

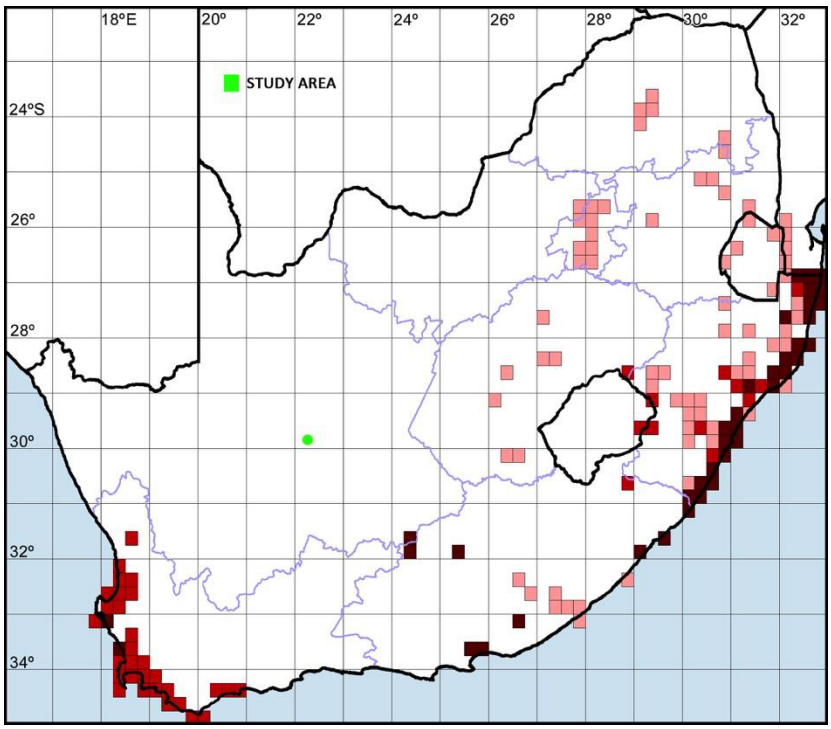


Figure 12: Snake hotspots

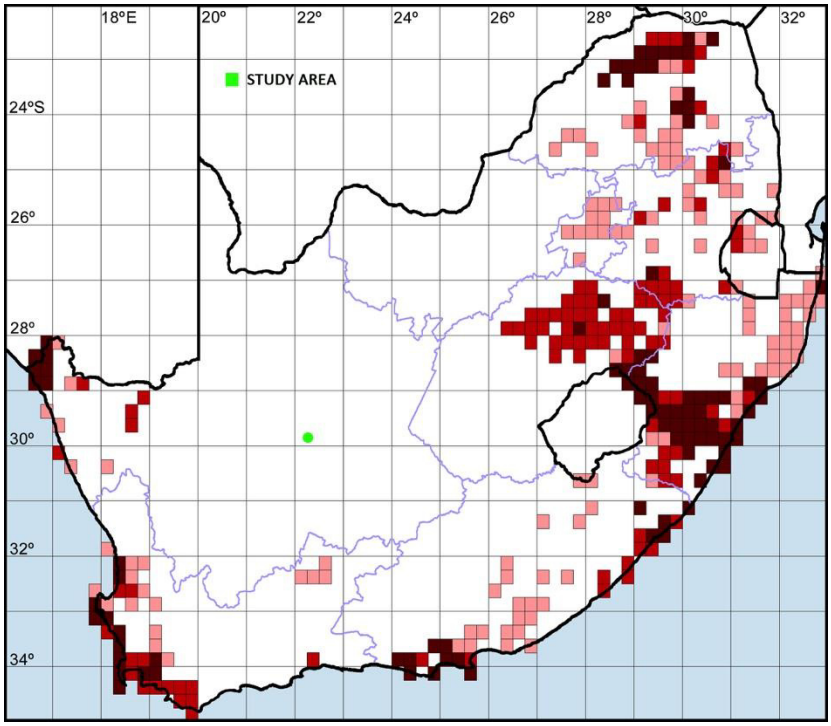


Figure 13: Lizard hotspots

4 SENSITIVITY ASSESSMENT

The sensitivity assessment identifies those areas and habitats within the study area that have a high conservation value and that may be sensitive to disturbance or transformation. All watercourses, including rivers, seasonal streams, drainage lines and wetland areas are, by default, considered sensitive, even if they are in a state of high degradation. Areas or habitats have a higher conservation value (or sensitivity) based on their threatened ecosystem status, ideal habitat for priority species, etc.

The study area and surrounding areas consist of three broad habitats, namely, shrubland, transformed land and dry drainage lines. The floral and faunal sensitivity analyses are shown in the tables below (Table 9 & Table 10).

