

PROPOSED MELKHOUT SUBSTATION BATTERY ENERGY STORAGE SYSTEM, HUMANSDORP, EASTERN CAPE VEGETATION IMPACT ASSESSMENT

Report Number 535611/4



Report Prepared by

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November 2018

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) Eskom Holdings SOC Ltd (Eskom). SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

BESS	Battery Energy Storage System
BLMC	Biodiversity Land Management Classes
CBA	Critical Biodiversity Area
CR	Critically Endangered (SANBI National Red List Categories)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DDT	Data Deficient - Taxonomically Problematic (SANBI National Red List Categories)
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECO	Environmental Control officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered (SANBI National Red List Categories)
GIS	Geographical Information Systems
GPS	Global Positioning System
IPP	Independent Power Producer
IUCN	International Union for Conservation of Nature
MSDS	Material Safety Data Sheet
NFEPA	National Freshwater Ecosystem Priority Areas
NEMBA	National Environmental Management Biodiversity Act (Act 10 of 2004)
NEMPAA	National Environmental Management Protected Areas Act (Act 57 of 2003)
NFA	National Forestry Act (Act 84 of 1998)
NT	Near Threatened (SANBI National Red List Categories)
PNCO	Provincial Nature Conservation Ordinance (Ordinance 19 of 1973)
SANBI	South African National Biodiversity Institute
SOC	State Owned Company
STEP	Subtropical Thicket Ecosystem Planning
SSC	Species of Special Concern
TOPS	Threatened Or Protected Species (as per NEMBA)
VU	Vulnerable (SANBI National Red List Categories)
WMA	Water Management Area

Definitions

Critical Biodiversity Area (CBA)	Areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan
Critically Endangered (CR)	A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction
Data Deficient – Insufficient Information (DDD)	A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required and that future research could show that a threatened classification is appropriate
Data Deficient – Taxonomically Problematic (DDT)	A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
Endangered (EN)	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
Endemic	The ecological state of a species being unique to a defined geographic location, such as an island, nation, country or other defined zone, or habitat type
Ericoid	Generally means that apart from its sclerophyllous leaves, it has short internodes so that the leaves more or less cover the usually slender branchlets
Exotic	Introduced from another country : not native to the place where found
Forb	A herbaceous flowering plant that is not a graminoid (see Graminoid and Herbaceous Plant).
Fynbos	is the name given to the hard leaved (sclerophyllous) shrublands and heathlands found in the coastal plains and mountains of the south western and southern Cape of South Africa
Geophyte	A perennial plant with an underground food storage organ, such as a bulb, tuber, corm, or rhizome.
Graminoid	A herbaceous plant with a grass-like morphology, i.e. elongated culms with long, blade-like leaves (see Herbaceous Plant).
Herbaceous Plant	Plants that have no persistent woody stem above ground (includes forbs and graminoids).
Indigenous	Originating or occurring naturally in a particular place; native
Invasive Alien Species (IAPs)	Plants, animals, pathogens and other organisms that are exotic, non-indigenous or non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health.
Least Concern	A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of

	extinction. Widespread and abundant species are typically classified in this category
Matrix (botany)	An integration of two or more vegetation types. A juxtaposition of different species related to differing vegetation types.
Near Threatened (NT)	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
Renosterveld	
Rocky Outcrop	Visible exposure of bedrock or ancient superficial deposits on the surface of the Earth
Species of Special Concern (SSC)	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)
Shrubland	Plant community characterised by vegetation dominated by shrubs, often also including grasses, herbs, and geophytes.
Subsurface Flow	The flow of water at a shallow depth beneath the ground surface; it may be influenced by relatively impermeable layers which enlarge lateral flow
Succulent	(of a plant, xerophyte) having thick fleshy leaves or stems adapted to storing water
Thermal Runaway	A repeating cycle in which excessive heat causes more heat until the operation ceases or an explosion occurs
Vulnerable (VU)	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

1 Project Introduction

1.1 Introduction

The Applicant, Eskom Holdings SOC Ltd., proposes to build a Battery Energy Storage System (BESS) system at the Melkhout Substation, located near Humansdorp in the Eastern Cape, to optimise excess Independent Power Producer (IPP) in-feeds into the distribution network.

In compliance with the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (Act 36 of 107), a Basic Assessment process has commenced by SRK Consulting (SRK) on behalf of Eskom Holdings SOC Ltd. in order to assess the potential environmental and social impacts of the proposed BESS.

The need for a Vegetation Impact Assessment has been identified due to the required vegetation clearance and the location of the site within a Critical Biodiversity Area. This study assesses the vegetation on site and any potential impacts that may result from the construction and operation of the proposed BESS. The findings of the Vegetation Impact Assessment will provide input into the relevant environmental assessment reports and the required vegetation destruction permits, if required.

1.1.1 Applicant Details

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1.1.2 Assessor Details

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1.2 SRK Profile and Expertise of Project Team

Luc Strydom, from the SRK Port Elizabeth office, has been appointed as the independent specialist to undertake the Vegetation Impact Assessment in terms of applicable legislation and guidelines.

