Botanical Survey At ESKOM Paleisheuwel Substation Included In The West Coast Group of Battery Energy Storage System (BESS) Project, Western Cape Province

Vegetation Assessment

Final

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Prepared for: SRK Consulting (South Africa) (Pty) Ltd

NEMAI CONSULTING

Environmental, Social and OHS Consultants

P.O. Box 1673
Sunninghill
2157
South Africa

147 Bram Fisher Drive
Ferndale
2194
South Africa

Tel: +27 11 781 1730
Fax: +27 11 781 1731
www.nemai.co.za

Title and Approval Page

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Client:	SRK Consulting (South Africa) (Pty) Ltd

Prepared By:	Nemai Consulting (Pty) Ltd			
NEMAI CONSULTING	☎	+27 11 781 1730		147 Bram Fischer Drive, FERNDALE, 2194
	🖷	+27 11 781 1731		
	✉	AvhafareiP@nemai.co.za		PO Box 1673, SUNNINGHILL, 2157
		www.nemai.co.za		
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Author: Avhafarei Phamphe	
Author's Affiliations	**Professional Natural Scientist**: South African Council for Natural Scientific Professions Ecological Science (400349/2)
	Professional Member of South African Institute of Ecologists and Environmental Scientists
	Professional Member: South African Association of Botanists.

Executive Summary

Eskom Holdings SOC Ltd proposes installing Battery Energy Storage System (BESS) at existing distribution substations throughout South Africa to:

- 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.

The use of BESS technology has been increasing rapidly worldwide. The growth in the BESS industry is expected to continue as costs of these systems are declining. While costs are still relatively high when compared to conventional grid electricity, the cost of battery energy storage has been decreasing since the 1990s (AIG, undated; Platte River Power Authority, 2017).

Battery storage technologies are widely used because they improve energy security by optimising energy supply and demand, reducing the need to import electricity via interconnectors, and also reducing the need to continuously adjust generation unit output. In addition, BESS's can provide system security by supplying energy during electricity outages, minimizing the disruption and costs associated with power cuts. Another reason for the rising popularity of storage systems is that they can enable the integration of more renewables in the energy mix (AIG, undated).

Battery storage systems can decrease the requirement for investment in new conventional generation capacity, resulting in financial savings and reduced emissions from electricity generation. Using storage systems also means fewer and cheaper electricity transmission and distribution system upgrades are required (AIG, undated).

Due to the cancellation of the Kiwano Concentrating Solar Power (CSP) project, the project funders, the World Bank, agreed that Eskom could use the funds allocated for the Kiwano CSP for an alternative (renewable) project. The World Bank approved the BESS project as a suitable alternative to the Kiwano CSP.

Eskom initially identified a total of 24 substation sites in the Western Cape Province where the BESS could be implemented with a total (proposed) BESS capacity of 148.5 Megawatts (MW). The following criteria were considered in the selection of suitable sites for the BESS:

- Proximity of electricity customers to existing or confirmed future renewable generators. The following renewable energy sources were identified in the West Coast area:
    - Paleisheuwel 75 MW PV facility;
    - Aurora 9 MW PV facility (Vredelus);

  - Sere 100 MW Wind Energy Facility (WEF) (Skaapvlei); and
  - Kerschbosch 65 MW WEF (Hopefield);
- Situations where the distribution network in the West Coast area will see notable benefits from the introduction of BESS:
  - Reduction in electricity supply losses;
  - Peak load reduction on critically loaded network components;
  - Peak load reduction allowing for deferment of capital investment;
  - Reduction in loading / congestion of upstream High Voltage networks;
  - Improvement of local network attributes and quality of supply; and
  - Peak load reduction where the peak load is concurrent with national system peak (i.e. winter evenings);
- Availability of sufficient Medium Voltage connection capacity for the BESS; and
- Availability of sufficient space at the substation for installation of the BESS containers.

Eskom identified five substations in the West Coast, namely:

- Darling;
- Yzerfontein;
- Paleisheuwel;
- Zandberg; and
- Skaapvlei.

Eskom subsequently decided that only Skaapvlei and **Paleisheuwel** will be taken forward into assessment.

In order to provide data to support various environmental applications for a proposed Eskom BESS at Paleisheuwel Substation in the West Coast Group, Nemai Consulting (Pty) Ltd was appointed to conduct a botanical assessment specialist study. The aim of this report was to assess the impacts that the proposed development will have on the flora on site. The current ecological status and conservation priority of vegetation on the site were also assessed. Red data plant species and plant species of conservation concern that are known to occur on site were investigated.

The project area falls within the Fynbos biome which extends across the southern corner of South Africa in a 100-200km wide coastal belt in the Western Cape Province. Fynbos is characterised as schlerophyllous shrub-land and this biome is comprised of two major vegetation types, the Fynbos and the Renosterveld. The Fynbos Biome forms the main part of the Cape Floristic Region (CFR), which is recognised globally as a biodiversity hotspot, due to the high numbers of endemic plant and invertebrate taxa. The study area is classified as falling within the *Endangered* Leipoldtville Sand Fynbos vegetation type. The proposed development site falls within Ecological Support Area (ESA) 1 category.

During the field survey, only one threatened plant species (3 individuals) was observed within the study area, namely *Leucospermum rodolentum*. This species belongs to the Proteaceae family which is listed in Schedule 4 (Protected flora) of the Western Cape Nature Conservation Laws Amendment Act of 2000. Therefore, a permit to remove this species will need to be obtained from Cape Nature.

***Leucospermum rodolentum* recorded on site**

There are likely to be additional listed plant species such as bulbs, herbs and annuals present at the site which were not observed as some species are naturally rare or are only visible at specific times of the year. According to Raimondo *et al.* (2009), *Leucospermum rodolentum* is listed as Vulnerable. It is therefore recommended that prior to construction activities, a suitably qualified specialist (or a similarly qualified individual, preferably a horticulturist with West Coast Search and Rescue experience) should be appointed in order to undertake or oversee a search, rescue and relocation process. According to Helme (2012), Red Data plant species such as *Leucadendron procerum, L. loranthifolium, Cullumia micracantha, Phylica cuspidata, Aspalathus ternata, Athanasia sertulifera* were found in the area. Many of these plant species were recorded by Helme (2012) on farms within the vicinity especially on the natural strip areas.

Although *Brunsvigia orientalis* is listed in the 'Red List' as of 'Least Concern', a 'Search and Rescue' strategy should nevertheless be implemented to save these plants from where they would be impacted by the BESS project as they are provincially protected species (Western Cape Nature Conservation Laws Amendment Act of 2000 Schedule 4 Protected flora). A permit to remove these plant species will need to be obtained from CapeNature. The removal should occur with due care, and these plant species should be relocated into areas with the same aspect, soil conditions and elevation to ensure that the relocations are successful.

All areas affected by construction should be rehabilitated upon completion of the construction phase of the development to its pre-construction state where possible. Mitigation measures provided will ensure that any available ecological linkages between sensitive areas are not affected negatively. Mitigation measures included in Table *10* and Table 11are feasible and will be easy to achieve. As soon as the proposed development has been constructed, the rehabilitation process needs to take place and should ensure that alien plant emergence and erosion do not occur.

Table 1. The summary of all impact significance ratings with mitigation measures are shown below:

Impact	*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact 1. Loss of a threatened plant species and plant SCC from vegetation clearance as a result of placement of infrastructure and construction of the BESS	Local 1	Medium 2	Long-term 3	**Medium** 6	Definite	**MEDIUM**	**– ve**	High
With mitigation	Local 1	Low 1	Long-term 3	**Low 5**	Probable	**LOW**	**--ve**	High
Impact 2. Potential loss of topsoil from site preparation and construction of BESS	Local 1	Low 1	Medium-term 2	**Very Low** 4	Definite	**VERY LOW**	**– ve**	High
With mitigation	Local 1	Low 1	Short-term 1	**Very-Low 3**	Possible	**INSIGNIFICANT**	**– ve**	High
Impact 3. Loss of vegetation from vegetation clearance and the construction of the BESS.	Local 1	Low 1	Long-term 3	**Low** 5	Definite	**LOW**	**– ve**	High
With mitigation	Local 1	Low 1	Long-term 3	**Low 5**	Probable	**LOW**	**– ve**	High
Impact 4. Increased soil erosion due to compaction by vehicles and construction activities, and incorrect storm water management measures	Local 1	Medium 2	Short-term 1	**Very-Low** 4	Possible	**INSIGNIFICANT**	**– ve**	High
With mitigation	Local 1	Low 1	Short-term 1	**Very-Low 3**	Possible	**INSIGNIFICANT**	**– ve**	High
Impact 5. Proliferation of alien invasive species on account of site disturbance	Local 1	Medium 2	Medium-term 2	**Low** 5	Probable	**LOW**	**– ve**	High
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low 4**	Possible	**INSIGNIFICANT**	**– ve**	High
Impact 6. Loss of vegetation due to fuel and chemical spills from the use of electrical equipment e.g. generator and storage of hazardous substances.	Local 1	Medium 2	Medium-term 2	**Low** 5	Possible	**VERY LOW**	**– ve**	High
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low 4**	Improbable	**INSIGNIFICANT**	**– ve**	High
Impact 7. Loss of endangered vegetation type from vegetation clearance and construction of the BESS.	Local 1	Medium 2	Long-term 3	**Medium** 6	Definite	**MEDIUM**	**– ve**	High
With mitigation	Local 1	Medium 2	Medium-term 2	**Low 5**	Probable	**LOW**	**– ve**	High

Impact	*Extent*	*Intensity*	*Duration*	*Consequence*	*Probability*	*Significance*	*Status*	*Confidence*
Impact 8. Loss of ESA habitats from vegetation clearance and construction of the BESS.	Local 1	Low 1	Long-term 3	**Low** 5	Definite	**LOW**	**– ve**	High
With mitigation	Local 1	Low 1	Medium-term 2	**Very Low** **4**	Probable	**VERY LOW**	**– ve**	High
Impact 9. Loss and/or degradation of floral habitat	Local 1	Medium 2	Medium-term 2	**Low** 5	Probable	**LOW**	**– ve**	High
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low** **4**	Possible	**INSIGNIFICANT**	**– ve**	High
Impact 10. Loss of vegetation from fires due to operating of electrical equipment and smoking of personal	Local 1	Medium 2	Medium-term 2	**Low** 5	Possible	**VERY LOW**	**– ve**	Low
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low** **4**	Possible	**INSIGNIFICANT**	**– ve**	Low

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1 INTRODUCTION

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1.1 Objectives of the Survey

In order to achieve the aim stated above, the following objectives are to be achieved:

- To apply relevant literature to determine the diversity and eco-status of the plants (vegetation) within the proposed development site;
- To carry out a field survey in order to gain an understanding of the diversity and eco-status of taxa which inhabit the study area, as well as the presence of unique habitats that might require further investigation or protection;
- To assess the current habitat and conservation status of plant species within the study area;
- To comment on ecological sensitive species/areas;
- To assess the possible impact of the proposed project on these taxa and/or habitats;
- To list the species on site and to recommend necessary actions in case of occurrence of endangered, vulnerable or rare species or any species of conservation concern; and
- To provide management recommendations to mitigate negative and enhance positive impacts within the proposed development site.

1.2 Declaration of Independence

The specialist investigator declares that I:

- Act as independent specialist for this project.
- Consider myself bound by the rules and ethics of the South African Council for Natural Scientific Professions.
- Do not have any personal or financial interest in the project except for financial compensation for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment (EIA) Regulations, 2006.
- Will not be affected by the outcome of the environmental process, of which this report forms part of.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed development but aim to present facts and my best scientific and professional opinion with regards to the impacts of the development.