Table 9: Floristic sensitivity analysis

Criteria	Distinctive habitats		
	Shrubland	Transformed Land	Dry Drainage Lines
Red Data Species	1	1	5
Habitat Sensitivity	5	2	8
Floristic Status	5	2	5
Floristic Diversity	5	2	5
Ecological Fragmentation	4	2	5
Sensitivity Index	40%	18%	56%
Sensitivity Level	Medium	Low	Medium

High: 80% – 100%; Medium/high: 60% – 80%; Medium: 40% – 60%; Medium/low: 20% – 40%; Low: 0% – 20%

Table 10: Faunal sensitivity analysis

Criteria	Distinctive habitats		
	Shrubland	Transformed Land	Watercourses
Red Data Species	5	3	5
Habitat Sensitivity	6	2	8
Faunal Status	6	2	5
Faunal Diversity	6	3	5
Ecological Fragmentation	6	2	5
Sensitivity Index	58%	24%	56%
Sensitivity Level	Medium	Medium/Low	Medium

High: 80% – 100%; Medium/high: 60% – 80%; Medium: 40% – 60%; Medium/low: 20% – 40%; Low: 0% – 20%

4.1 ECOLOGICAL SENSITIVITY ANALYSIS

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature (Table 11).

Table 11: Ecological sensitivity analysis

Ecological community	Floristic sensitivity	Faunal sensitivity	Ecological sensitivity
Shrubland	Medium	Medium	Medium
Transformed Land	Low	Medium/Low	Medium/Low
Dry Drainage Lines	Medium	Medium	Medium

High: 80% – 100%; Medium/high: 60% – 80%; Medium: 40% – 60%; Medium/low: 20% – 40%; Low: 0% – 20%

In reality the overall or combined ecological sensitivity of the study area is 'Medium/Low'. This is because much of the site is disturbed and within a built-up environment within the substation grounds. The fact that the site is within a very disturbed area with large mining operations north and south and a solar photovoltaic operation to the southeast, further reduces sensitivity in terms of movement of wild fauna through the area, loss of vegetation due to fringe impacts and general anthropogenic activities.

However, all watercourses are, by default, considered sensitive and need to be approached as such, depsite levels of degradation. Also any watercourses in and arid region such as the study site is within are oftentimes more sensitive to negative impacts.

4.2 NATIONAL PRIORITY AREAS

The study site is not situated within or close to any national priority areas, including Important Bird Areas (IBAs) and Protected Areas. There are no priority areas, including protected areas within a 10km radius of the study site (Protected Areas Register – www.egis.environment.gov.za).

According to the Protected Areas Register, which is maintained by the Department of Environment, Forestry & Fisheries (DEFF Website - https://portal.environment.gov.za), the study area is not within a protected area. National priority areas include formal and informal (private) protected areas (nature reserves); important bird areas (IBAs); RAMSAR sites; National fresh water ecosystem priority areas (NFEPA) and National protected areas expansion strategy focus areas (NPAES).

4.3 NORTHERN CAPE CBAS & ESAS

Critical biodiversity areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI, 2007). These form the key outputs of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision-making tools. CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services (SANBI).

The study site is not situated within a Critical Biodiversity (CBA) area or Ecological Support Area (ESA).

4.4 DFFE SCREENING TOOL SENSITIVITIES

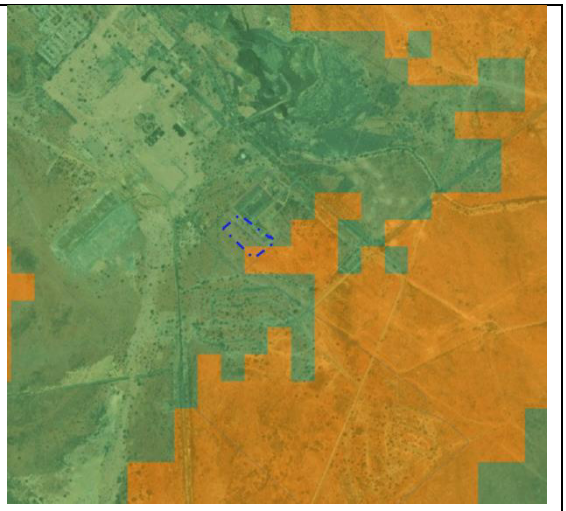
The Department of Forestry, Fisheries and the Environmental (DFFE) has development a desktop screening tool that is important to take into consideration when assessing the sensitivity of a site (www.screening.environment.gov.za). The screening tool incorporates most datasets as produced by DWS, DFFE, SANBI and Provincial Conservation Plans. According to the screening tool (accessed May 2021) the various sensitivities for the study site and immediate surroundings are as follows:

- Animal species: Low & Medium.
- Aquatic biodiversity combined sensitivity: Very High.
- Plant species: Low.
- Terrestrial biodiversity combined sensitivity: Very High.

