

# ESKOM CUPRUM BESS

## AQUATIC SITE SENSITIVITY VERIFICATION AND COMPLIANCE STATEMENT

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SITE SENSITIVITY VERIFICATION (AQUATIC COMPONENT) 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

The logo for SATIVA features the word "SATIVA" in a bold, dark blue, sans-serif font. The letter "V" is stylized as a green leaf with a stem. A thin horizontal line is positioned below the text.

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01 August 2022

**AECOM**

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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 04<sup>th</sup> of June 2021, are still valid.

Regards,



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**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	To undertake an Site Sensitivity Verification (aquatic) to verify the results of the DFFE Screening Tool in regards to aquatic sensitivity, undertake a Compliance Statement, as well as determine the presence of watercourse or other aquatic systems on the study site.
Coordinates	29°57'37.63"S 22°18'0.76"E (Approximate centre of 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	<b>AECOM</b> 263A West Ave Centurion, South Africa 0157 Tel: +27 12 421 3500 Email: dalian.govender@aecom.com
Consultant	<b>Sativa Travel and Environmental Consultants (Pty) Ltd</b> Constantia Park, Building 16-2, 546 16 <sup>th</sup> Road Midrand, 1685 Cell: 076 328 1558 Fax: 086 652 9774 Email: info@sativatec.co.za
Author	Johannes Oren Maree, MSc. MBA; <i>Pr. Sci. Nat.</i> (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 (23h00 to 4h59)

and be available to provide ancillary and energy services during the day (5h00 to 22h59). 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 site sensitivity verification (aquatic) and Compliance Statement for the proposed project. Field investigations were conducted on 23 April 2021.

### LOCATION OF THE STUDY AREA

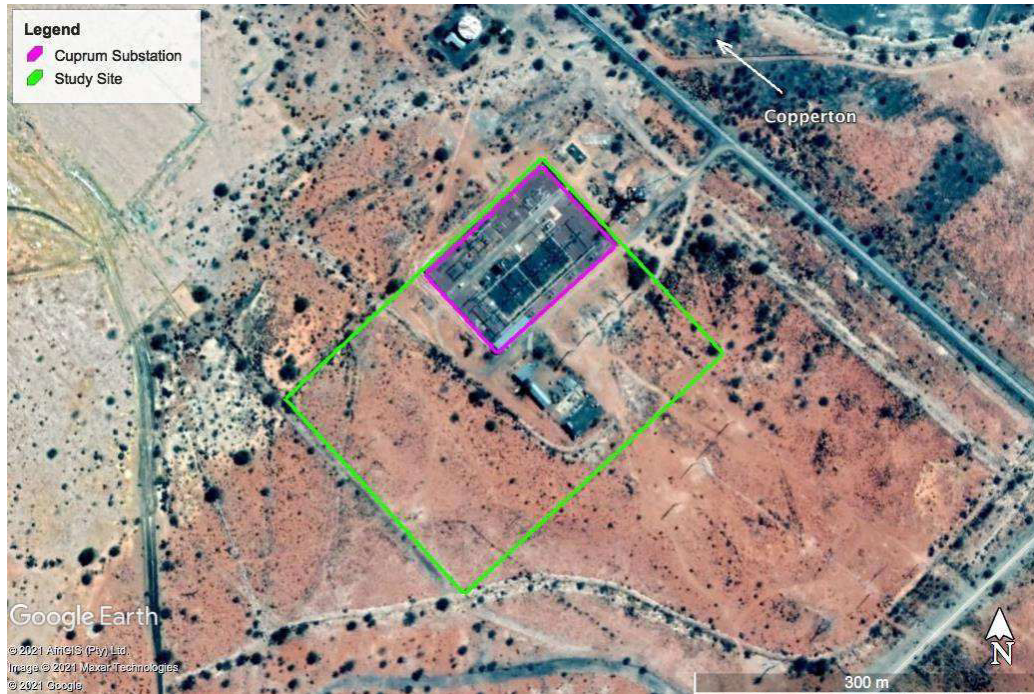
The study site is located at the existing Eskom Cuprum Substation. The study site is at Copperton, which is north of the R357 and approximately 54km southwest of the Town of Prieska. The site is within the Siyathemba Local Municipality of the Pixley ka Seme District Municipality, Northern Cape Province.