2 Relevant Legislation and Guidelines

The following legislations and guidelines are relevant to this project:

- Hazardous Substances Act (Act No. 5 of 1973);

- Occupational Health and Safety Act (Act No. 85 of 1993);
- Constitution of the Republic of South Africa (Act No. 108 of 1996);
- National Environmental Management Act (Act No. 107 of 1998);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- Conservation of Agricultural Resources Act (Act No. 43 of 1983);
- National Forestry Act (Act No. 84 of 1998);
- Western Cape Nature Conservation Laws Amendment Act of 2000;
- Guideline for involving biodiversity specialists in EIA processes (2005): Edition 1. CSIR Report No ENV-S-C 2005 053 C;
- Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape (2005);
- Department of Environmental Affairs and Development Planning. WCDMA01 Critical Biodiversity Areas and Ecological Support Areas 2010 [vector geospatial dataset] 2010;
- The Biodiversity Sector Plan for the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities (2010);
- National Biodiversity Assessment (2011);
- Western Cape Biodiversity Framework (2014) Status Update: Critical Biodiversity Areas of the Western Cape (2014);
- The Western Cape Provincial Spatial Development Framework (2014) (Department of Environmental Affairs & Development Planning); and
- The Western Cape Biodiversity Spatial Plan Handbook (2017).

3 SCOPE OF WORK

The Scope of Work for Nemai Consulting is to provide specialist botanical consulting services for the proposed Eskom BESS substation sites, namely Skaapvlei and Paleisheuwel, located in the Western Cape Province. **This report is only applicable to Paleisheuwel BESS site.** The specialist work and report are compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and the 2014 EIA Regulations, as amended (2017).

SRK Consulting (SRK) has been appointed to undertake the Basic Assessment (BA) Process for the two sites. They will liaise with the botanist to ensure the scope of work is finalised and executed as per the EIA requirements. Adherence to the timelines is of utmost importance to ensure deadline for submissions are achieved. Draft botanical reports will be sent to SRK for

review, updated and finalised accordingly and final reports submitted to SRK by the agreed timeframe.

3.1 General Terms of Reference

Botanical assessments must follow guidelines as set out in the following documents:

a. Department of Environmental Affairs and Development Planning (DEA&DP) guidelines for involving biodiversity specialists in the EIA process (Brownlie, 2005);

b. Ecosystem guidelines for Environmental Assessment in the Western Cape (Cadman *et al.,* 2016);

c. CapeNature's Terms of Reference for the consideration of biodiversity in Environmental Assessment and decision-making;

d. The requirements of CapeNature for providing comments on agricultural, environmental, mine planning and water-use related applications; and

e. Appendix 6 of the Environmental Impact Assessment Regulations, 2014 (Government Gazette, 2017 as amended).

3.2 Specific Terms of Reference

a. Describe the existing baseline floral characteristics of the study areas and place this in a regional context. Include a description of biodiversity patterns at a community and ecosystem level (main vegetation type, plant communities in the vicinity and threatened/vulnerable ecosystems), at species level (threatened Red List species, Protected species, Presence of alien species) and in terms of significant landscape features;

b. Describe the sensitivity of the site and its environs; and map these resources;

c. Undertake an independent site walk-through to determine the final location of infrastructure based on ecological, visual and cultural (archaeological and palaeontological) sensitivity of the study area;

d. Identify and assess potential impacts of the project and the alternatives, including impacts associated with the construction and operation phases, using the appointed EAP's (to undertake an EIA) prescribed impact rating methodology;

e. Indicate the acceptability of alternatives and recommend a preferred alternative;

f. Identify and describe potential cumulative impacts of the proposed development in relation to proposed and existing developments in the surrounding area;

g. Recommend mitigation measures to avoid and/or minimise impacts and/or optimise benefits associated with the proposed project; and

h. Recommend and draft a monitoring campaign, if applicable.

4 SITE LOCATION

The site is located within portion 10 of Farm Bergvaley 400 in Cederberg Local Municipality, West Coast District Municipality, Western Cape Province (**Figures 1, 2** and **3**). The collage of photographs taken within the proposed development site is indicated in **Figure 4** below.

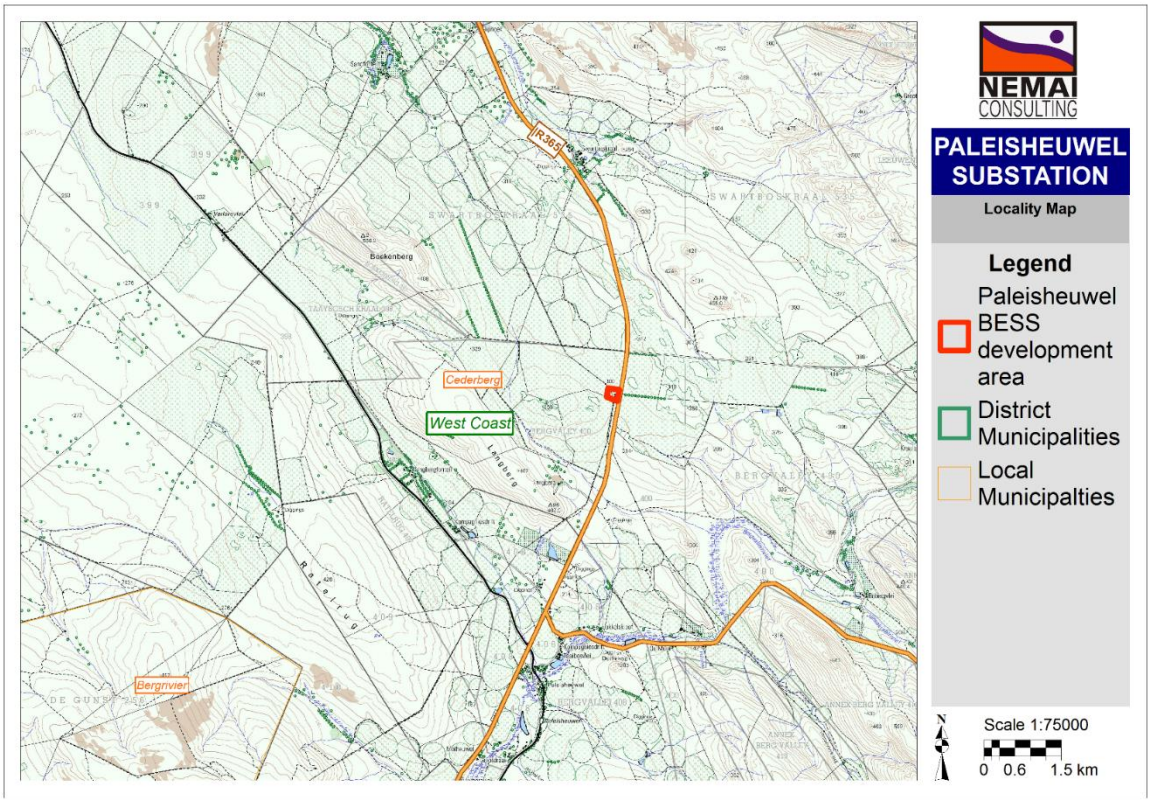

Figure 1. 1 in 50 000 Topographical map of the proposed development area

Figure 2. Google Earth map of the proposed development area

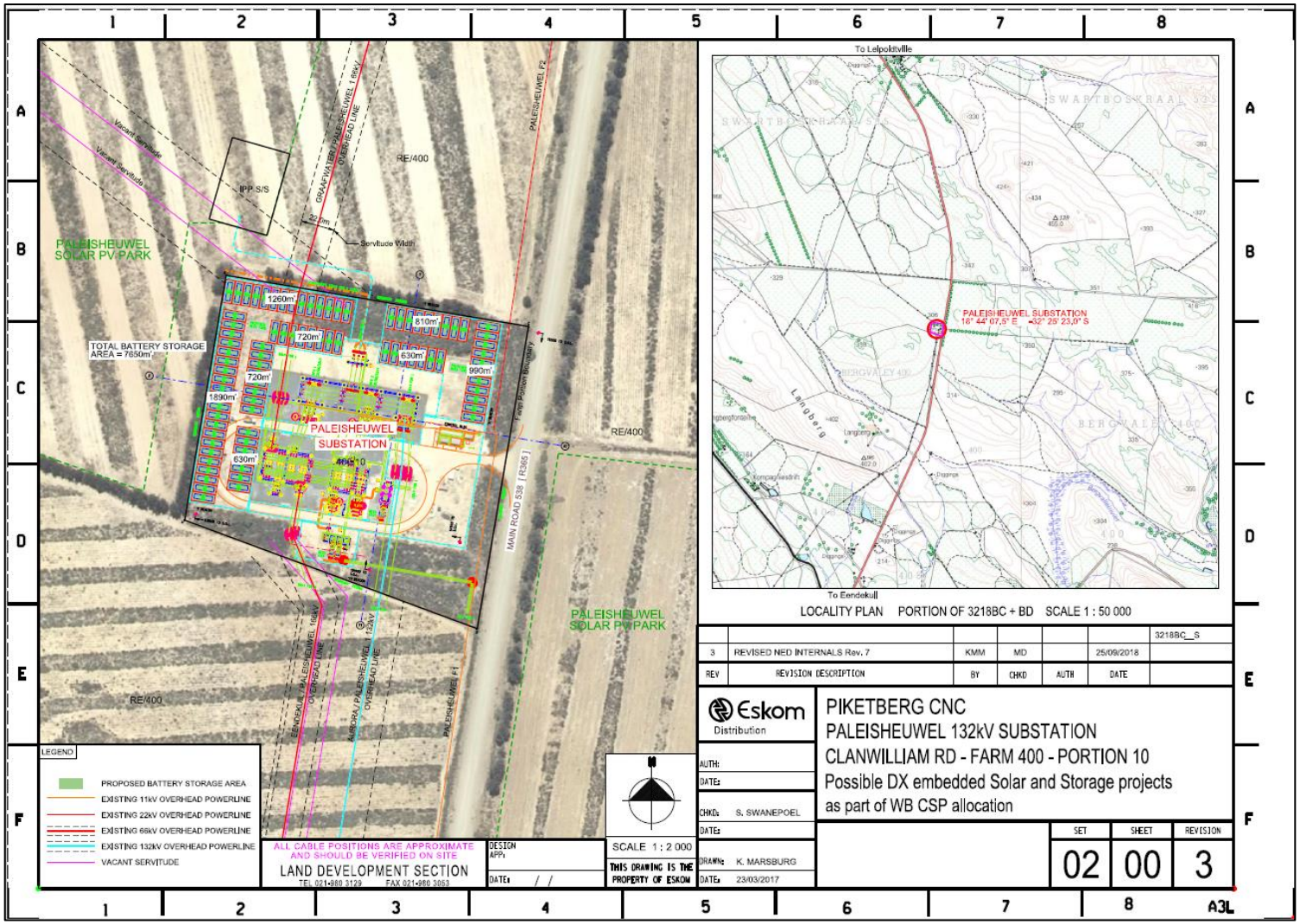

Figure 3. Map of the study area (Eskom, 2019)

Figure 4. Collage of photographs taken within the proposed development area

5 REGIONAL VEGETATION

The project area falls within the Fynbos biome (SANBI, 2012) (**Figure 5**) and the Biome extends across the southern corner of South Africa in a 100-200km wide coastal belt in the Western Cape Province. Fynbos is characterised as schlerophyllous shrub-land and this biome is comprised of two major vegetation types, the Fynbos and the Renosterveld. The Fynbos Biome forms the main part of the Cape Floristic Region (CFR), which is recognised globally as a biodiversity hotspot, due to the high numbers of endemic plant and invertebrate taxa.