Figure 14, below, shows the maps / screenshots of the various themes and sensitivities as taken from the Screening Tool assessment.

Combined Terrestrial Biodiversity Sensitivity

Aquatic Sensitivity



Plant Species Theme	Animal Species Theme
Blue Dotted Line: Study Site. Red: High Sensitivity Orange: Medium Sensitivity Green: Low Sensitivity	

Figure 14: DFFE Screening Tool Sensitivities

The Screening Tool is a guideline and desktop assessment that needs to be verified during site investigations (ground-truthed). During site investigations the following were found:

- Animal species: Low & Medium.
- Aquatic biodiversity combined sensitivity: Low.
- Plant species: Low.
- Terrestrial biodiversity combined sensitivity: Low to Medium/Low.

The site investigations by the specialist concur with the screening tool in terms of sensitivities for plant species and animal species. However, the site investigations, and therefore the specialist, dispute that the aquatic and terrestrial biodiversity are 'Very High'. The area is moderately- to highly-disturbed, lacks any watercourses, including saltpans, floodplains, etc; and lacks any levels of biodiversity sensitivity, ideal habitats, pristine ecosystems, etc. The veld type / ecosystem in which the site is situated is also not a threatened ecosystem. Furthermore, much of the study site and surrounding area is highly impacted on. Mining activities in the immediate area have had large negative impacts on the environment. The specialist is therefore of the opinion that the aquatic and terrestrial biodiversity sensitivity should be Low to Medium/Low.

4.5 NORTHERN CAPE CONSERVATION ACT

It is important to take cognisance of the Northern Cape Nature Conservation Act (Act No. 09 of 2009) in which six schedules are outlined. Some of these schedules have relevance to the project, namely:

- Schedule 1: Specially protected species;
- Schedule 2: Protected species;
- Schedule 3: Common indigenous species; and
- Schedule 6: Invasive species.

In general none of the fauna or flora in Schedules 1 & 2 are found permanently in the study site. The study site will also be fenced. However, for simplicity, it is best to state that no wild animals

may be interfered with, trapped or killed. The most likely Schedule 1 & 2 ground animals to wonder through the site are: aardvark (*Orycteropus afer*); bat-eared fox (*Otocyon megalotis*), cape fox (*Vulpes chama*); and side-striped jackal (*Cants adustus*). If any free-roaming fauna wonder through the site it is best to not interfere but simply let them move on. Perimeter fence can then be inspected to see where and how they entered the site and rectified.

A number of protected avifauna species may traverse the area as well. Due to lack of ideal habitat on site, including water, these birds (many of which are medium to large raptors will not remain on site to nest or roost. However, power line pylons do create ideal roosting and nesting sites for a lot of bird species and therefore any new lines forming part of the project must be fitted with bird flight diverters and bird-friendly perches.

No other special requirements within the schedules or the Act itself have relevance to the project.

4.6 SENSITIVITY MAPPING OF THE STUDY AREA

All relevant datasets, DFFE screening desktop assessment guidelines and field investigations were taken into account in determining / calculating the sensitivity mapping of the study site (Figure 15).

Low sensitivity areas are transformed and highly degraded areas within the grounds of the Eskom Substation. All gravel roads and access roads are low sensitivity areas. The substation area to the north and east of the study site is also low sensitivity.

The medium sensitivity area is an area that is also moderately degraded, but has some characteristics of Bushmanland Basin Shrubland and is therefore calculated to be of medium sensitivity. There are no high sensitivity areas within the study area.

Figure 15: Sensitivity Map

5 THE GO, NO-GO OPTION

5.1 POTENTIAL FATAL FLAWS

There are no obvious fatal flaws and the project may proceed.

5.2 CLASSIFICATION CRITERIA

The term '**fatal flaw**' is used to evaluate whether or not an impact would have a 'no-go' implication for the project. In the scoping and impact assessment stages, this term is not used. Rather impacts are described in terms of their potential significance.

A potential fatal flaw (or flaws) from a biodiversity perspective is seen as an impact that could have a "no-go" implication for the project. A 'no-go' situation could arise if residual negative impacts (i.e. those impacts that still remain after implementation of all practical mitigatory procedures/actions) associated with the proposed project were to:

a) Conflict with international conventions, treaties or protocols (e.g. irreversible impact on a World Heritage Site or Ramsar Site);

b) Conflict with relevant laws (e.g. clearly inconsistent with NEMA principles, or regulations in terms of the Biodiversity Act, etc.);

c) Make it impossible to meet national or regional biodiversity conservation objectives or targets in terms of the National Biodiversity Strategy and Action Plan (BSAP) or other relevant plans and strategies (e.g. transformation of a 'critically endangered' ecosystem);

d) Lead to loss of areas protected for biodiversity conservation;

e) Lead to the loss of fixed, or the sole option for flexible, national or regional corridors for persistence of ecological processes;

f) Result in loss of ecosystem services that would have a significant negative effect on lives (e.g. loss of a wetland on which local communities rely for water);

g) Exceed legislated standards (e.g. water quality), resulting in the necessary licences/approvals not being issued by the authorities (e.g. WULA);

h) Be considered by the majority of key stakeholders to be unacceptable in terms of biodiversity value or cultural ecosystem services.