### WATERCOURSES IN THE STUDY AREA

There are no watercourses in the study area.

There are also no salt pans within a 500m radius of the site.

### LOCALITY MAP



## COMPONENTS OF THE PROJECT



## 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.

## CONCLUSIONS

The conclusions of the study are as follows:

- **There are no watercourses in the study area.**
- Site investigations were conducted, during which time no watercourses were found to be present within the study area.
- There are no saltpans within a 500m radius of the outer boundaries of the study site.
- There are no obvious fatal flaws in terms of the aquatic (water) environment.
- A Water Use Licence Application (WULA) process or a General Authorisation (GA) process will not be required for the project.
- The specialist is of the opinion that study site has a low aquatic sensitivity and will therefore not require further assessment in the form of a Aquatic Impact Assessment.

## 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.
- Due to the fact that there are no watercourses on site or immediately surrounding or along access roads, there is no need for specific mitigating measures in terms of the surface water environment.

## Eskom Prieska BESS Project: Aquatic SSV and Compliance Statement

- Care should still be taken to avoid pollutants that might be carried away by water used during construction and might seep into the soils and potentially contaminant underground water.

## 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 (1<sup>st</sup> ed) & 2020 (2<sup>nd</sup> 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 specialist 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.

Signature:



Date: 13 July 2021



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## LIST OF ACRONYMS

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

- 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 (23h00 to 4h59)

and be available to provide ancillary and energy services during the day (5h00 to 22h59). The BESS shall have capability to be operated to provide capacity to meet the energy demand on the grid.

The project involves the following:

#### 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.
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  - ✓ 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.

### **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 site sensitivity verification (aquatic) 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 verify whether there are any watercourses or other aquatic systems present on site. If any are found to be present, then a further purpose is to conduct a full assessment and delineation. Otherwise, to compile a short verification report and Compliance Statement.

The purpose of the study is to verify whether the results of the DFFE Screening Tool, which identified the 'Aquatic Biodiversity Theme' as "Very High", is different from the present state of aquatic systems and watercourses on site.

In accordance with GN320 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), this study forms part of the site sensitivity verification (aquatic) report that will:

- (a) confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.; and
- (b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

The Report is further a Compliance Statement, to:

- (a) confirm that the site is of Low sensitivity for aquatic biodiversity; and
- (b) indicate whether or not the proposed development will have an impact on the aquatic features.

## **1.3 QUALITY AND AGE OF THE BASE DATA USED**

The latest data sets were used for the report in terms of background information.

The source and age of data used is as follows:

- Threatened ecosystems: Latest datasets obtained from the SANBI website ([www.bgis.sanbi.org](http://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](http://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](http://www.bgis.sanbi.org)).
- Department of Forestry, Fisheries and the Environment (DFFE) – Screening Tool ([www.screening.environment.gov.za](http://www.screening.environment.gov.za)).
- Google Earth maps and imagery – Google Earth Pro – Google LLC, 2020.
- National Freshwater Ecosystem Priority Assessment (NFEPA) Map.
- National Land Cover 2000 ([www.arc.agric.za](http://www.arc.agric.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;
- Field investigations were undertaken on the 23<sup>rd</sup> of April 2021, which forms part of the summer (wet) season investigations.
- The study and site investigations were limited to surface water systems and do not include any underground investigations. Such investigations are however seen as unnecessary for the project.
- 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 possible presence of watercourses and aquatic systems in the region and study site. The primary sources used were those as mentioned above in Section 1.3. Data sets of NFEPA sites, rivers, etc. were overlaid on google earth images along with the study site to determine if there were aquatic systems in the study area or within close proximity. Statellite imagery from Google Earth was also examined to determine whether there appeared to be distinctive watercourses present, such as rivers or salt pans.

## 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 ideal 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.

Field investigations were undertaken on 23 April 2021. Due to the small size and location of the site within an existing substation, a comprehensive assessment was possible within this timeframe.