The CFR covers approximately 87 892 km^2 within the Western Cape Province and slightly into the Eastern Cape Province of South Africa. This region is extremely rich in plant species, with approximately 9 600 different species of plants having been documented with at least 70% of these endemic to this region. The diversity of plant taxa arises from the diversity of soil types, topography and climatic conditions across the region.

The chain of large mountain ranges within the region is viewed as essential water catchment areas, and as such has historically received the focus of conservation action in the region. This has unfortunately neglected the low lying Fynbos areas which hold high levels of biodiversity. Much of the vegetation types of the lowlands have been converted into agricultural fields or rangelands, or succumbed to the expansion of infrastructure development. The disruption of the natural fire regimes has impacted negatively on many of the Fynbos plant species as these species utilise specific fire frequencies to set seed and germinate. Infestation by alien invasive plant species, such as certain Australian Acacia and Eucalyptus species, has also converted much of the natural habitat areas into alien "forests", devoid of the natural biodiversity of the region. The Fynbos Biome is predicted to be severely impacted upon by climate change, with estimates of as high as a 50% loss of the Fynbos Biome. The drastic climatic changes predicted could alter the conditions required for the persistence of the biome, such as changes in rainfall patterns and temperature, which in turn lead to changes in the plant communities which are able to persist in the area.

The study area is classified as falling within the Leipoldtville Sand Fynbos vegetation type (**Figure 6**).

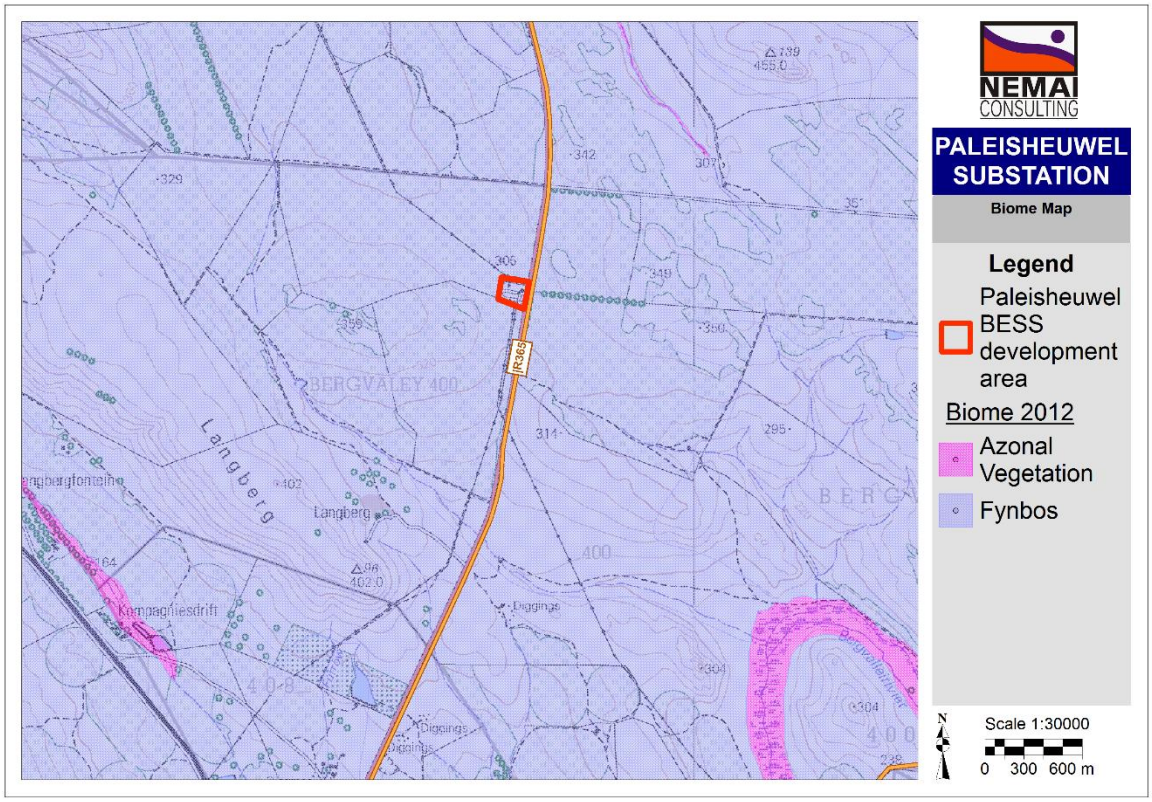

Figure 5. Biome with relation to the development area

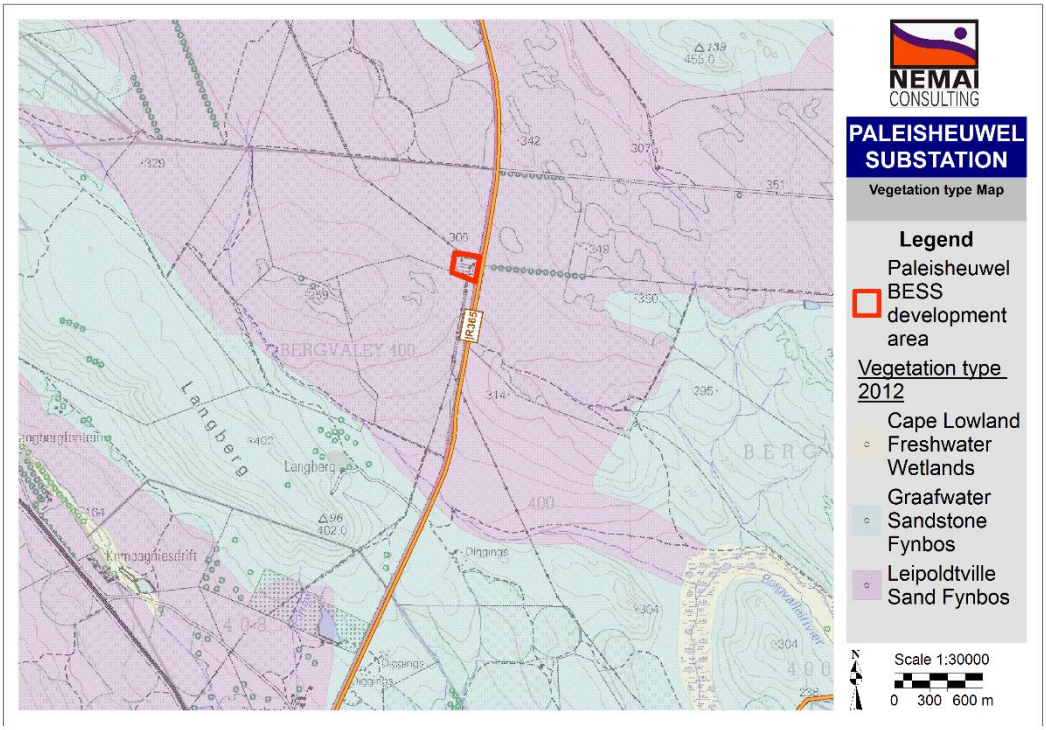

Figure 6. Vegetation type with relation to the development area

The description of the vegetation type follows below:

5.1 Leipoldtville Sand Fynbos

The Leipoldtville Sand Fynbos is found in the Western Cape Province. It occurs on the coastal plains on either side of the Olifants River to Aurora and extending deep inland to the foot of the Graafwater Mountains and Piketberg. It also occurs in the Olifants River Valley from the Bulshoek Dam to The Baths (Keerom), with a gap between Klawer Vlei and Sandkop. Outliers are found scattered in the Swartveld from Het Kruis to the vicinity of Porterville (Mucina and Rutherford, 2006).

This vegetation type is listed as Endangered with a conservation target (percent of area) from National Spatial Biodiversity Assessment (NSBA) (2011) of 29%. At present none of the vegetation units are conserved in statutory or private conservation areas, which is alarming since 55% has already undergone transformation, including cultivation (primarily potatoes, rooibos) with central pivot irrigation, and pastures. Water extraction for central pivot irrigation and other agricultural uses is reputedly drying out this vegetation type. Alien species, *Acacia saligna* and *A. cyclops,* are problematic in this vegetation type (Mucina and Rutherford, 2006).

6 TERRESTRIAL THREATENED ECOSYSTEMS

The South African National Biodiversity Institute (SANBI), in conjunction with the Department of Environmental Affairs (DEA), released a draft report in 2009 entitled “Threatened Ecosystems in South Africa: Descriptions and Maps”, to provide background information on the above List of Threatened Ecosystems (SANBI, 2009). The purpose of this report was to present a detailed description of each of South Africa’s ecosystems and to determine their status using a credible and practical set of criteria. The following criteria were used in determining the status of threatened ecosystems:

- Irreversible loss of natural habitat;
- Ecosystem degradation and loss of integrity;
- Limited extent and imminent threat;
- Threatened plant species associations;
- Threatened animal species associations; and
- Priority areas for meeting explicit biodiversity targets as defined in a systematic conservation plan.

In terms of section 52(1) (a), of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA), a national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011 (Government Notice 1002) (Driver *et al.* 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Protected. The purpose of categorising these ecosystems is to prioritise conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and

loss of structure, function, and composition of these ecosystems. It is estimated that Threatened Ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), EIAs and other environmental applications (Mucina and Rutherford, 2006). The project area does not fall within any of the terrestrial threatened or protected ecosystems (**Figure 7**).

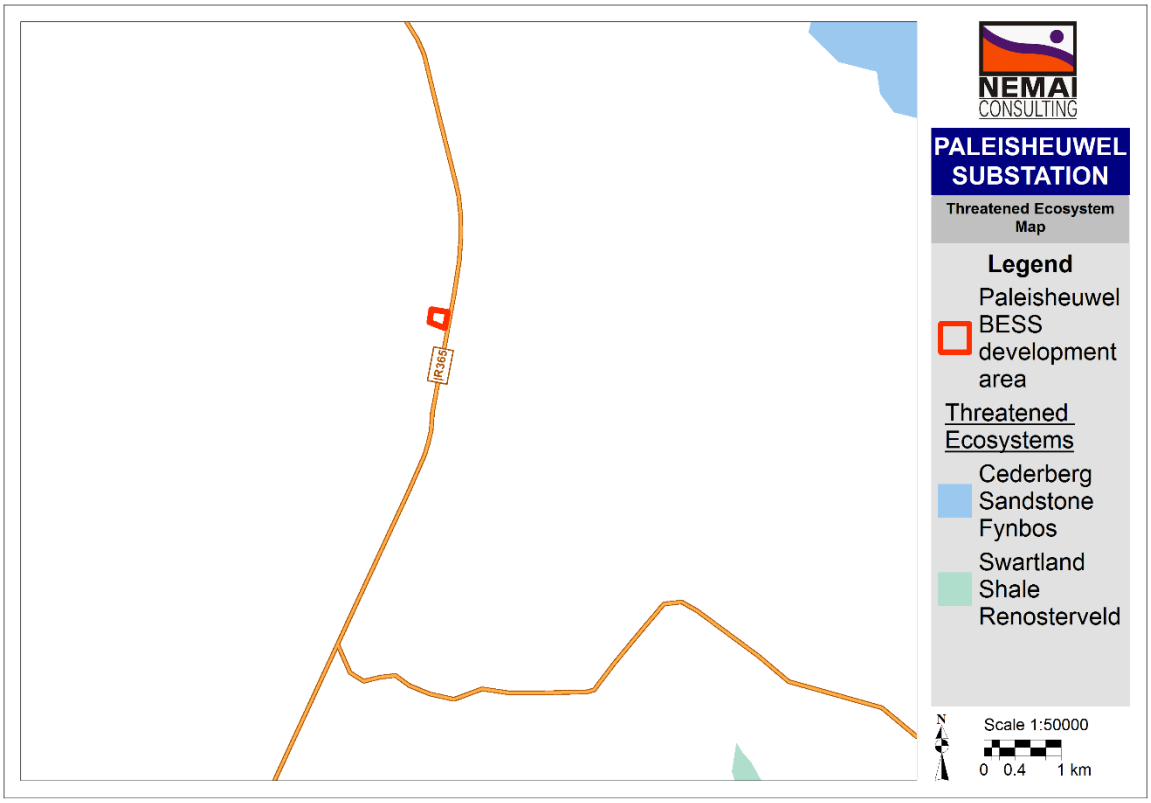

Figure 7. Terrestrial threatened ecosystem with relation to the development area

7 WESTERN CAPE BIODIVERSITY SPATIAL PLAN 2017

The Western Cape Biodiversity Spatial Plan (WCBSP) is the product of a systematic biodiversity planning assessment that delineates, on a map (via a Geographic Information System (GIS)), CBAs and ESAs which require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and freshwater realms. These spatial priorities are used to inform sustainable development in the Western Cape Province (Pool-Stanvliet *et al.* 2017).