Vegetation Impact assessor: Luc Strydom, BA (Environmental Management)
Luc Strydom is an Environmental Consultant in the Port Elizabeth office. Luc has been involved in environmental management for the past 4 years. His expertise includes Environmental Impact Assessments (EIA), Environmental Management Programmes (EMPr), Water Use License Applications (WULA), Environmental Auditing, Vegetation Surveys; Aquatic Impact Assessments (AIA) and Geographic Information Systems (GIS).
Project manager and coordinator: Karissa Nel, MEM (Environmental Management), CEAPSA, Pr Sci Nat
Karissa Nel is an Environmental Scientist, with 13 years' experience in Environmental Impact Assessments (EIA), Environmental Management Programmes (EMPr) and Environmental Auditing, Environmental Licensing, as well as specialist assessments such a botanical and wetland impact assessments. Her training is in aquatic research, zoology, microbiology and environmental management.
Environmental Assessment Practitioner, Internal Reviewer: Rob Gardiner, MSc, MBA, Pr Sci Nat
Rob Gardiner is the Principal Environmental Scientist and head of SRK's Environmental Department in Port Elizabeth. He has more than 25 years' environmental consulting experience covering a broad range of projects, including Environmental Impact Assessments (EIA), Environmental Management Systems (EMS),

Environmental Management Programmes (EMPr), and environmental auditing. His experience in the development, manufacturing, mining and public sectors has been gained in projects within South Africa, Lesotho, Botswana, Angola, Zimbabwe, Suriname and Argentina.

1.3 Statement of SRK Independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

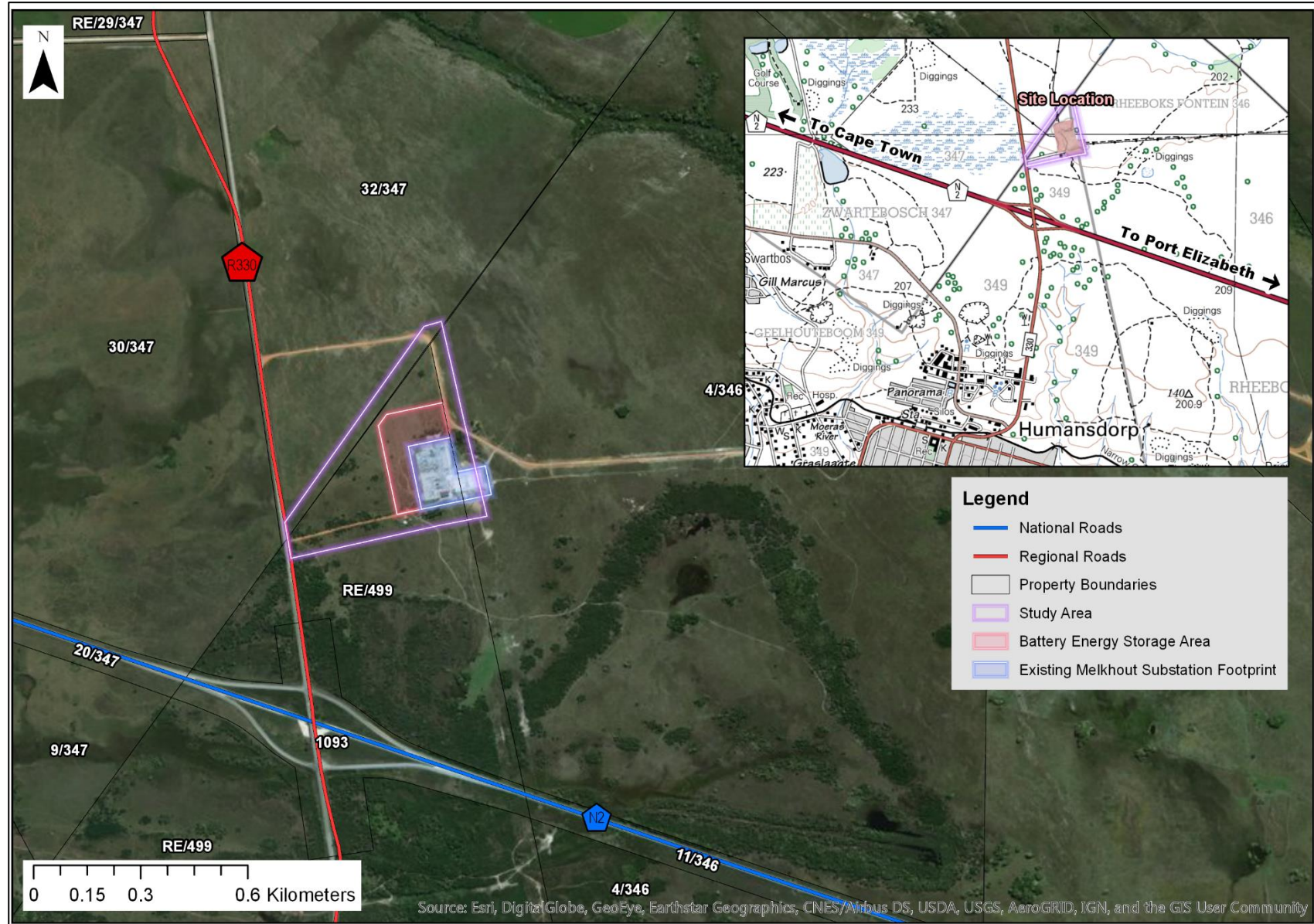


Figure 1-1: Locality Plan for the proposed development near Humansdorp

2 Study Scope and Methodology

2.1 Methodology

2.1.1 Terms of Reference

The following terms of reference applies to this study:

- Describe the vegetation in the vicinity of the study area via a desktop study in terms of vegetation types, their ecosystem threat status and Critical Biodiversity Areas in terms of the relevant systematic biodiversity plans and known/recorded flora species of special concern;
- Undertake a survey of the study area in order to ground-truth the findings of the desktop exercise, including the presence of protected plants and other species of special concern;
- Assess the condition of the vegetation in the study area to establish the baseline conditions; and
- Compile a report describing the findings above and identify and rate the significance of potential impacts on vegetation of the area. Recommendations for mitigation, if any, to minimise the relevant impacts should also be included.