6 IMPACT ASSESSMENT

The impacts of the activities related to the proposed project were rated. There are existing and potential impacts and mitigating measures are recommended to help reduce the sum of the negative impacts (cumulative effect). The impact assessment focuses mainly on the construction phase of the project, but does consider the long-term impact the project may have on the natural environment. The operation phase is only considered in terms of ongoing, routine maintenance after clean up and rehabilitation at the end of the construction phase.

6.1 EXISTING IMPACTS

In terms of the natural ecology of the area, the primary existing negative impacts on the study area are the existing Eskom substation at which the proposed Cuprum BESS project is situated,

along with everyday activities, etc. The large mining operation in the immediate area is a significant source of negative impacts on the immediate area in which the study site is situated.

6.2 POTENTIAL IMPACTS

The potential negative impacts of the proposed project are primarily the loss of natural shrubland due to the construction and lay-down of the proposed Cuprum BESS project. No protected trees or other protected flora will be impacted and there will be no long-term negative impact on the movement of wild fauna in and through the area.

6.3 ASSESSMENT OF POTENTIAL IMPACTS

The assessment of potential impacts on the natural environment arising from the project and related activities is shown below in Table 12.

The scoring method used in the impact assessment is as follows:

Significant (SP) = [Extent (E) + Duration (D) + Magnitude (M)] x Probability (P)

The maximum value is 100 significance points (SP). Environmental impacts will be rated as either that of High, Moderate or Low significance on the following basis:

- SP ≥60: Indicates **high** environmental significance;
- SP 31 ≥ 59: Indicates **moderate** environmental significance;
- SP ≤ 30: Indicates **low** environmental significance.

Further explanation of the assessment methodology is found in the section on methodology

6.4 CUMULATIVE EFFECT

The cumulative effect speaks to the total sum of negative impacts on the natural environment. The cumulative effect looks at the sum of the existing impacts and the new, additional impacts arising from the proposed project and related activities. In general the overall cumulative impact will be 'Low'.

Table 12: Assessment of Potential Impacts

Potential Impacts arising from Project	Phase of Project	Impact Rating					
		Extent	Duration	Magnitude	Probability	Total	Significance
Total Impact of Proposed Project	**Construction Phase: Pre-mitigation**	Local (2)	Short-term (2)	Moderate (6)	Medium (3)	30	**Moderate**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	Site (1)	Immediate (1)	Minor (2)	Improbable (1)	4	**Low**
Mitigating Measures	i. Impacts on the existing natural environment related to the project are '**LOW**' Minimal natural and pristine shrubland will be cleared for the BESS. There are no protected trees or other RDL (Priority plants) on site. Therefore there will be no loss in sensitive or protected species. ii. Any temporary storage, lay-down areas or accommodation facilities to be setup within the property of the Eskom Substation only. No new areas to be cleared of shrubland for temporary laydown areas. iii. Ensure small footprint during construction phase. iv. There is no need for buffer areas or 'no-go' areas. v. As far as possible, only existing roads and access roads to be used. Where access roads need to be upgraded, extended, etc. these roads need to meet with standard construction guidelines. All roads used by vehicles and machinery during the construction phase to be continually maintained. vi. During construction activities dust suppression to be used. This along roads and actually project areas within the Eskom Substation. vii. No wood allowed to be collected from out of the surrounding shrubland / veld for firewood. No trees or shrubs allowed to be cut down or removed if not directly in the footprint of building / construction area. viii. No wild animals allowed to be interfered with. If nests, active burrows, etc. are encountered during construction they are to be cordoned off and a relevant Specialist first contacted as how to proceed. viii. All hazardous materials must be stored appropriately to prevent these contaminants from entering the water environment; ix. All excess materials brought onto site for construction to be removed after construction. x. No open trenches or mounds of soils to be left. xi. Rehabilitation plan for disturbed areas to be compiled and implemented as part of the construction phase. All access roads used during construction to be rehabilitated.						
Cumulative Effect of Project on Terrestrial Ecology	After construction and during operational phase	Local (2)	Short-term (2)	Minor (2)	Low (2)	12	**Low**
Cumulative Effect of Project on Aquatic ecology	After construction and during operational phase	Local (2)	Short (1)	Minor (2)	Low (2)	10	**Low**
Individual Impacts							
		Extent	Duration	Magnitude	Probability	Total	Significance
1. Loss of natural shrubland / flora	**Construction Phase: Pre-mitigation**	Site (1)	Short-term (2)	Low (4)	Medium (3)	21	**Low**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	None (0)	Immediate (1)	Minor (2)	Improbable (1)	3	**Low**