The WCBSP is a tool that comprises the Biodiversity Spatial Plan Map of biodiversity priority areas (this product), accompanied by contextual information and land use guidelines (the

WCBSP Handbook) that make the most recent and best quality biodiversity information available for informing all aspects of sustainable development in the Western Cape; from land use and development planning, to environmental assessment and regulation, and natural resource protection and management more broadly (Pool-Stanvliet *et al.* 2017).

The key informant in the spatial product is the Category field which speaks to broad categories defined in the Biodiversity Act and in the Guidelines regarding Bioregional Plans. These categories provide a link to the Handbook's comprehensive set of recommendations about how to use the maps and land- and resource-use guidelines in a range planning processes. The broad categories are: Protected Areas (PAs), Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), and Other Natural Areas (ONAs). In the spatial datasets a further distinction is made between CBAs that are likely to be in a natural condition (CBA 1) and those that are potentially degraded or represent secondary vegetation (CBA 2). Similarly, a distinction is made between ESAs that are likely to be functional (i.e., in a natural, near-natural or moderately degraded condition; ESA 1), and Ecological Support Areas that are likely severely degraded or have no natural cover remaining and therefore require restoration where feasible (ESA 2) ((Pool-Stanvliet *et al.* 2017).

The project area falls within ESA 1 category (**Figure 8**). The proposed development is situated within the existing Paleisheuwel substation property boundaries which is surrounded by the Aurora solar facility and tea farms. The area denoted as ESA 1 is totally transformed due to the existing substation, even though sections of natural habitat are found along the substation boundary. The ESA on site does not provide any ecological functionality and does not sustain any CBAs or terrestrial features.

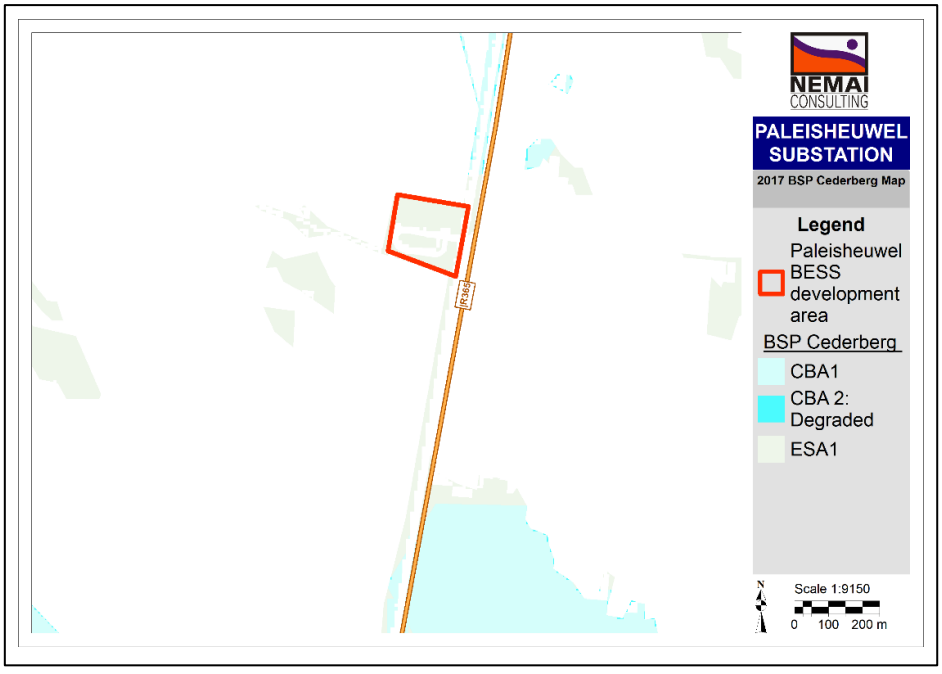

Figure 8. 2017 Western Cape Biodiversity Spatial Plan with relation to the development area

8 METHODOLOGY

8.1 Flora

The flora assessment consisted of two complementary approaches:

- A desktop analysis, which included a literature review (previous specialist studies), local knowledge, topographical maps, and Google Earth imagery; and
- Site visit was conducted in July 2019.

Satellite imagery of the area (Google Earth) was studied in order to acquire a three-dimensional impression of the topography and land use and also to identify potential "hot-spots" or specialized habitats such as natural habitats on or near the study area.

The Pretoria Computerised Information System (PRECIS) list of Red Data plants recorded in the 3218BC quarter degree grid square was consulted to verify the record of occurrence of the plant species seen in the vicinity of the study area. The site sampled is only a very small portion of the whole grid and so habitats suitable for certain species in the PRECIS list may not be present at the areas sampled. The vegetation map published in SANBI (2012) was consulted to identify vegetation units that are found in the study area. The desktop component of the study of the habitats of the Red-Data-listed plants was conducted before the site visit.

The habitats in the study area were inspected in a random zigzag fashion, paying particular attention to areas that at first sight appeared to be sensitive. All general observations were noted such as grasses, herbs (forbs), shrubs and trees. The habitats suitable for Red Data listed species known to occur in the quarter degree grid square were examined intensively for the presence of such species. Attention was also paid to the occurrence of medicinal, alien and declared weed species. Field guides such as van Wyk *et al.* (1997), Pooley (1998), van Oudshoorn (1999) and Manning (2009) were utilised during the field work.

Exotic and invasive plant species were categorised according to the framework laid out by The Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA). CARA defines weeds as alien plants, with no known useful economic purpose that should be eradicated. Invader plants, also considered by the Act, can also be of alien origin but may serve useful purposes as ornamental plants, as sources of timber, or other benefits such as medicinal uses (Henderson, 2001). These plants need to be managed and prevented from spreading.

Invasive species are controlled by NEM:BA – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014. The AIS Regulations list four (4) different categories of invasive species that must be managed, controlled or eradicated from areas where they may cause harm to the environment, or that are prohibited to be brought into South Africa.

Invasive plant species are divided into four categories, namely:

- Category 1a: Invasive species which must be combatted and eradicated. Any form of trade or planting is strictly prohibited.

- Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form or trade or planting is strictly prohibited.
- Category 2: Invasive species, or species deemed to be potentially invasive, in which a permit is required to carry out a restricted activity. Category 2 species include commercially important species such as pine, wattle and gum trees.
- Category 3: Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade, is however prohibited.

According to van Oudtshoorn (1999), a grass species reacts to grazing in one of two ways: it can either become more or less abundant. **Table 2** describes the classification of grasses.

Table 2. Classification of grasses (van Oudtshoorn, 1999)

Class	Description	Examples
Decreasers	Grasses that are abundant in good veld, but that decrease in number when the veld is overgrazed or undergrazed.	*Themeda triandra, Digitaria eriantha*
Increaser 1	Grasses that are abundant in underutilised veld. These grasses are usually unpalatable, robust climax species that grow without any defoliation	*Hyperthelia dissoluta, Trachypogon spicatus*
Increaser 2	Grasses that are abundant in overgrazed veld. These grasses increase due to the disturbing effect of overgrazing and include mostly pioneer and subclimax species	*Aristida adscensionis, Eragrostis rigidor*
Increaser 3	Grasses that are commonly found in overgrazed veld. These are usually unpalatable, dense climax grasses	*Sporobolus africanus, Elionurus muticus*
Invaders	All plants that are not indigenous to an area. These plants are mostly pioneer plants and are difficult to eradicate	*Arundo donax*

9 RESULTS AND DISCUSSION

9.1 Flora

9.1.1 Desktop study results

The study area is located within the following quarter degree square in terms of the 1:20 000 grid of South Africa 3218BC. SANBI uses this grid system as a point of reference to determine any Red Data plant species or any species of conservation concern occurring in South Africa. This can be used to determine the list of species which could potentially occur within an area (**Figure 9**).

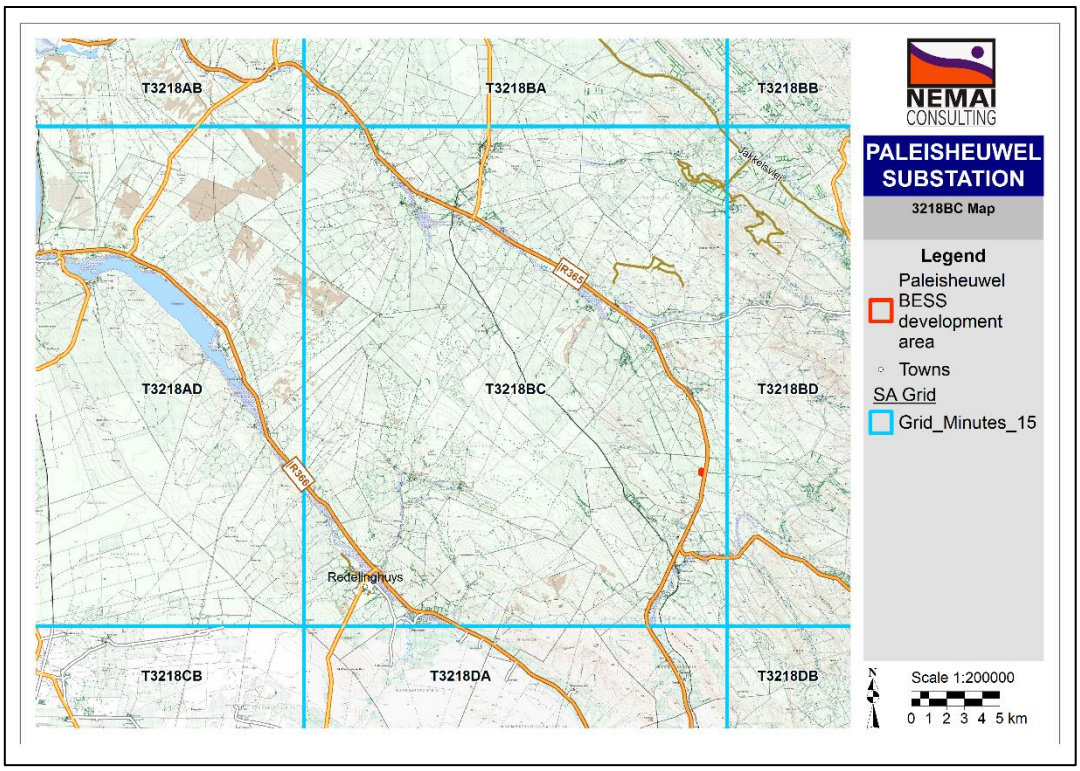

Figure 9. 1:50 000 grid of South Africa 3218BC with relation to the development area