2.1.2 Approach to the Study

The methodology undertaken is as follows:

- The vegetation classification of the area is provided using both VEGMAP2012 and the Eastern Cape Biodiversity Conservation Plan (2007). These were also used to identify any Critical Biodiversity Areas (CBAs) and threatened ecosystems;
- A site visit was conducted on 4 October 2018 to map the on-site vegetation and compile a species list. On-site vegetation mapping was done within the context of the regional planning framework and the state of transformation noted;
- The identification and tabulation of red data or protected species (referred to hereafter as Species of Special Concern (SSC)) lists were compiled according to:
 - The National Environmental Management: Biodiversity Act (NEMBA)(Act 10 of 2004) Threatened Or Protected Species (TOPS) regulations (GN R. 255 and GN R. 256);
 - Red Data listed species (as per the International Union of the Conservation of Nature (IUCN) Red List);
 - The National Forestry Act (NFA)(Act 84 of 1998);
 - Relevant provincial nature conservation ordinances; and
 - Localised endemics (not currently listed in the above-mentioned legislature) requiring conservation;
- An assessment of potential impacts and mitigation measures has been provided; and
- A final summary of recommendations is made based on the findings of this assessment.

The following legislation is applicable and has been considered during the course of this study:

- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003); and
- Nature and Environmental Conservation Ordinance, 1974 (No. 19 of 1974).

Other sources of information used in this study includes (but are not limited to):

- South African Biodiversity Information Facility (SANBI BGIS System);
- PRECIS, Plants of South Africa;
- Threatened Species Programme;
- Provincial Nature Conservation Ordinance 19 of 1974; and
- Eastern Cape Biodiversity and Conservation Plan (ECBCP).

2.1.3 Impact Assessment

Potential impacts that the proposed development could have during the construction and operational phases of the activity were investigated. Where possible, mitigation and/or management measures were proposed to limit the impact of the proposed development on terrestrial ecosystems. Rehabilitation or enhancements measures were also recommended where necessary.

In the case of the “No-Go” alternative, no additional construction or clearing of vegetation would occur and the site would remain in its current condition until/unless any other development is approved.

In most cases, the “No-Go” alternative approximates the baseline situation. In the sections assessing specific impacts below, the “No-Go” alternative is only assessed where the baseline descriptions do not fully capture current impacts.

2.2 Study Limitations

Please note that the following assumptions and limitations have been considered in the preparation of the assessment:

- In order to obtain a comprehensive understanding of the dynamics of the floral component of the terrestrial environment, as well as the status of endemic, rare or threatened species in any given area, it is preferable that assessments consider both temporal and spatial scales within the study area. However, due to time and budget constraints, long-term studies are rarely feasible, resulting in most specialist assessments being once off surveys. Therefore, due to the scope of the work presented in this report, a detailed investigation over time and seasons were not possible;
- The assessment is based on information collected during the site visit conducted on 4 October 2018. It is probable that due to the timing of these site visits, certain species that could be flowering at other times of the year could have been overlooked (especially bulbs and forbs). This can influence the quality and accuracy of the data collected; and
- The scope of this study is limited to site-specific impacts, i.e. impacts that may occur as a result of the no-go option or on other projects are not addressed in this study.

Notwithstanding these limitations, it is our view that this report provides a sufficiently detailed description of habitat systems in the vicinity of the site to enable a prediction of the significance of impacts associated with the activity.

3 Proposed Activities

3.1 Activity Description

The Applicant, Eskom Holdings SOC Ltd., proposes to build a Battery Energy Storage System (BESS) system at the existing Melkhout substation, located near Humansdorp in the Eastern Cape, to optimise excess Independent Power Producer (IPP) in-feeds into the distribution network.

The proposed Melkhout BESS forms part of a broader Eskom project to deploy 1,440 MWh of storage capability into the South African electricity system at various locations around the country. The project is being rolled out in two phases, with Phase 1 targeting the completion of 800 MWh (about 200 MW) before 31 December 2019 and Phase 2 targeting 640 MWh (about 160 MW) shortly thereafter. Melkhout BESS is one of Eskom's pilot projects with a planned capacity of 3 MW/30 MWh.

3.2 Activity Location

The project site is located across two properties, namely Portion 4 of the Farm Rheeboксfontein No. 346 Humansdorp RD and Erf 499, Humansdorp, within the Eastern Cape Province (see Figure 1-1). The study area is located directly adjacent to the R330 Regional Road, just off the N2 National Road. The proposed BESS site is located directly adjacent to the existing Melkhout Substation and will form an extension of this substation. The nearest town, Humansdorp, lies approximately 1.3 km to the south, of the site.