This report, after taking into consideration the desktop assessment, field survey and recommendations of the specialist should enable informed decision-making with regards to the validity of the verification assessment undertaken.

## 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 center): 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**, indicates the position of the main project components (Refer to Section 1.1) within the impact area (study site). The Cuprum Substation will be extended slightly in a west/southwest direction; a water pipe will be rerouted; two existing powerlines that feed into the Cuprum Substation will be rerouted west around the main project area; and the Battery Energy Storage System (BESS) will be constructed and placed south of the substation and west of offices and other buildings (Figure 3).



Figure 1: Site location

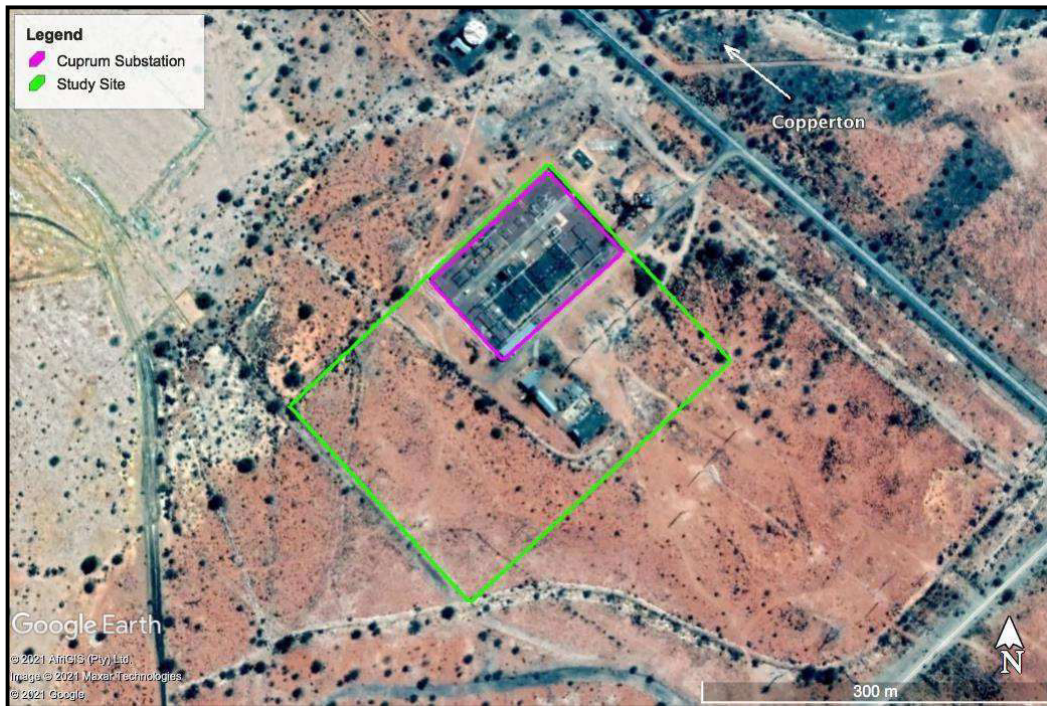


Figure 2: Study Site



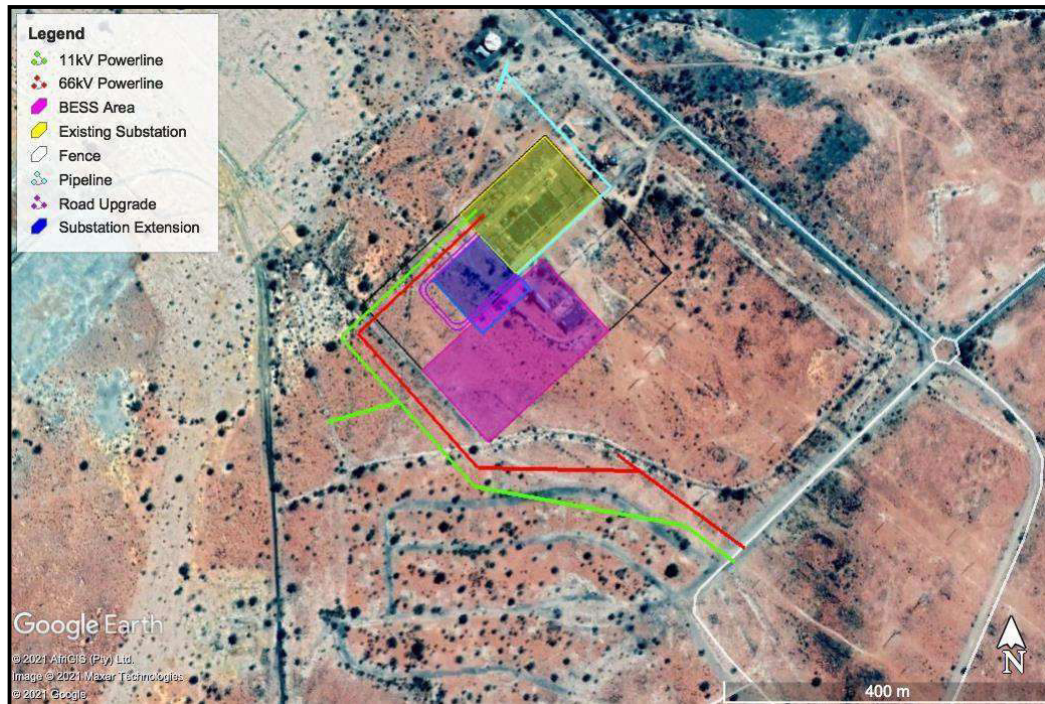


Figure 3: Project components relative to the proposed project

### 3.2 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.

The site is within the Arid Interior Climatic Zone of South Africa, where summers are dominated by hot temperatures (22°C – 33°C on average) and winters by cold temperatures (7°C – 17°C on average).