Mitigating Measures	i. No protected trees or other priority plants are within the study site. Therefore none will be destroyed. ii. Most of the project footprint is within disturbed areas. iii. Bushmanland Basin Shrubland is not a threatened veld type. iv. . No endogenous vegetation maybe disturbed without a permit. v. Any priority species encountered must be identified and rescue prior to any excavation or construction activities. vi. Cleared areas for construction must be continually monitored to ensure no potential erosion can occur (if and when it rains). vi. Denuded, areas left undeveloped must be reshaped to existing, prior contours.						
2. Loss or impact on fauna	**Construction Phase: Pre-mitigation**	Site (1)	Short-term (2)	Moderate (6)	Medium (3)	27	**Low**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	Site (1)	Immediate (1)	Minor (2)	Low (2)	4	**Low**
Mitigating Measures	i. Care must be taken not to interact directly with any wild life encountered. ii. Any bird nests encountered, active animal burrows, etc. may not be interfered with. Must be cordoned off and relevant Specialist first consulted on how to proceed.						
3. Habitat loss / habitat destruction	**Construction Phase: Pre-mitigation**	Local (2)	Short-term (2)	Moderate (6)	Medium (3)	30	**Moderate**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Low (4)	Low (2)	14	**Low**
	Operational Phase	None (0)	Immediate (1)	Minor (2)	Improbable (1)	3	**Low**
Mitigating Measures	i. The construction footprint and operation footprint must be kept as small as possible. ii. Fortunately there are no sensitive habitats on site. However, no vegetation, trees, fauna, etc. must be removed or destroyed unless absolutely necessary. iii. All of the mitigating measures put forward in the impact assessment must be implemented as part of reducing the negative impacts and cumulative impact on the natural environment within the project area.						
4. Impeding & Impounding waterflow	**Construction Phase: Pre-mitigation**	Local (2)	Short-term (2)	Low (4)	Medium (3)	24	**Low**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
Mitigating Measures	i. There are no watercourses on site including distinctive drainage lines. ii. There will be no impeding or impounding of watercourses. However, care should still be taken to ensure proper stormwater systems are put in place to prevent impounding natural stormwater surface flow if and when it occurs. iii. Stormwater systems must also ensure that a downpour does not lead to erosion of surface areas.						
5. Erosion	**Construction Phase: Pre-mitigation**	Local (2)	Short-term (2)	Minor (2)	Medium (3)	18	**Low**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	Site (1)	Immediate (1)	Minor (2)	Improbable (1)	4	**Low**
Mitigating Measures	i. All mitigating measures as per Item 3 & 4 have reference to siltation and erosion.						

	ii. Carefully monitoring of construction is essential to locate and mitigate any erosion observed speedily. Investigations must be conducted after every rain downpour. Any problems need to be rectified immediately to avoid problem escalating and siltation of downstream dams and stream occurring.						
6. Introduction & spread of alien invasive weeds	**Construction Phase: Pre-mitigation**	Local (2)	Medium-term (3)	Moderate (6)	Medium (3)	33	**Moderate**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	Site (1)	Immediate (1)	Minor (2)	Low (2)	4	**Low**
Mitigating Measures	i. A site-specific alien weed plan must be compiled for the site. The plan can be basic but must include routine inspection of the whole site and outer perimeters of property (at least once a month); eradication of any weeds found; and basic on-site record-keeping of the plan, inspections, dates, photos, etc. ii. *Prosopis glandulosa var. torreyana* (mesquite; Suidwes-doring) is highly invasive in arid ecosystems. Disturbed areas can quickly become invaded. The alien weed plan must give special attention to this alien shrub species. iii. The construction contractors must implement a site-specific weed erradiction plan and rehabilitation plan of areas after construction. This plan and records of eradication, photos, etc. must be kept in the EMPr and on site during construction phase. This plan may differ from the plan compiled for the long-term operation phase of the project.						
7. Fringe impacts arising from construction phase	**Construction Phase: Pre-mitigation**	Site (1)	Short-term (2)	Moderate (6)	Medium (3)	27	**Low**
	Construction Phase: Post mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
	Operational Phase	Site (1)	Immediate (1)	Minor (2)	Improbable (1)	4	**Low**
Mitigating Measures	i. Due to the nature of the project the potential for any significant fringe benefits is low. ii. Care must be taken with heavy machinery used on the project. All access roads used must be monitored and maintained. iii. Soils and stones excavated may be used in the immediate vicinity as backfill, fixing of roads, filling of dongas, etc. iv. Excavated soils and rocks may not be simply dumped in the shrubland / veld. v. ECO must monitor fringe impacts and ensure any issues such as illegal dumping, general waste and rubbish lying around, etc. is routinely cleaned up and disposed of. vi. All Eskom protocols and guidelines in terms of contractors, construction, etc. must be strictly adhered to. vi. *Prosopis glandulosa var. torreyana* (mesquite; suidwes-doring) is highly invasive in arid ecosystems. Disturbed areas can quickly be invaded. A monitoring programme should be put in place to routinely remove any mesquite found growing in newly constructed areas of the project.						