Table 3 indicates the Red data plants that are known to occur on or around the project area recorded in 3218BC quarter degree square. The definitions of the conservation status are provided in **Table 4.**

Table 3. Red Data Plant species which could potentially occur within the study area (SANBI data, Raimondo *et al*. 1999)

RDL floral species	Conservation Status
Agathosma marifolia	Near Threatened
Erica dregei	Endangered
Athanasia sertulifera	Endangered
Lebeckia plukenetiana	Endangered
Leucadendron foedum	Vulnerable
Macrostylis hirta	Vulnerable
Aspalathus ternata	Near Threatened
Ficinia pygmaea	Near Threatened
Cullumia floccosa	Critically Endangered
Cullumia micracantha	Endangered
Lampranthus amoenus	Endangered
Leucospermum rodolentum	Vulnerable
Stapelia glanduliflora	Vulnerable
Euchaetis tricarpellata	Vulnerable
Muraltia brevicornu	Vulnerable
Oncosiphon africanum	Vulnerable

RDL floral species	Conservation Status
Pelargonium fasciculaceum	Near Threatened
Diosma dichotoma	Endangered
Caesia sabulosa	Vulnerable
Lachnaea capitata	Vulnerable
Helichrysum tricostatum	Near Threatened
Leucadendron brunioides var. *flumenlupinum*	Critically Endangered
Leucadendron procerum	Vulnerable
Macrostylis cassiopoides subsp. *dregeana*	Endangered
Macrostylis crassifolia	Vulnerable
Lachenalia contaminata	Near Threatened
Manulea corymbosa	Vulnerable
Phylica cuspidate var. *cuspidata*	Vulnerable
Passerina filiformis subsp. *glutinosa*	Near Threatened
Phylica cylindrica	Vulnerable
Protea scolymocephala	Vulnerable
Serruria millefolia	Vulnerable
Albuca clanwilliamae-gloria	Endangered
Aspalathus cuspidata	Vulnerable
Disperis cucullata	Near Threatened
Elegia recta	Near Threatened
Felicia josephinae	Vulnerable
Heliophila elata	Vulnerable
Lachenalia bachmannii	Endangered
Lampranthus debilis	Endangered
Leucadendron loranthifolium	Near Threatened
Polycarena subtilis	Endangered
Serruria decipiens	Vulnerable
Serruria rubricaulis	Near Threatened
Leucadendron stellare	Critically Endangered
Serruria adscendens	Near Threatened

Table 4. Definitions of Red Data status (Raimondo *et al.* 1999)

Symbol	Status	Description
CR	Critically Endangered	A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five International Union for Conservation of Nature (IUCN) criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
EN	Endangered	A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
VU	Vulnerable	A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
NT	Near Threatened	A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable, and is therefore likely to become at risk of extinction in the near future.

9.1.2 Plant species recorded in the study area

The project area is situated around the existing substation footprint but within the same property boundary i.e. between the substation fence and the property boundary. The natural vegetation is mostly dominated by the perennial, grass-like restio *Willdenowia incurvata* (Sonqua Sunreed) (**Figure 10**). Various alien invasive plant species and weeds were also dominant around the fence, with remnants of Leipoldtville Sand Fynbos vegetation type still remaining on site. All of the plant species recorded during the field visit within the study area are listed in **Table 5**.

Figure 10. *Willdenowia incurvata* recorded within the project area

Table 5. Plant species recorded within the development area

Family	Scientific name	Common name	Ecological status (SA Red list categories)	Form
Fabaceae	*Acacia cyclops*	Red eye	Invader Category 1b	Tree
Fabaceae	*Acacia saligna*	Port Jackson willow	Invader Category 1b	Tree
Hyacinthaceae	*Albuca viscosa*	Sticky tamarack	Least Concern	Herb
Hyacinthaceae	*Albuca canadensis*	Soldier-in-the-box	Least Concern	Herb
Fabaceae	*Aspalathus tridentata*	Langbeen Capegorse	Least Concern	Shrub
Asparagaceae	*Asparagus rubicundus*	Red-stemmed asparagus	Least Concern	Shrub
Amaryllidaceae	*Brunsvigia orientalis*	Candelabra lily	Schedule 4 Protected Flora Cape Nature	Succulent
Aizoaceae (Mesembryanthemaceae)	*Carpobrotus edulis*	Sea Fig	Least Concern	Succulent
Gentianaceae	*Chironia sp*		Least Concern	Herb
Asteraceae	*Dicerothamnus rhinocerotis= Elytropappus rhinocerotis*	Rhinoceros bush	Least Concern	Herb
Asteraceae	*Dimorpotheca pluvialis*	Cape Daisy	Least Concern	Herb
Ebenaceae	*Diospyros glabra*	Blueberry Bush	Least Concern	Shrub
Ebenaceae	*Diospyros lycioides*	Blue bush	Least Concern	Shrub
Sapindaceae	*Dodonaea viscosa* var. *angustifolia*	Sand Olive	Least Concern	Shrub
Ebenaceae	*Euclea acutifolia*	Guarri	Least Concern	Shrub
Asteraceae	*Euryops speciosissimus*	Clanwilliam Daisy	Least Concern	Herb
Poaceae	*Eragrostis curvula*	Weeping Love Grass	Least Concern	Grass
Poaceae	*Ehrharta calycina*	Perennial Veld Grass	Least Concern	Grass
Asteraceae	*Felicia sp*		Least Concern	Herb
Asteraceae	*Felicia fruticosa*	Blue Margarite	Least Concern	Herb
Hyacinthaceae	*Lachenalia pusilla*	Cape cowslips	Least Concern	Herb
Proteaceae	*Leucospermum rodolentum*	Sandveld Pincushion	Vulnerable Schedule 4 Protected Flora Cape Nature	Shrub

Family	Scientific name	Common name	Ecological status (SA Red list categories)	Form
Fabaceae	*Lupinus angustifolius*	Blue lupin	Weed	Herb
Asteraceae	*Metalasia sp*		Least Concern	Shrub
Apocynaceae	*Microloma sagittatum*	Bokhoring	Schedule 4 Protected Flora Cape Nature	Herb
Polygalaceae	*Muraltia spinosa (=Nylandtia spinosa)*	Tortoise berry	Least Concern	Herb
Polygalaceae	*Muraltia scoparia (=Nylandtia scoparia)*	Tortoise berry	Least Concern	Shrub
Asteraceae	*Crassothonna (Othonna) cylindrica*	Ossierapuisbos	Least Concern	Herb
Oleaceae	*Olea sp*		Least Concern	Shrub
Asteraceae	*Othonna leptodactyla*		Least Concern	Herb
Oxalidaceae	*Oxalis luteola*	Pink Sorrel	Least Concern	Herb
Thymelaeaceae	*Passerina corymbosa*	Gonna bush	Least Concern	Shrub
Thymelaeaceae	*Passerina vulgaris*		Least Concern	Shrub
Pinaceae	*Pinus pinaster*	Cluster pine	Invader 2	Tree
Rhamnaceae	*Phylica sp*		Least Concern	Shrub
Celastraceae	*Putterlickia pyracantha*	False Spike-thorn	Least Concern	Shrub
Asteraceae	*Pteronia camphorata*	Sandgombos	Least Concern	Shrub
Brassicaceae	*Raphanus raphanistrum*	Wild radish	Weeds	Herb
Lamiaceae	*Salvia africana-lutea*	Brown Salvia	Least Concern	Shrub
Anacardiaceae	*Searsia dissecta*	Langsteel Korentebossie	Least Concern	Shrub
Anacardiaceae	*Searsia rigida*	Margaret's Rock Currant	Least Concern	Shrub
Proteaceae	*Serruria aitonii*	Marshmallow Spiderhead	Schedule 4 Protected Flora Cape Nature	Shrub
Asteraceae	*Seriphium (Stoebe) plumosum*	Slangbos	Least Concern	Shrub
Asteraceae	*Seriphium (Stoebe) nervigera*	steekblaarslangbos	Least Concern	Shrub
Aizoaceae (Mesembryanthemaceae)	*Tetragonia fruticosa*	Kinkelbossie	Schedule 4 Protected Flora Cape Nature	Shrub
Restionaceae	*Thamnochortus bachmannii*	Namaqua thatching reed	Least Concern	Reed

Family	Scientific name	Common name	Ecological status (SA Red list categories)	Form
Asphodelaceae	*Trachyandra sp*		Least Concern	Herb
Restionaceae	*Willdenowia incurvata*	Sonqua Sunreed	Least Concern	Grass-like restio

9.1.3 Alien invasive species recorded in the study area

Alien invader plants are species that are of exotic, non-native or of foreign origin that typically invade undeveloped or disturbed areas. Invaders are a threat to our ecosystem because by nature they grow fast, reproduce quickly and have high dispersal ability (Henderson, 2001). This means that invader plants and seeds spread rapidly and compete for the growing space of our own indigenous plants. If these invader plants out-compete indigenous plants there is a shift in the species composition of the area and the change in our plant communities causes a decline in species richness and biodiversity (Henderson, 2001). Many factors allow alien invasive plants to succeed, particularly the absence of their natural enemies. This makes it difficult to control invasive plants without bringing in natural enemies and eliminating the high competition they have over the indigenous vegetation (Bromilow, 2010). Alien invasive plant species within the proposed development area were observed to occur in clumps, scattered distributions or as single individuals on site. Invader and weed species must be controlled to prevent further infestation and it is recommended that all individuals of invader species (Especially Category 1) must be removed and eradicated (Henderson, 2001). Riparian vegetation, human settlements, overgrazed areas, roads and foot paths are all associated with alien invasive plant species. Alien invasive plant species such as *Acacia saligna* (Port Jacksons willow) (**Figure 11**) and *Acacia cyclops* (Red eye) (**Figure 12**) were recorded in abundance within the study area.

Figure 11. *Acacia saligna* recorded within the project area

Figure 12. *Acacia cyclops* recorded within the project area

9.1.4 Species of Conservation Concern recorded within the project area

According to the NEM:BA, there is a dire need to conserve biodiversity in each Province and as such, all natural and/or indigenous resources must be utilised sustainably. According to the South African Red Data list categories done by SANBI (**Figure 13**), **threatened species** are species that are facing a high risk of extinction. Any species classified in the International Union for Conservation of Nature (IUCN) categories Critically Endangered, Endangered or Vulnerable is a threatened species whereas **Species of conservation concern** are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient – Insufficient Information (DDD).