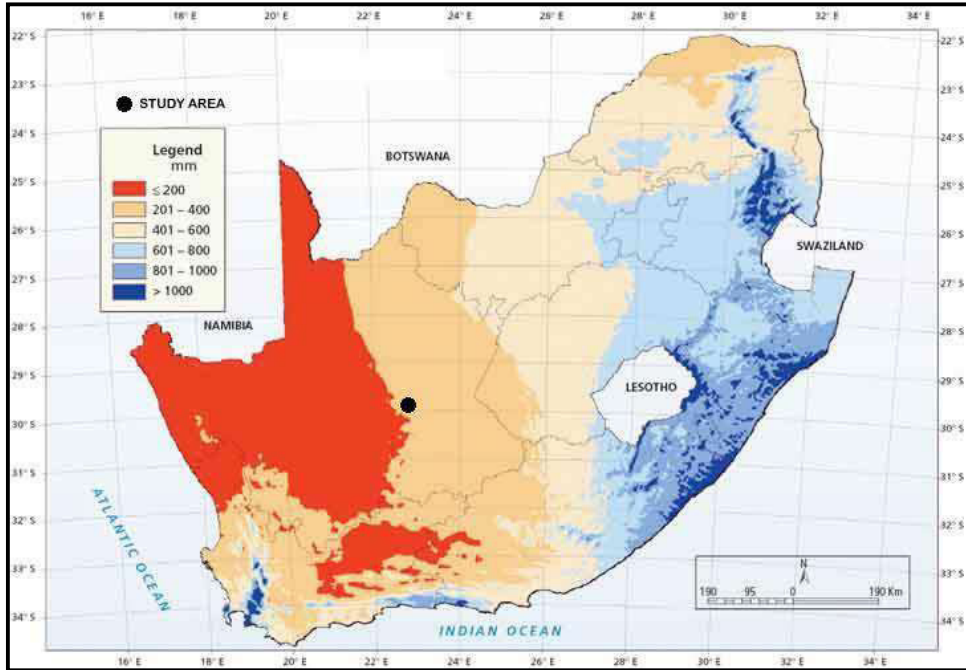


Figure 4: Rainfall zones of South Africa

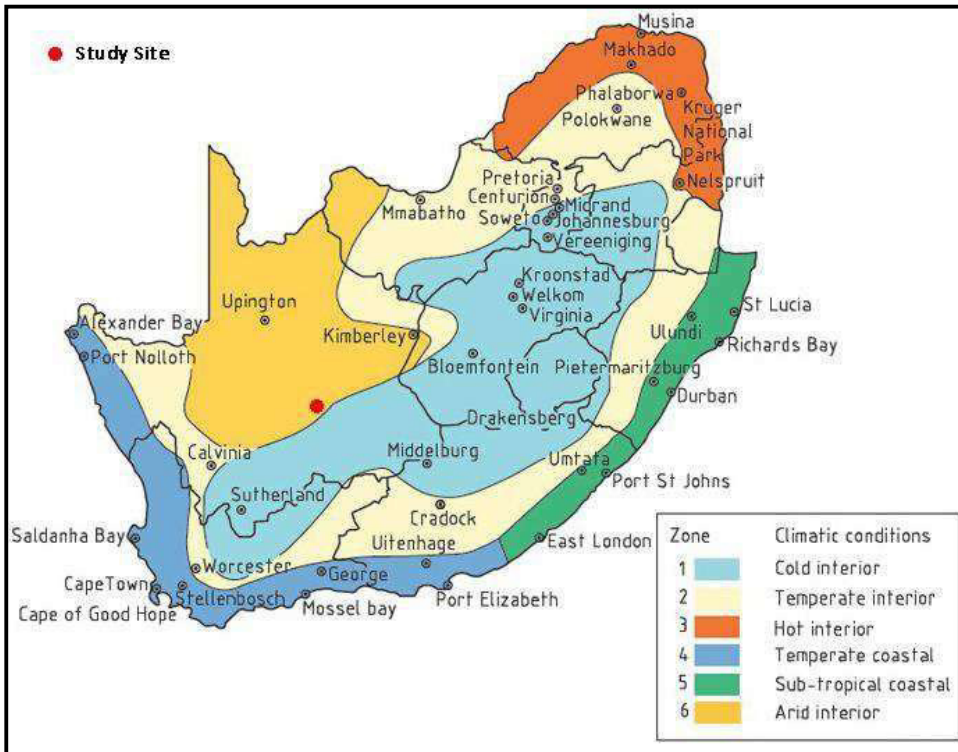


Figure 5: Climatic Zones of South Africa



### **3.3 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.

### **3.4 WATERCOURSES IN THE STUDY AREA**

#### **There are no watercourses in the study area.**

Bastersput-se-Leegte is the closest stream / river to the site, which is approximately 1,2km north of study site. 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 6). 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](http://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, Bastersput-se-Leegte, which is north of the study site (Figure 6).