A Locality Plan is included as Figure 1-1 above.



4 Desktop Assessment: Description of the Study Area

4.1 Climate

The climate of the Humansdorp area (closest town to the site) receives on average 474 mm of rain per year. Humansdorp receives its highest rainfall during August (48 mm) and its lowest rainfall during January (27 mm). The average midday temperatures range between 18.6°C in Winter (July) to 25°C in February (Summer). The coldest time is during July when night time temperatures drop to 7.4°C on average (SA Explorer, 2000-2018). Figure 4-1 portrays the local climate conditions of the area within which the residential development is proposed.

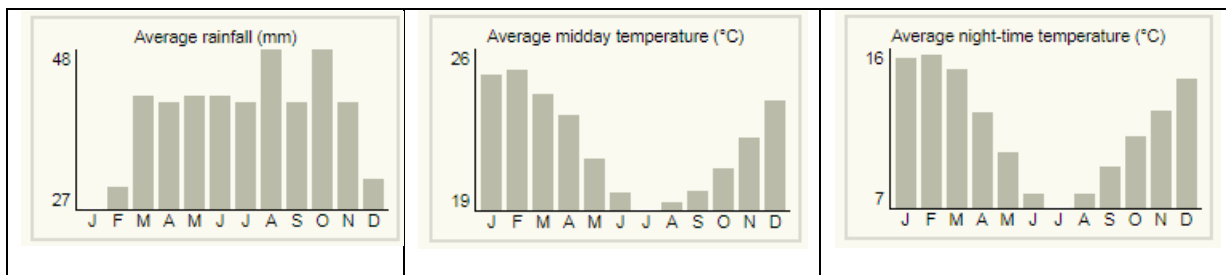


Figure 4-1: Climate conditions of the surrounding area (SA Explorer, 2000-2018)

4.2 Geology and Soils

According to Johnson, *et al.* (2006), the site is underlain by the Goudini Formation (Table Mountain Group, Cape Supergroup), which consists of medium-grained quartzose sandstone. Bedding is thinner and topography is less pronounced, compared with the underlying Peninsula and overlying Skurweberg sandstones. Numerous shallow caves are typically present in cliffs in this formation. Although cross-bedding is common, it is generally unobvious. Shale layers are normally less than one metre thick (Le Roux, 2000).

According to the National Soil Classes database (BGIS¹), the site is underlain by imperfectly drained soils, often shallow and often with a plinthic horizon. These soils may be seasonally wet. Soils have a marked clay accumulation, are strongly structured and a non-reddish colour. They may occur associated with one or more vertic, melanic and plinthic soils.