7 CONCLUSIONS & RECOMMENDATIONS

CONCLUSIONS

- The conclusions of the ecological study are as follows:
- The study site is within the original extent of the veldtype known as Bushmanland Basin Shrubland, which is within the Nama-Karoo Biome.
- The veld type is not a threatened ecosystem.
- Most of the study area is transformed or degraded shrubland.

- There are no watercourses, including dry drainage lines and saltpans in the study area. There are also no saltpans within a 500m radius of the site.
- There are no protected trees, RDL plants or RDL animal species present in the study area.
- The study site is not within a CBA or ESA.
- The study site is not within any priority areas, including Important Bird Areas (IBAs).
- The DFFE screening desktop assessment shows the study area as 'High Sensitivity' in terms of the aquatic theme and combined biodiversity theme. During site investigations (ground-truthing / verification) this was found not to be the case. The sensitivities on site and the immediate surroundings are 'Low Sensitivity' in terms of aquatic theme and 'Low / Medium' in terms of combined biodiversity as shown in the calculated ecological sensitivities.
- The impact assessment calculated the overall negative impact of the project on the study site, during the Construction Phase and the Operational Phase to both be 'Low' with the implementation of mitigating and management measures. The impact assessment also calculated the risk of negative impacts on the fringes of the study area / project area to be 'Low', with the implementation of mitigating measures. There are no positive impacts arising from the proposed project in terms of the natural environment.
- There are no obvious fatal flaws.

RECOMMENDATIONS

The recommendations of the study are as follows:

- There are no obvious fatal flaws and it is the opinion of the specialist that the project should be authorised and allowed to proceed to the next phase.
- All recommended mitigating measures should be implemented and strictly adhered to.

8 APPENDICES

8.1 LIST OF FLORAL SPECIES IDENTIFIED ON SITE

Trees

Vachellia (Acacia) karroo.

Shrubs and Herbs

Aptosimum spinescens, Lycium cinereum, Pentzia spinescens, Rhigozum trichotomum.

Grasses

Aristida adscensionis, Enneapogon desvauxii, Stipagrostis ciliata, Stipagrostis obtuse.

Aquatic

None

Priority Species

No RDL species.

No ODL species.

No protected trees.

8.2 LIST OF PLANT SPECIES COMMONLY FOUND IN BUSHMANLAND BASIN SHRUBLAND

Tall Shrubs: Lycium cinereum (d), Rhigozum trichotomum (d). Low Shrubs: Aptosimum spinescens (d), Hermannia spinosa (d), Pentzia spinescens (d), Zygophyllum microphyllum (d), Aptosimum elongatum, Aptosimum marlothii, Berkheya annectens, Eriocephalus microphyllus var. pubescens, Eriocephalus pauperrimus, Eriocephalus spinescens, Felicia clavipilosa subsp. clavipilosa, Limeum aethiopicum, Osteospermum armatum, Osteospermum spinescens, Pegolettia retrofracta, Phaeoptilum spinosum, Plinthus karooicus, Polygala seminuda, Pteronia glauca, Pteronia inflexa, Pteronia leucoclada, Pteronia mucronata, Pteronia sordida, Rosenia humilis, Selago albida, Senecio niveus, Tetragonia arbuscula, Zygophyllum lichtensteinianum. Succulent Shrubs: Salsola tuberculata (d), Aridaria noctiflora subsp. straminea, Brownanthus ciliatus subsp. ciliatus, Galenia sarcophylla, Lycium bosciifolium, Ruschia intricata, Salsola namibica, Sarcocaulon patersonii, Sarcocaulon salmoniflorum, Tripteris sinuata var. linearis, Zygophyllum flexuosum. Semiparasitic Shrub: Thesium hystrix. Herbs: Gazania lichtensteinii (d), Leysera tenella (d), Amaranthus praetermissus, Chamaesyce inaequilatera, Dicoma capensis, Indigastrum argyraeum, Lepidium desertorum, Monsonia umbellata, Radyera urens, Sesamum capense, Tribulus terrestris, Tribulus zeyheri. Succulent Herbs: Mesembryanthemum crystallinum, Mesembryanthemum stenandrum, Trianthema parvifolia, Zygophyllum simplex. Graminoids: Aristida adscensionis (d), Enneapogon desvauxii (d), Stipagrostis ciliata (d),

Stipagrostis obtusa (d), Aristida congesta, Enneapogon scaber, Stipagrostis anomala, Tragus berteronianus, Tragus racemosus. (Mucina & Rutherford, 2006, 2010).