Figure 6: Main Watercourses in the area

### 3.5 DRAINAGE REGIONS

The table below summarises the drainage region and catchment information for the area in which the study site is situated (Table 1).

Table 1: Drainage Region Information

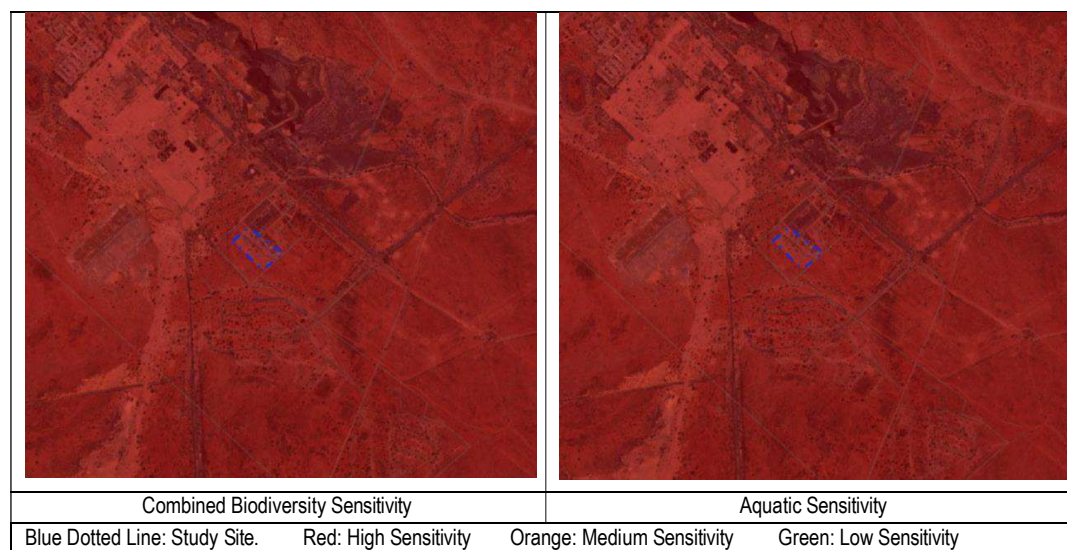
Level	Category
Primary Drainage Area (PDA)	D
Quaternary Drainage Area (QDA)	D54D
Water Management Area (WMA) – Previous / Old	Lower Orange
Water Management Area (WMA) – New (as of Sept. 2016)	Orange (WMA 6)
Sub-Water Management Area	Orange Tributaries
Catchment Management Agency (CMA)	Orange (CMA 6)
Wetland Vegetation Ecoregion	Nama-Karoo Bushmanland
Fish FEPA	No
Fish FSA	No
Fish Corridor	No
Fish Migratory	No
Priority Quaternary Catchment	No
SWSA	No