¹ <http://bgis.sanbi.org/MapViewer>

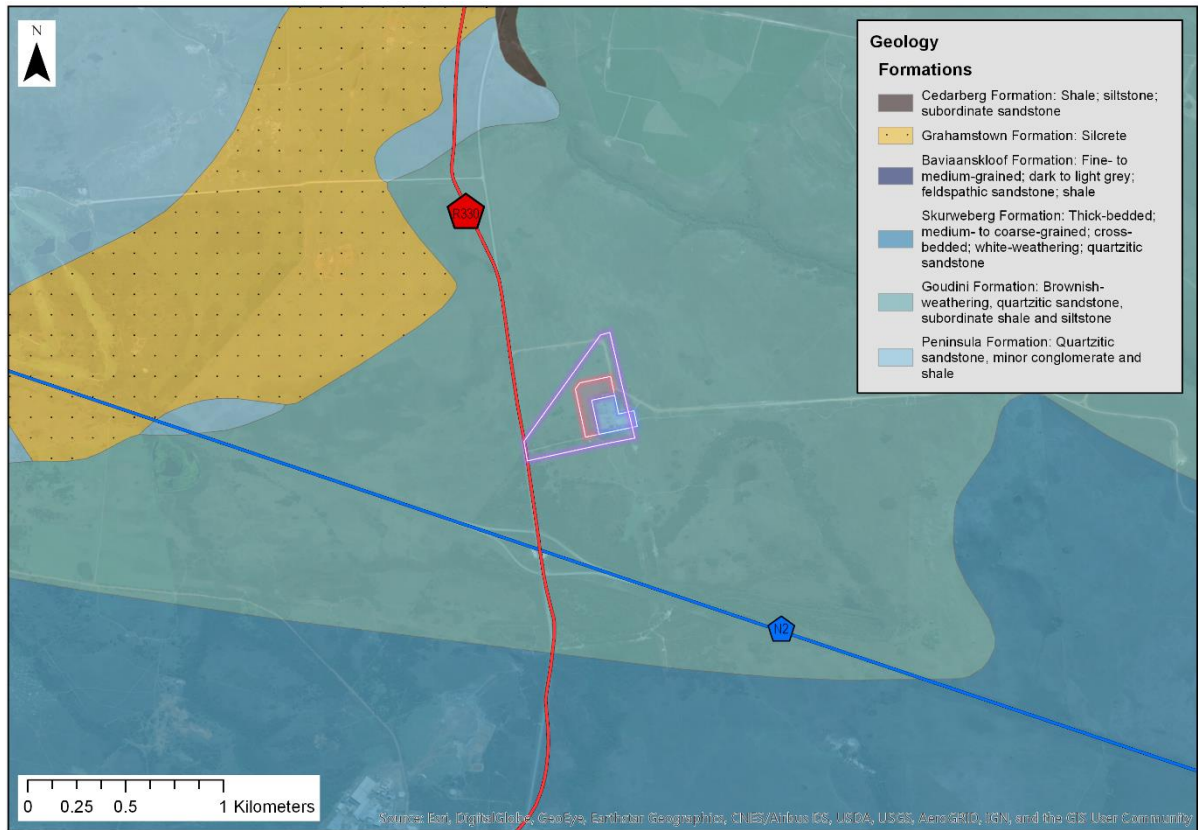


Figure 4-2: Geological map of proposed development area

4.3 Hydrology

The site falls within the Fish to Tsitsikamma Water Management Area (WMA), specifically within the Tsitsikamma Sub-Water Management Area. The quaternary catchment applicable to the development is K90F (see Figure 4-3 below).

The latest 1:50,000 topographical data shows no drainage lines occur within 500 m of the development site. A few farm dams have been built in the area (mostly along drainage lines), to provide domestic and stock water. The Swart River, located approximately 740 m to the north, and the Seekoei River, approximately 6.2 km to the south, are the predominant perennial rivers within the quaternary catchment.

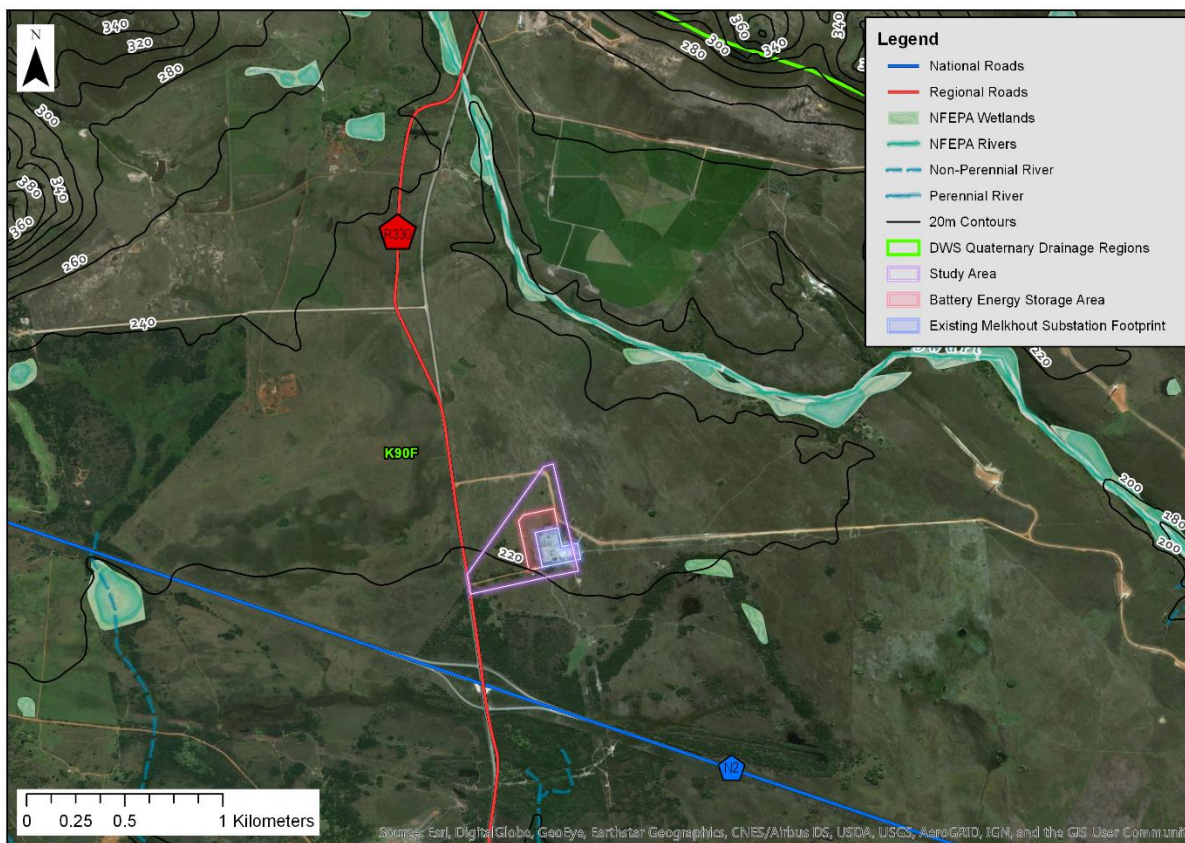


Figure 4-3: Hydrology map of the development site.

4.4 Land Use

The surrounding area does not fall within a conservation area or semi-urban settlements and has been mostly transformed for agriculture purposes, wind farms or pasture lands. Isolated farm structures are present within the immediate surrounding area. The vegetation on the site itself remains moderately intact apart from the existing substation and related access roads and fencing. Additionally the N2 national road is situated directly south of the site and the R330 Regional Road is situated directly west of the site.