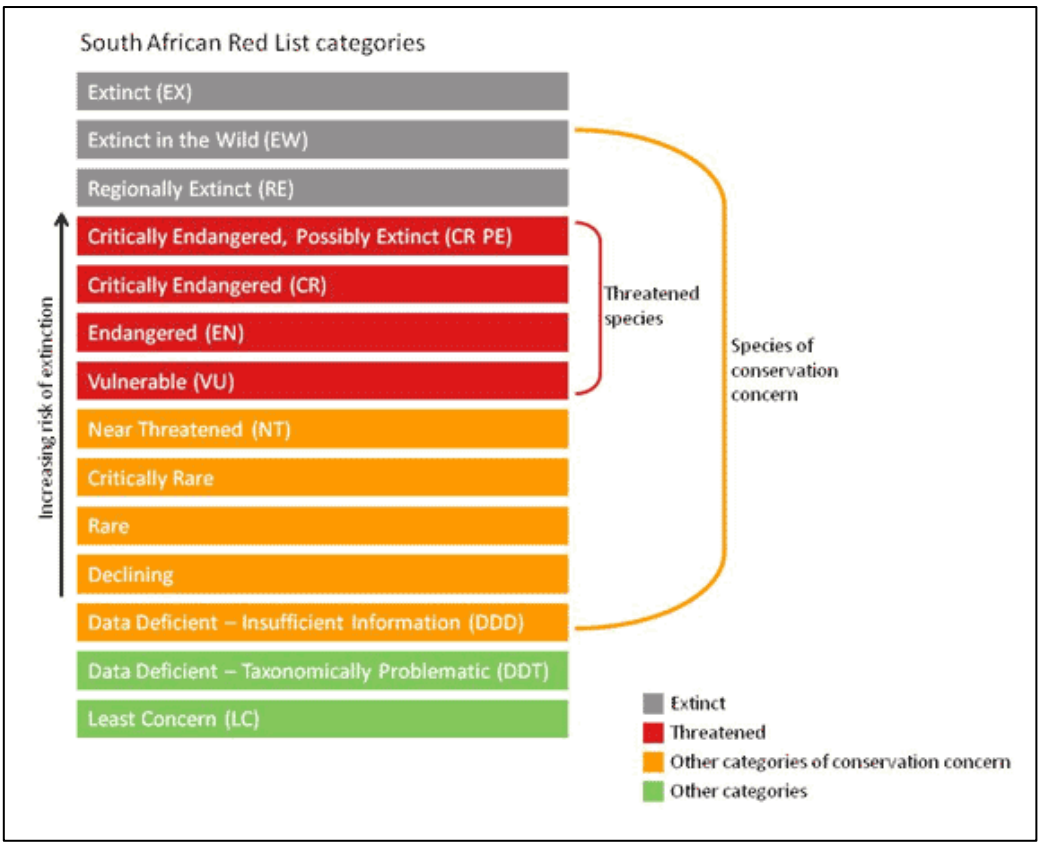

Figure 13. South African Red data list categories (SANBI)

During the field survey, only one threatened plant species (3 individuals) was observed within the study area, namely *Leucospermum rodolentum*. According to Raimondo *et al.* (2009), this plant species is listed as Vulnerable. This species belongs to the family Proteaceae and this family is listed in Schedule 4 (Protected flora) of the Western Cape Nature Conservation Laws Amendment Act of 2000. Therefore, a permit to remove this species will need to be obtained from CapeNature. According to Helme (2012), Red Data plant species such as *Leucadendron procerum* (Vulnerable), *L. loranthifolium* (Near Threatened), *Cullumia micracantha* (Endangered), *Phylica cuspidata* (Vulnerable), *Aspalathus ternata* (Near Threatened) and *Athanasia sertulifera* (Endangered) are known to occur in the area but were not recorded within the proposed development area during this field visit. Many of these plant species were recorded by Helme (2012) on farms within the vicinity especially on the natural strip areas. **Appendix A** indicates the photographs of the Red data plant species.

Leucospermum rodolentum (**Figure 14**) occurs in Sand fynbos on the west coast lowlands where it survives in arid areas by tapping into deep water (Rebelo *et al.* 2005). It is an endemic species that only grows in a small area of the Western Cape province of South-Africa.

Figure 14. *Leucospermum rodolentum* recorded on site

Although *Brunsvigia orientalis* (**Figure 15**) is listed in the 'Red List' as of 'Least Concern', a 'Search and Rescue' strategy should nevertheless be implemented to save these plants from where they would be impacted by BESS project as they are provincially protected species (Western Cape Nature Conservation Laws Amendment Act of 2000 Schedule 4 Protected flora).

Figure 15. *Brunsvigia orientalis* recorded on site

Apart from the Red Data listed species, there are many provincially protected species present within the study area. The following provincially protected species (Western Cape Nature Conservation Laws Amendment Act of 2000 (Schedule 3 and 4 Endangered and Protected flora, respectively)) were recorded on site, namely:

- *Amaryllidaceae* – all species
- Apocynaceae - All species except those specified in Schedule 3;
- *Mesembryanthemaceae* – all species and
- *Proteaceae* - All species except those specified in Schedule 3.

A permit in order to remove these plant species will need to be obtained from CapeNature. The removal should occur with due care, preferably by a qualified botanist or similarly qualified individual (a horticulturist with West Coast Search and rescue experience). The plant should be relocated into areas with the same aspect, soil conditions and elevation to ensure that the relocations are successful. The distribution of plant SCC and provincially protected flora are indicated in **Figure 16** below.

Figure 16. The distribution of plant SCC and provincially protected flora within the proposed development site

9.1.5 Habitat available for species of conservation importance

The list of Red data plant species previously recorded in the region (3218BC QDS) in which the proposed development is situated was obtained from SANBI. These species and their probability of occurrence are indicated in **Table 6** below. The probability of occurrence is

based on the suitable habit where the species is likely to occur. On the basis of habitat preferences, the species could be allocated to habitats within the study area where they are most likely to be found.

Table 6. Red Listed plant species which are known to occur in the general vicinity of the project area (Raimondo *et al*. 1999) which could potentially be found within the study area.

RDL floral species	Conservation Status	Suitable habitat	Probability of Occurrence
Agathosma marifolia	Near Threatened	Deep sands between rocks.	Low
Erica dregei	Endangered	Sandy flats.	Low
Athanasia sertulifera	Endangered	Dry, sandy flats.	High
Lebeckia plukenetiana	Endangered	Renosterveld on shales and granites.	Low
Leucadendron foedum	Vulnerable	Most prominent in Hopefield Sand Fynbos.	Low
Macrostylis hirta	Vulnerable	Well-drained sandy soils, occurring in deep sands as well as shallow rocky soils	High
Aspalathus ternata	Near Threatened	Lowland sand fynbos.	High
Ficinia pygmaea	Near Threatened	Seasonally wet coastal pans.	Low
Cullumia floccosa	Critically Endangered	Deep sands.	Medium
Cullumia micracantha	Endangered	Sand fynbos, deep sands	Medium
Lampranthus amoenus	Endangered	Low-lying sandy flats in Sand Fynbos.	Low
Leucospermum rodolentum	Vulnerable	Sand fynbos on the west coast lowlands, survives in arid areas by tapping deep water.	**FOUND**
Stapelia glanduliflora	Vulnerable	Arid, stony slopes among shrubs.	Medium
Euchaetis tricarpellata	Vulnerable	Mainly deep sandy soils on flats, occasionally in rocky sandstone fynbos.	Medium
Muraltia brevicornu	Vulnerable	Lowland acid sands over clay.	Low
Oncosiphon africanum	Vulnerable	Coastal sands, salt marshes and inland sandy areas.	Low
Pelargonium fasciculaceum	Near Threatened	Deep sands in arid fynbos.	Low
Diosma dichotoma	Endangered	Sandy plains, close to the coast.	Very Low
Caesia sabulosa	Vulnerable	Deep sandy flats.	Low
Lachnaea capitata	Vulnerable	Acid sand flats, often seasonally damp.	Low
Helichrysum tricostatum	Near Threatened	Sandveld, on sandy flats.	Low
Leucadendron brunioides var. *flumenlupinum*	Critically Endangered	Dry montane fynbos in moist habitats such as seeps and river courses on sandy alluvium or sandstone-derived soils.	Low
Leucadendron procerum	Vulnerable	Found in deep sands, slopes and flats.	High

RDL floral species	Conservation Status	**Suitable habitat**	**Probability of Occurrence**
Macrostylis cassiopoides subsp. *dregeana*	Endangered	Acid sands.	Low
Macrostylis crassifolia	Vulnerable	Sandy flats.	Medium
Lachenalia contaminata	Near Threatened	Seasonally wet flats.	Very low
Manulea corymbosa	Vulnerable	Sandy soils near the coast.	Very low
Phylica cuspidata var. *cuspidata*	Vulnerable	Lowland sand flats and stony/rocky soils on mountain slopes	Very low
Passerina filiformis subsp. *glutinosa*	Near Threatened	Strandveld, in deep calcareous coastal sands.	High
Phylica cylindrica	Vulnerable	Lowland sand flats and lower mountain slopes.	Medium
Protea scolymocephala	Vulnerable	A sand plain species, tending to occur along drainage lines and adjacent seepage areas	Very low
Serruria millefolia	Vulnerable	Arid sandstone fynbos.	Medium
Albuca clanwilliamae-gloria	Endangered	Deep acid sands.	Medium
Aspalathus cuspidata	Vulnerable	Sandy plains.	Medium
Disperis cucullata	Near Threatened	Sand Plain Fynbos and renosterveld, in seasonally damp areas on flats,	Very low
Elegia recta	Near Threatened	Seasonally waterlogged habitats, over a wide range of soils including shale or acid coastal sands.	Very low
Felicia josephinae	Vulnerable	Deep acid sands in sandveld.	Medium
Heliophila elata	Vulnerable	Sandy flats, mountain plateaus and slopes.	Medium
Lachenalia bachmannii	Endangered	Lowland flats, on edges of vernal pools on clays.	Very low
Lampranthus debilis	Endangered	Seasonally wet flats.	Very low
Leucadendron loranthifolium	Near Threatened	Sandy flats in sandstone fynbos.	Low
Polycarena subtilis	Endangered	Sandy flats	Medium
Serruria decipiens	Vulnerable	Sand Fynbos of the west coast lowlands.	Medium
Serruria rubricaulis	Near Threatened	Sandstone fynbos at lower altitudes.	Low
Leucadendron stellare	Critically Endangered	Terrestrial	Low
Serruria adscendens	Near Threatened	Sandstone fynbos, lower slopes.	Low

10 IMPACT ASSESSMENT METHODOLOGY FOR EIAS - INSTRUCTIONS TO SPECIALISTS

The significance of all potential impacts that would result from the proposed Project is determined in order to assist decision-makers. The significance rating of impacts is considered by decision-makers, as shown below.

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.
- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.
- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity.
- **HIGH**: the potential impact **will** affect a decision regarding the proposed activity.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur. The significance of each identified impact[1] must be rated according to the methodology set out below:

Step 1 – Determine the **consequence** rating for the impact by determining the score for each of the three criteria (A-C) listed below and then **adding** them[2]. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Table 7. Consequence Rating Methodology

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1

[1] This does not apply to minor impacts which can be logically grouped into a single assessment.

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Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. ***Duration***– *the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years (i.e. reversible impact)	1
Medium-term	2 to 15 years (i.e. reversible impact)	2
Long-term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Example 1:

Extent	Intensity	Duration	**Consequence**
Regional 2	Medium 2	Long-term 3	**High** 7

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

Table 8. Probability Rating Methodology

Probability– the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Example 2:

Extent	Intensity	Duration	**Consequence**	**Probability**
Regional 2	Medium 2	Long-term 3	**High** 7	Probable

Step 3 – Determine the overall **significance** of the impact as a combination of the **consequence** and **probability** ratings, as set out below:

Table 9. Significance Rating Methodology

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

Example 3:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**

Step 4 – Note the **status** of the impact (i.e. will the effect of the impact be negative or positive?)