### 3.6 DFFE SCREENING TOOL SENSITIVITIES

The Department of Forestry, Fisheries and the Environment (DFFE) has developed a desktop screening tool when assessing the sensitivity of a site ([www.screening.environment.gov.za](http://www.screening.environment.gov.za)). The screening tool incorporates most datasets as produced by DWS, DFFE, South African National Biodiversity Institute (SANBI) and Provincial Conservation Plans. According to the screening tool (accessed May 2021) sensitivities for the study site and surroundings are as follows:

- Aquatic biodiversity combined sensitivity: Very High.
- Terrestrial biodiversity combined sensitivity: Very High.

Figure 7, below, shows the maps as taken from the Screening Tool assessment.



**Figure 7: 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:

- Aquatic biodiversity combined sensitivity: Low.
- Terrestrial biodiversity combined sensitivity: Low.

During ground-truthing the study area and immediate surrounding area was found to have an Aquatic Sensitivity of 'Low', and not as shown by the DFFE Screening Tool. The study site and local area are within an arid region, and therefore any watercourses or surface water systems present are viewed as sensitive. However, there are no watercourses within the study site or within a 500m radius of the outer boundaries of the site and therefore it is unclear why the DFFE screening tool assessment would show this area has sensitive in terms of the aquatic component.

## 4 CONCLUSIONS & RECOMMENDATIONS

### 4.1 CONCLUSIONS

- The conclusions of the study are as follows:

- **There are no watercourses in the study area.**
- Site investigations were conducted, during which time no watercourses were found to be present within the study area.
- There are no saltpans within a 500m radius of the outer boundaries of the study site.
- There are no obvious fatal flaws in terms of the aquatic (water) environment.
- A Water Use Licence Application (WULA) process or a General Authorisation (GA) process will not be required for the project.
- The specialist is of the opinion that study site has a low aquatic sensitivity and will therefore not require further assessment in the form of an Aquatic Impact Assessment.

#### **4.2 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.
- Due to the fact that there are no watercourses on site or immediately surrounding or along access roads, there is no need for specific mitigating measures in terms of the surface water environment.
- Care should still be taken to avoid pollutants that might be carried away by water used during construction and might seep into the soils and potentially contaminant underground water.









## 5 APPENDICES

### 5.1 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 development south of the substation. 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 <i>Senegalia Mellifera</i>	Study site from another angle. <i>Pentzia spinescens</i> is the low spiny shrub in the foreground, which is common to the area



Eskom Prieska BESS Project: Aquatic SSV and Compliance Statement

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

## 5.2 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.
- Co-Authored Book: 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 reasearch 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.

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- 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.

## 6 REFERENCES

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- van Wyk, E. & F. van Oudtshoorn. 2009. Guide to Grasses of Southern Africa. 2<sup>nd</sup> ed. Briza, Pretoria.