4.5 Vegetation

4.5.1 Vegetation Type

According to the National South African Vegetation Map (Mucina & Rutherford, 2012), the study area falls within the *Eastern Fynbos-Renosterveld* Bioregion, within the *Fynbos* Biome.

The main historical vegetation type that occurs in the study area is *Kouga Grassy Sandstone Fynbos* (refer to Figure 4-4 for the vegetation map). This vegetation type is described below.

Kouga Grassy Sandstone Fynbos

Kouga Grassy Sandstone Fynbos (FFs 28) is described as low shrubland with sparse emergent tall shrubs and dominated by grasses in the undergrowth, or grassland with scattered ericoid shrubs. The lower dry slopes (where leeching is less severe) support a higher grassy cover. Kouga Grassy Sandstone Fynbos is distributed throughout the eastern section of the Western Cape and western section of the Eastern Cape, mostly located between Uniondale and Uitenhage, usually situated adjacent to *Kouga Sandstone Fynbos* vegetation type. It is usually present at lower altitudes and often on north-facing slopes (Mucina and Rutherford, 2012).

The conservation target for this vegetation type is 23%, with around 20% currently conserved in conservation areas such as Baviaanskloof, Groendal, Kouga, Berg Plaatz, Guerna and Welbedacht State Forest reserves. About 2% enjoys protection in eight private conservation areas. Approximately 9% of the area has been transformed for cultivation, however much of the vegetation type has been transformed into grassy pasture as a result of too frequent burning (Mucina and Rutherford, 2012).

Endemic Taxa includes:

- Tall shrubs: *Freylinia crisper*;
- Low shrubs: *Argyrolobium parviflorum*, *A. trifoliatum*, *Cullumia cirsioides*, *Eriocephalus tenuipes*, *Euchaetis vallis-simiae*, *Sutera cinerea*;
- Succulent shrubs: *Lampranthus lavisii*
- Herbs: *Annesorhiza thunbergii*, *Aster laevigatus*, *Centella didymocarpa*, *Peucedanum dregeanum*;
- Geophytic herbs: *Cyrtanthus flammosus*, *C. labiatus*, *C. montanus*, *Gladiolus uitenhagensis*;
- Succulent herbs: *Gasteria glauca*; and;
- Graminoids: *Restio vallis-simius*

Typical alien invasive species associated with Kouga Grassy Sandstone Fynbos includes *Pinus pinaster*, *Acacia cyclops* and *Acacia mearnsii* (Mucina and Rutherford, 2012).

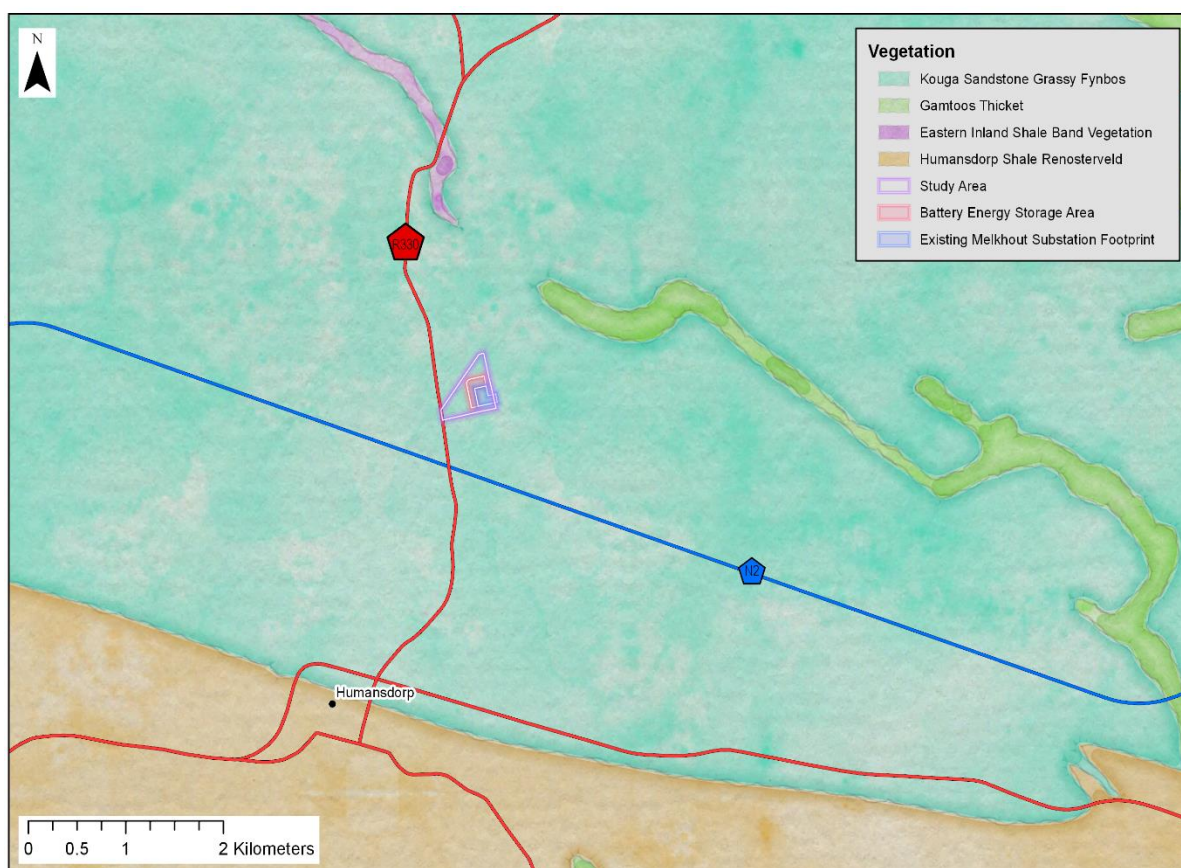


Figure 4-4: Historical vegetation map of proposed development area (Mucina and Rutherford, 2012).