Example 4:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***	***Status***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**

Step 5 – State your level of **confidence** in the assessment of the impact (high, medium or low).

Depending on the data available, you may feel more confident in the assessment of some impact than others. For example, if you are basing your assessment on extrapolated data, you may reduce the confidence level to low, noting that further ground-truthing is required to improve this.

Example 5:

Extent	*Intensity*	*Duration*	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**	High

Step 6 – Identify and describe practical **mitigation** and **optimisation** measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- **Essential**: best practice measures which must be implemented and are non-negotiable; and.
- **Best Practice**: recommended to comply with best practice, with adoption dependent on the proponent's risk profile and commitment to adhere to best practice, and which must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures.

Example 6: A completed impact assessment table

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Regional 2	Medium 2	Long-term 3	**High** 7	Probable	**HIGH**	**– ve**	High
Essential mitigation measures: • Xxx1 • Xxx2 • Xxx3								
With mitigation	Local 1	Low 1	Long-term 3	**Low** **5**	Improbable	**VERY LOW**	**– ve**	High

Best practice measures (which are assumed not to affect impact significance ratings) must be presented in the text, in bullet format.

Step 7 – Summarise all impact significance ratings as follows in your executive summary:

Impact	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Impact 1: XXXX	Medium	Improbable	**LOW**	–ve	High
With Mitigation	Low	Improbable	**VERY LOW**		High
Impact 2: XXXX	Very Low	Definite	**VERY LOW**	–ve	Medium
With Mitigation:	*Not applicable*				

10.1 Construction Phase

Activities include:

- Clearance of vegetation that will impact on the vegetation negatively due to loss of plant SCC.
- Removal of topsoil will impact on the rehabilitation of the project area.
- Site establishment and preparation (placement of construction material, construction camp, laydown areas, etc.).
- Storage of non-hazardous construction material.
- Storage of hazardous/dangerous material e.g. fuel for generators, storage of the liquid electrolyte prior to fuelling the flow batteries.
- Storage of general waste.
- Storage of hazardous waste.

As a result of the proposed activities, the potential impacts include the following:

- Loss of plant SCC from vegetation clearance and the construction of the BESS.

- Potential loss of topsoil from site preparation. Loss of topsoil on areas that will be compacted and/or covered with hardened surfaces e.g. cement. Topsoil will be removed in these areas and stored until rehabilitation.
- Loss of vegetation from vegetation clearance and the construction of the BESS.
- Increased soil erosion due to compaction by vehicles and construction activities, and incorrect storm water management measures.
- Proliferation of alien invasive species on account of site disturbance. Introduction and spread of weeds and invasive alien plants in and around the site due to imported soil used during construction of the BESS, transportation and human movements.
- Loss of vegetation due to fuel and chemical spills from the use of electrical equipment e.g. generator and storage of hazardous substances.
- Loss of endangered vegetation type and ESA habitats from vegetation clearance and construction of the BESS.

The construction phase of the proposed development is anticipated to have direct impacts on floral habitat and loss of plant SCC (threatened species). Even though the development area is situated just outside of the existing substation fence (although within the same property boundary), the vegetation type on site is listed as endangered, with the presence of plant SCC and provincially protected flora. Site clearing will potentially result in permanent removal of floral habitat which is considered to be of ecological importance to the survival of plant SCC such as *Leucospermum rodolentum* and therefore the disturbance of vegetation must be limited only to areas of construction. The provincially protected species were recorded in abundance on site. The potential loss of plant SCC is site specific and the plants that can be used during rehabilitation should be identified and stored appropriately off-site for use after construction.

Topsoil will be required during the rehabilitation of the proposed development area and should there be a loss of topsoil and proliferation of alien species, this could ultimately lead to loss and/or degradation of floral habitat.

Soils on site are considered to be equally predisposed to potential contamination, as contamination sources are generally unpredictable and often occur as incidental spills or leak for construction developments. The significance of soil contamination is considered to be very low, largely depending on the nature, volume and/or concentration of the contaminant of concern. Although the majority of the identified soils display moderately low susceptibility to erosion under current (undisturbed) veld conditions, their susceptibility to erosion will be largely increased once the vegetation is cleared for construction activities, and the soils will inevitably be exposed to wind and storm water.

The clearing of vegetation will lead to the disturbance and degradation of flora habitat, which then creates opportunities for invasion by invasive and alien species. The loss of topsoil, loss of ESA, soil contamination, proliferation of alien species etc. could ultimately lead to loss and/or degradation of floral habitat. These impacts are mostly localised and if the mitigation measures are adequately addressed, their significance with mitigation measures can be reduced to low and or insignificant.

Table 10. Proposed construction phase impacts and the recommended mitigation measures for the proposed Eskom Paleisheuwel BESS in the West Coast Group of BESS Project

Impact 1. Loss of a threatened plant species and plant SCC from vegetation clearance as a result of placement of infrastructure and construction of the BESS

CONSTRUCTION PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Long-term 3	**Medium** 6	Definite	**MEDIUM**	**– ve**	High
Essential mitigation measures: • Appoint a suitably qualified specialist to undertake and oversee the rescue and relocation of plant SCC and provincially protected flora species. A suitable timeframe must be allowed before construction commences to undertake the plant rescue and relocation operation. The relocation/replanting of these plant species should preferably take place in Autumn, once the rains have fallen, in order to fast track establishment of these plant species on site. • Obtain a permit from CapeNature for the removal/destruction of plant SCC and provincially protected flora. • The design and construction layout plan should be done in such a manner as to consider the least damage/ removal of plant SCC and provincially protected plants where possible. • Plants that can be used during rehabilitation should be identified and stored appropriately off-site for use after construction. • Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm and this can be achieved through provision of appropriate awareness to all personnel.								
With mitigation	Local 1	Low 1	Long-term 3	**Low** **5**	Probable	**LOW**	**--ve**	High

Impact 2. Potential loss of topsoil from site preparation and construction of BESS

CONSTRUCTION PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Low 1	Medium-term 2	**Very Low** 4	Definite	**VERY LOW**	**– ve**	High
Essential mitigation measures: • During site preparation, topsoil and subsoil are to be stripped separately from each other and must be stored separately from spoil material for use in the rehabilitation phase. It should be protected from wind and rain, as well as contamination from diesel, concrete or wastewater. • Records of all environmental incidents must be maintained, and a copy of these records must be made available to authorities on request throughout the project execution. • Movement of vehicles on site is to be along the approved and formalised access roads, which shall be adequately mainlined throughout construction.								
With mitigation	Local 1	Low 1	Short-term 1	**Very-Low** **3**	Possible	**INSIGNIFICANT**	**– ve**	High

Impact 3. Loss of vegetation from vegetation clearance and the construction of the BESS.

CONSTRUCTION PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Low 1	Long-term 3	**Low** 5	Definite	**LOW**	**– ve**	High
Essential mitigation measures: • Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for development purposes, should be incorporated into landscaped areas. • Vegetation clearing should be kept to a minimum, and this should only occur where it is absolutely necessary. • Plants that can be used during rehabilitation should be identified and stored appropriately off-site for use after construction. • Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm and this can be achieved through provision of appropriate awareness to all personnel. • Prevent contamination of natural vegetation by any pollution. • Proliferation of alien and invasive species is expected within the disturbed areas and they should be eradicated and controlled to prevent further spread. • No structures should be built outside the area demarcated for the development. • No storage of building materials or rubbles are allowed outside the area demarcated for the development. • Avoid translocating stockpiles of topsoil from one place to sensitive areas in order to avoid translocating soil seed banks of alien species. • All stockpiles, construction vehicles, equipment and machinery should be situated within the development site. • Although it is unavoidable that sections of the project infrastructure development will need to traverse areas of potential high sensitivity, the clearing of vegetation must be limited to the development area acquired for the project.								
With mitigation	Local 1	Low 1	Long-term 3	**Low** **5**	Probable	**LOW**	**– ve**	High

Impact 4. Increased soil erosion due to compaction by vehicles and construction activities, and incorrect storm water management measures

CONSTRUCTION PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Short-term 1	**Very-Low** 4	Possible	**INSIGNIFICANT**	**– ve**	High
Essential mitigation measures: • Topsoil from the construction activities should be stored for post-construction rehabilitation work and should not be disturbed more than is absolutely necessary. • Protect topsoil from contamination by aggregate, cement, concrete, fuels, litter, oils, domestic and wastes. • An ecologically-sound storm water management plan must be implemented during construction and appropriate water diversion systems put in place.								
With mitigation	Local 1	Low 1	Short-term 1	**Very-Low** **3**	Possible	**INSIGNIFICANT**	**– ve**	High

Impact 5. Proliferation of alien invasive species on account of site disturbance

CONSTRUCTION PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Medium-term 2	**Low** 5	Probable	**LOW**	**– ve**	High
Essential mitigation measures: • Control of alien invasive species and noxious weeds for areas disturbed by the construction activities, in accordance with the requirements of the NEM:BA Alien and Invasive Species Regulations. Eradication method to be approved by Eskom OU Project Environmental Manager. • To prevent unnecessary alien plant infestations, an alien plant monitoring and eradication programme needs to be in place, at least until the disturbed areas have recovered and properly stabilised.								
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low** **4**	Possible	**INSIGNIFICANT**	**– ve**	High

Impact 6. Loss of vegetation due to fuel and chemical spills from the use of electrical equipment e.g. generator and storage of hazardous substances.

CONSTRUCTION PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Medium-term 2	**Low** 5	Possible	**VERY LOW**	**– ve**	High
Essential mitigation measures: • Appropriate measures should be implemented in order to prevent potential soil pollution through fuel, oil leaks and spills and then compliance monitored by an appropriate person. • Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. • An Eskom emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur. • Measures to avoid leakages and spillages on to bare ground and leakages must be undertaken. • Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Safe disposal certificate must always be returned and filed at the waste disposal site. Drip-trays must be placed under vehicles and equipment when not in use. • Washing and cleaning of equipment should also be done within bunds, in order to trap any cement and prevent excessive soil erosion and these sites must be re-vegetated after construction has been completed. • Eskom's spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase. • Surface runoff must be contained and regarded as contaminated and hazardous and must not be allowed into the natural environment. All surface runoff from the waste disposal site must be recaptured through a sump, and either channelled to a treatment facility or contained in drums and disposed off as liquid hazardous waste at a properly permitted hazardous waste site. • Spill kits will be made available on site for clean-up of spills and leaks of contaminants.								
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low** **4**	Improbable	**INSIGNIFICANT**	**– ve**	High

Impact 7. Loss of endangered vegetation type from vegetation clearance and construction of the BESS.

CONSTRUCTION PHASES								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Long-term 3	**Medium** 6	Definite	**MEDIUM**	**– ve**	High
Essential mitigation measures: • The most significant way to mitigate the loss of sensitive habitat is to limit the construction footprint within the natural habitat areas remaining. Disturbance of vegetation must be limited to the development area acquired for the project. Where possible, sensitive habitats must not be cleared and encouraged to grow. • Disturbance of vegetation must be limited only to areas of construction. • Eskom must employ a botanist/ rehabilitation specialist who will compile a rehabilitation plan and also oversee the entire rehabilitation process. • All stockpiles, construction vehicles, equipment and machinery should be situated inside of the development footprint • Prevent contamination of natural areas by any pollution.								
With mitigation	Local 1	Medium 2	Medium-term 2	**Low** **5**	Probable	**LOW**	**– ve**	High

Impact 8. Loss of ESA habitats from vegetation clearance and construction of the BESS.