Biogeographically Important Taxon *(Bushmanland endemic) Succulent Herb: Tridentea dwequensis.*

Endemic Taxa: *Herb: Cromidon minutum. Geophytic Herbs: Ornithogalum bicornutum, Ornithogalum ovatum subsp. oliverorum.* (Mucina & Rutherford, 2006, 2010).

(d) = Dominant.

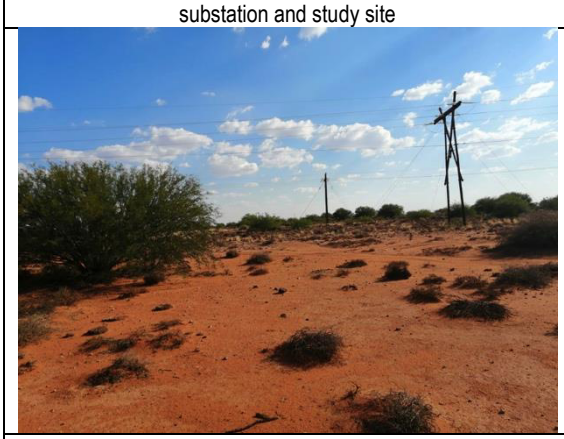
8.3 PHOTOGRAPHS

Eskom Cuprum Substation

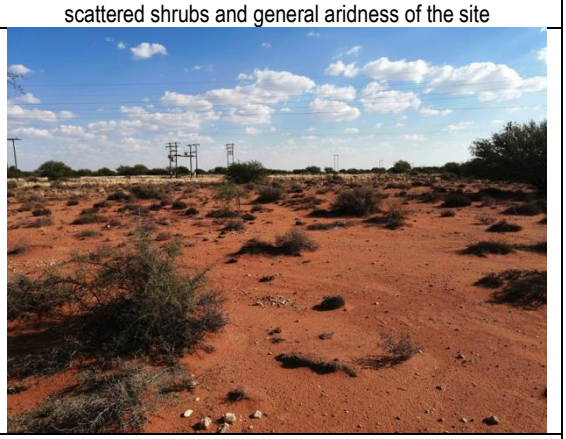
Entrance road to Cuprum Substation and study site

Buildings, power lines and other infrastructure at the substation and study site

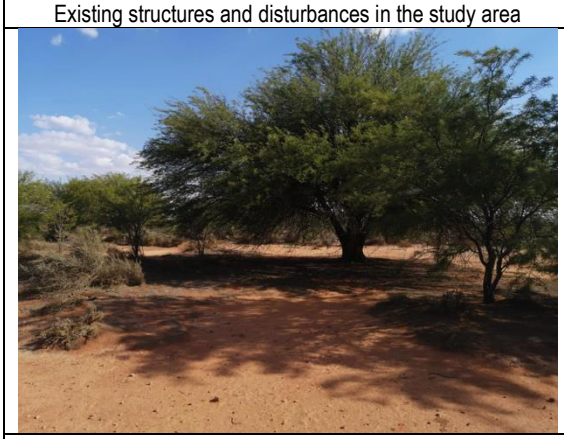
Proposed area for the BESS. Notice lack of grass cover, scattered shrubs and general aridness of the site



Study Site. Arid area with poor grass cover, lack of trees and scattered shrubs and forbs. The large shrub in left of picture is *Senegalia Mellifera*



Study site from another angle. *Pentzia spinescens* is the low spiny shrub in the foreground, which is common to the area

	
Existing disturbances within the study area, which is to be expected in a substation environment	Some white grasses (*Stipagrostis* spp) in the study area common to the arid regions of the Northern Cape
	
Existing structures and disturbances in the study area	Old diggings and trenches in the study area
	
A few scattered sweet thorn *Vachellia (Acacia) karoo* trees are found in the immediate area of the study site	Study Site and proposed area for the BESS setup, looking towards the Substation

8.4 SUMMARY OF BIODIVERSITY OF DISTRICT MUNICIPALITY

A summary of the biodiversity of the district municipality in which is the study site is situated is shown below (www.bgis.sanb.org.za).