4.5.2 Conservation Value

Species of Special Concern

Species of special concern (SSC) includes red data or protected species in terms of the National Environmental Management: Biodiversity Act (NEMBA)(Act 10 of 2004) Threatened or Protected Species (TOPS) regulations (GN R. 255 and GN R. 256), Red Data listed species as per the International Union of the Conservation of Nature (IUCN) Red List, the National Forestry Act (NFA)(Act 84 of 1998), relevant provincial nature conservation ordinances (PNCO) as well as localised endemics (not currently listed in the above-mentioned legislature) requiring conservation as recommended by botanical specialists.

South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. Threatened species tend to be strongly associated with habitats that are extensively degraded or have been lost to other land uses such as agriculture, urban development or mining.

The SSC found in the study area as well as species likely to occur in these areas which will require permits for the removal, or destruction of such species are described in the findings chapter below (section 5).

Protected areas

Protected Areas are the core areas in the network of biodiversity areas and are vital in supporting ecological sustainability and enhancing resilience to climate change.

Protected Areas are areas of land, water or sea that are formally protected by and gazetted in terms of the National Environmental Management: Protected Areas Act (NEMPAA) (Act No. 57 of 2003). These areas are managed mainly for biodiversity conservation, allow for long term security of tenure and are recognized as such by the National Protected Areas Expansion Strategy, which seeks to expand Protected Areas in South Africa. The NEMPAA distinguishes between several categories of Protected Areas, namely special nature reserves, national parks, nature reserves, and protected environments.

There are no formally protected areas within the surrounding area, however the area is classified as CBA 1 (as discussed below). See Figure 4-5 below. The nearest protected area is the Lombardini Game Farm, approximately 6.25 km to the south-east.

Eastern Cape Biodiversity Conservation Plan

The Eastern Cape Biodiversity Conservation Plan (ECBCP) is a broad-scale biodiversity plan. It addresses the urgent need to identify and map Critical Biodiversity Areas (CBAs) and priorities for conservation in the Province. It also provides land use planning guidelines, recommending biodiversity-friendly activities in priority areas. The ECBCP integrates other existing broad-scale biodiversity plans in the Province, and fills in the gaps using mainly national data. It has been designed to serve as the basic biodiversity layer in Strategic Environmental Assessments, State of Environment Reports, SDFs, EMFs and Bioregional Plans and contains maps of terrestrial and aquatic CBAs, as well as suggested land use guidelines.

A land management objectives-based approach has been adopted in the ECBCP. This approach rests on the concept of Biodiversity Land Management Classes (BLMCs). Each BLMC sets out the desired ecological state that an area should be kept in to ensure biodiversity persistence. Table 4-1 depicts the desired ecological state for the relevant terrestrial CBAs.

The site is located within an area classified as CBA 1 according to the ECBCP (refer to Figure 4-5). This requires that the biodiversity be maintained in near natural state with minimal loss of ecosystem integrity. According to Berliner, *et al.* (2007), no transformation of natural habitat should be permitted.

Table 4-1: Biodiversity Land Management Classes for Terrestrial CBAs (Berliner, *et al.*, 2007)

CBA Map Category	Code	Description of CBAs	BLMC		Recommended Land Use Objective
Protected Areas	PA1	Statutory protected areas. They include all national parks and provincial nature reserves.	BLMC1	Natural landscapes	Maintain biodiversity in as natural state as possible. Manage for no biodiversity loss.
	PA2	Non-statutory protected areas: municipal and private conservation areas.			
Terrestrial CBA 1 (not degraded)	T1	Critically endangered vegetation types (ecosystems) identified through ECBCP the systematic conservation assessment;	BLMC2	Near natural landscapes	Maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.
Terrestrial CBA 1 (degraded)	T1	Critically endangered vegetation types from STEP; Critically endangered forest patches in terms of the National Forest Assessment; Areas essential for meeting biodiversity targets for biodiversity features (SA vegetation types, expert mapped priority areas); KZN systematic conservation planning priorities; and Forest clusters identified as critical in the forestry planning process (Berliner et al 2006).			
Terrestrial CBA 2	T2	Endangered vegetation types identified through the ECBCP systematic conservation assessment;	BLMC2	Near natural landscapes	Maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.
	C1	Endangered vegetation types from STEP;			
	C2	Endangered forest patches in terms of the National Forest Assessment; All expert-mapped areas less than 25 000ha in size (includes expert data from this project, STEP birds, SKEP, Wild Coast, Pondoland and marine studies); All other forest clusters (includes 500m buffers); and 1km coastal buffer strip.			
Other Natural Areas	ONA T3	N/A	BLMC3	Functional Landscapes	Manage for sustainable development, keeping natural habitat intact in wetlands (including wetland buffers) and riparian zones. Environmental authorisations should
	ONA				

CBA Map Category	Code	Description of CBAs	BLMC		Recommended Land Use Objective
					support ecosystem integrity.
Transformed Areas	TF		BLMC4	Transformed Landscapes	Manage for sustainable development.