CONSTRUCTION PHASES								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Low 1	Long-term 3	**Low** 5	Definite	**LOW**	**– ve**	High
Essential mitigation measures: • The most significant way to mitigate the loss of sensitive habitat is to limit the construction footprint within the natural habitat areas remaining. Disturbance of vegetation must be limited to the development area acquired for the project. Where possible, sensitive habitats must not be cleared and encouraged to grow. • Disturbance of vegetation must be limited only to areas of construction. • Eskom must employ a botanist/ rehabilitation specialist who will compile a rehabilitation plan and also oversee the entire rehabilitation process. • All stockpiles, construction vehicles, equipment and machinery should be situated inside of the development footprint • Prevent contamination of natural areas by any pollution.								
With mitigation	Local 1	Low 1	Medium-term 2	**Very Low** **4**	Probable	**VERY LOW**	**– ve**	High

10.2 Operational Phase

Activities include:

- Vegetation management activities e.g. removal of plants from the BESS site.
- Changing electrical equipment.
- Refuelling of electrolyte.
- Repairs and maintenance of equipment, buildings, fencing, roads.
- Waste generation and temporary storage on site.
- Site inspections by personnel.

As a result of the proposed activities, the potential impacts include the following:

- Loss of vegetation type, important species and ecological processes resulting from vegetation management measures e.g. manual vegetation removal, brush cutting or application of herbicide within the BESS site.
- Introduction and spread of weeds and invasive alien plants in and around the site due to disturbance cause during construction of the BESS, transportation and human movements.
- Loss of topsoil due to erosion caused by inadequate/ failing storm water management measures/designs.
- Disturbance to ecological processes due to altered habitat and disturbance to natural movements/processes.
- Soil contamination from hazardous substance spillages outside their primary and secondary containment.
- Loss of vegetation type, important species and ecological processes from soil contamination or spillage onto vegetation from hazardous substance spillages outside their primary and secondary containment.
- Loss of vegetation from fires due to operating of electrical equipment during construction and smoking of personal.
- Loss of habitat due to operational activities.

According to the information provided by Eskom, “the batteries are designed to have fire detection systems and fire suppression systems when overheating or fires occur. This should prevent a fire from happening in the first place but if the suppression fails or does not work effectively the likelihood of the fire spreading into the surrounding vegetation is improbable.

The batteries area will either have a cement platform or stoned. This will prevent potential loss of floral habitat from fires due to overheating/explosion of the batteries.

Table 11. **Proposed operational phase impacts and the recommended mitigation measures for the proposed Eskom Paleisheuwel BESS in the West Coast Group of BESS Project**

Impact 9. Loss and/or degradation of floral habitat

OPERATIONAL PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Medium-term 2	**Low** 5	Probable	**LOW**	**– ve**	High
Essential mitigation measures: • All alien seedlings and saplings must be removed as they become evident for the duration of operational phase. • Control of alien invasive species and noxious weeds for areas disturbed by the construction activities, in accordance with the requirements of the NEM:BA Alien and Invasive Species Regulations. Eradication method to be approved by Eskom OU Project Environmental Manager. • Manual / mechanical removal is preferred to chemical control. • Prevent contamination of natural vegetation by any pollution. • Indigenous plants naturally growing within the project area, but that would be otherwise destroyed during clearing for development purposes, should be incorporated into landscaped areas. • Vegetation clearing should be kept to a minimum, and this should only occur where it is absolutely necessary. • All waste generated will be stored in a temporary demarcated storage area, prior to disposal thereof at a licensed registered landfill site. • As much vegetation growth as possible should be promoted post construction activities within the project area in order to protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping. The plant material to be used for rehabilitation should be similar to what is found in the surrounding area. • Entire footprint of area affected by operation and maintenance activities to be reinstated and rehabilitated. • Clear the area of all inert waste and rubble. • Incorporate findings of specialists from walk-down survey (if applicable).								
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low** **4**	Possible	**INSIGNIFICANT**	**– ve**	High

Impact 10. Loss of vegetation from fires due to operating of electrical equipment and smoking of personal

OPERATIONAL PHASE								
	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Medium-term 2	**Low** 5	Possible	**VERY LOW**	**– ve**	Low
Essential mitigation measures: • Firefighting equipment appropriate to the type of hazardous substances and waste on site should be available. • Minimize the storage of flammable liquids on site (e.g. fuel, flammable wastes). These are apart from the dangerous goods stored within the BESS or to fuel the BESS. • Smoking shall not be permitted in those areas where there is a fire hazard, e.g. fuel storage areas and areas susceptible to the rapid spread of fires. Smoking should be discouraged for all areas on site but if required should only be allowed in designated areas with fire extinguishers. • Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires. • Appropriate instruction to employees about the fire risks and the construction of firebreaks around the site perimeter. • Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulation. • Provide an emergency tipping area for waste loads identified to be on fire or otherwise deemed to be an immediate risk. • No fires for heating purposes shall be allowed on site. • Prepare and annually review a fire risk assessment. • The contractor shall comply with all applicable laws, regulations, permits and approval conditions and requirements relevant to the storage, use and proper disposal of hazardous materials. • Ensure all staff are appropriately trained for fire and explosion hazards. • Emergency numbers for local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on site.							
With mitigation	Local 1	Low 1	Medium-term 2	**Very-Low** **4**	Possible	**INSIGNIFICANT**	**– ve**	Low

11 CONCLUSION AND RECOMMENDATIONS

The project area falls within the Fynbos biome which extends across the southern corner of South Africa in a 100-200km wide coastal belt in the Western Cape Province. Fynbos is characterised as schlerophyllous shrub-land and this biome is comprised of two major vegetation types, the Fynbos and the Renosterveld. The Fynbos Biome forms the main part of the CFR, which is recognised globally as a biodiversity hotspot, due to the high numbers of endemic plant and invertebrate taxa. The study area is classified as falling within the *Endangered* Leipoldtville Sand Fynbos vegetation type. The project area falls within ESA 1 category. The ESA on site does not provide any ecological functionality and does not sustain any CBAs or terrestrial features.

During the field survey, only one threatened plant species was observed within the study area, namely *Leucospermum rodolentum*. This species belongs to the Proteaceae, this family is listed in Schedule 4 (Protected flora) of the Western Cape Nature Conservation Laws Amendment Act of 2000. Therefore, a permit to remove this species will need to be obtained from Cape Nature. Although *Brunsvigia orientalis* is listed in the 'Red List' as of 'Least Concern', a 'Search and Rescue' strategy should nevertheless be implemented to save these plants from where they would be impacted by BESS project as they are provincially protected species (Western Cape Nature Conservation Laws Amendment Act of 2000 Schedule 4 Protected flora). A permit in order to remove these plant species will need to be obtained from CapeNature. The removal should occur with due care, preferably by a qualified botanist or similarly qualified individual (a horticulturist with West Coast Search and rescue experience). The plant should be relocated into areas with the same aspect, soil conditions and elevation to ensure that the relocations are successful.

All areas affected by construction should be rehabilitated upon completion of the construction phase of the development to its pre-construction state where possible. Mitigation measures provided will ensure that any available ecological linkages between sensitive areas are not affected negatively. Mitigation measures included in Table 10 are feasible and will be easy to achieve. As soon as the proposed development has been constructed, the rehabilitation process needs to take place and should ensure that alien plant emergence and erosion do not occur.

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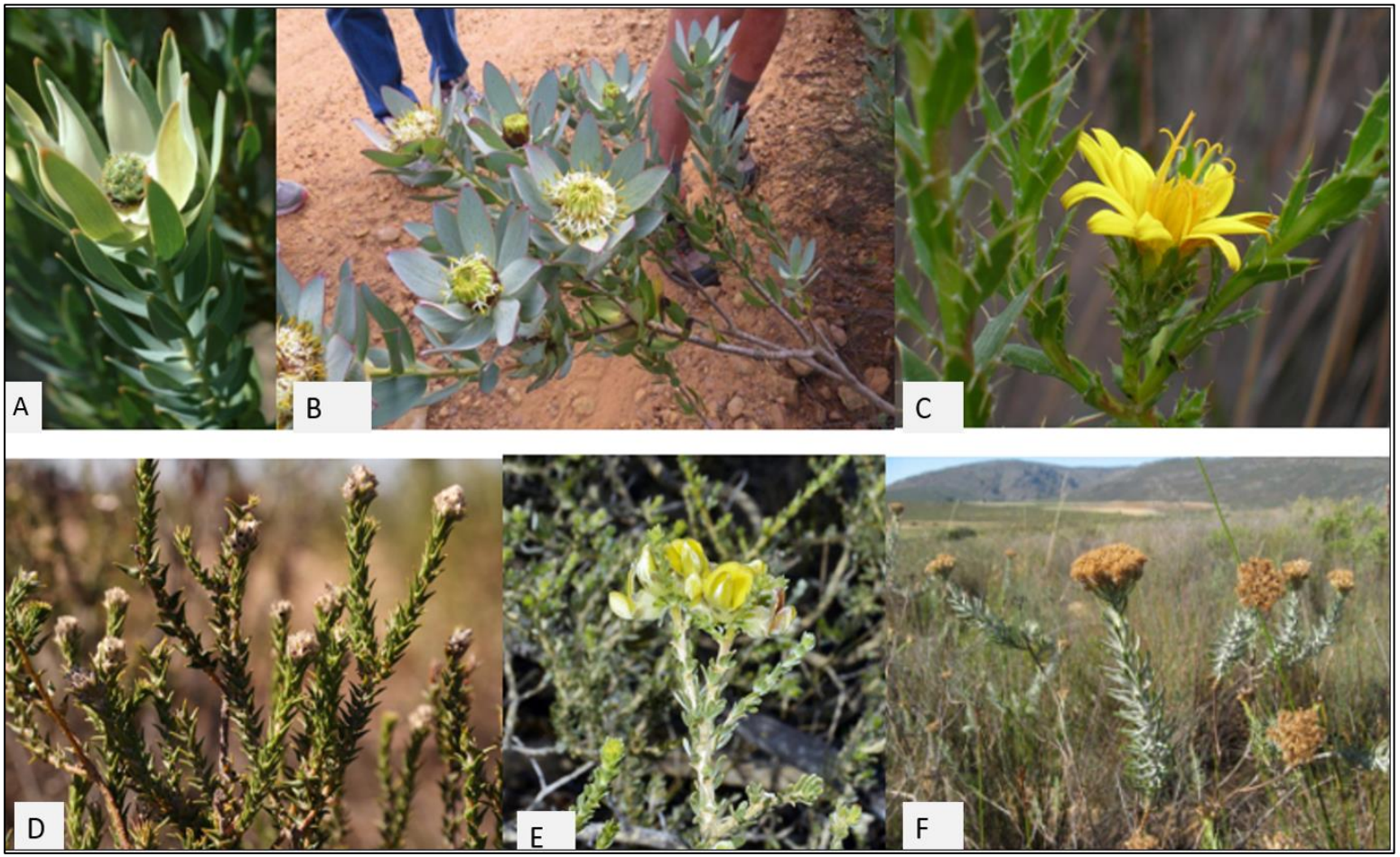
Appendix A. Red data plant species which were recorded near the project area (Helme, 2012)



A.*Leucadendron procerum* (Vulnerable), **B**. *Leucadendron loranthifolium* (Near Threatened), **C**. *Cullumia micracantha* (Endangered), **D**. *Phylica cuspidata* var *cispidata* (Vulnerable), **E**. *Aspalathus ternata* (Near Threatened), and **F**. *Athanasia sertulifera* (Endangered).