Terrestrial Ecosystems

Vegetation Types

Name	Size (ha)	Size (%)
Bushmanland Arid Grassland	391385,8 ha	24,95%
Bushmanland Basin Shrubland	106313,6 ha	6,78%
Bushmanland Sandy Grassland	51,6 ha	0%
Bushmanland Vloere	1451,1 ha	0,09%
Gordonia Duneveld	72717 ha	4,64%
Gordonia Plains Shrubland	29224,7 ha	1,86%
Highveld Salt Pans	3575,3 ha	0,23%
Koranna-Langeberg Mountain Bushveld	37925,2 ha	2,42%
Kuruman Mountain Bushveld	35676,6 ha	2,27%
Lower Gariep Alluvial Vegetation	3069,2 ha	0,2%
Lower Gariep Broken Veld	35421,3 ha	2,26%
Northern Upper Karoo	528880,7 ha	33,71%
Olifantshoek Plains Thornveld	280480 ha	17,88%
Southern Kalahari Salt Pans	224,6 ha	0,01%
Upper Gariep Alluvial Vegetation	20013,7 ha	1,28%
Upper Karoo Hardeveld	22327,1 ha	1,42%
16 vegetation types in the municipality covering 1568737,6 ha (100 %)		

Threatened Ecosystems

Threatened EcoSystems (Critically Endangered)

There are no Critically Endangered Threatened EcoSystems in the municipality.

Threatened EcoSystems (Endangered)

Name	Size (ha)	Size (%)
Lower Gariep Alluvial Vegetation	2002,2 ha	0,13%
1 Endangered Threatened EcoSystems in the municipality covering 2002,2 ha (0,13 %)		

Threatened EcoSystems (Vulnerable)

There are no Vulnerable Threatened EcoSystems in the municipality.

8.5 LISTING OF THREATENED OR PROTECTED SPECIES (TOPS)

Species can be listed as threatened or protected (TOPS) in terms of Section 56 of the National Environmental Management: Biodiversity Act (NEMBA) of 2004

Restricted activities involving TOPS species may not be carried out without a permit; and can be prohibited. Restricted activities include:

i. Hunt / catch / capture / kill

ii. Gather / collect / pluck

iii. Pick parts of / cut / chop off / uproot / damage / destroy

iv. Import into RSA / introduce from the sea

v. Export (re-export) from RSA

vi. Possess / exercise physical control

vii. Grow / breed / propagate

viii. Convey / move/ translocate

ix. Sell / trade in / buy / receive / give / donate/ accept as a gift / acquire / dispose of

x. Any other prescribed activity

Note: Does not include activities relating to habitat loss

8.6 SHORT CV OF SPECIALIST

QUALIFICATIONS

2000 MBA, Oxford Brookes University (England)
1998 Diploma in Small Business Management (Damelin College)
1988 MSc (Rand Afrikaans University)
1987 BSc (Hons.) (Rand Afrikaans University)
1986 BSc (Rand Afrikaans University)

FURTHER TRAINING AND DEVELOPMENT

- Diploma in Public Speaking & Communications Ambassador College (USA)
- SAQA Accreditation and Qualifications in Training, Assessing & Service Provision (AgriSeta)
- SASS 5 Training Course

PUBLICATIONS

- Co-Authored Book: Cut Flowers of the World. 2010. Briza, Pretoria.
- Cut Flowers of the World, 2ed. 2020. Briza, Pretoria.
- 100s of articles for popular magazines such as Farmer's Weekly & SA Landscape

PROFESSIONAL MEMBERSHIPS

- SA Council of Natural Scientific Professions (SACNASP)
    - Reg. No. 400077/91
- South African Wetland Society
    - Reg. No: 998061
- Society of Wetland Scientists

PROFESSIONAL EXPERIENCE

Position: **Director / Owner**
Employer: Sativa
Period: 2000 to current
Scope of Work Done:

- Conduct specialist studies and research for EIA projects.
- Specialist studies and consultancy includes
- Ecological studies
- Aquatic and Wetland assessments
- Avifaunal impact assessments
- Risk Matrices for water use licences
- Specialist Environmental Consultant
- Environmental Control Officer (ECO) work
- Specialist work involves field investigations and report writing.

Position: **Technical Manager**
Employer: Sunbird Flowers (Pty) Ltd
Period: 1997 - 2000
Scope of Work Done:

- Consulted on and managed projects in the agricultural & floricultural industries, with specific emphasis on high-yield agriculture.
- Managed existing and new projects.

- Involved in all aspects of project management from managing, planning; costing; marketing; budgeting, technical and training.
- Assisted emerging rural farmers in most aspects of agriculture

(i.e. Cut flower and vegetable production) including setting up of business plans, marketing, training and costings.

- Did “turn-key” projects in most agriculture related fields. This included – Tunnel and greenhouse production; Hydroponics; vegetables, cut flowers; field crops.

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