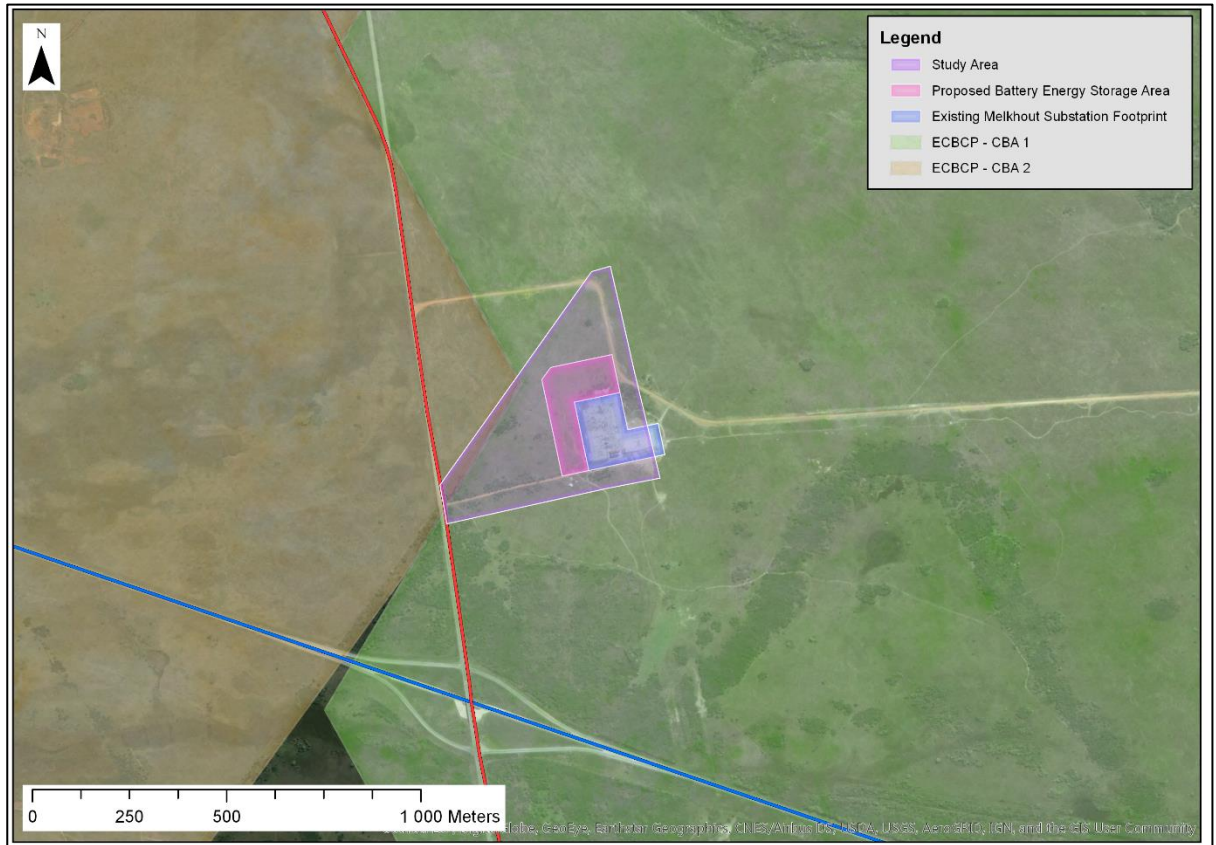


Figure 4-5: ECBCP Terrestrial Critical Biodiversity Area (CBA) map

5 Results

5.1 Vegetation Type

As summarised from the above descriptions, according to the National Vegetation Map by Mucina and Rutherford (2012), the proposed site falls within *Kouga Grassy Sandstone Fynbos (FFs 28)*, listed as *Least Concern* (conservation target of 23%).

However, during the site visit undertaken on 4 October 2018, it was noted that the vegetation on site consists of a mix of species related to *Kouga Grassy Sandstone Fynbos (FFs 28)* as well as *Humansdorp Shale Renosterveld (FRs 19)*. Refer to Appendix A for a list of indigenous species observed on site, including the vegetation type(s) in which they are listed. According to the National Vegetation Map, *Humansdorp Shale Renosterveld* is mapped 2.9 km from the boundary of the site. It is likely that the site falls within a transitional zone between the two vegetation types and contains a matrix of species associated with both vegetation types. Therefore, potential species occurring within the area as well as impact ratings have been assessed with this vegetation matrix in mind.

Humansdorp Shale Renosterveld is classified as *Endangered* (conservation target of 29%) according to Mucina and Rutherford (2012). None of this vegetation type is currently conserved in formal protected areas and only 6% enjoys protection on private land (Thaba Manzi and Lombardini Game Farms). Some 61% is already transformed mainly as a result of cultivation. Therefore to ensure that the conservation target is reached, less than 10% of the historical extent of this vegetation type can be lost to transformation.

Table 5-1: Remaining extents of vegetation types

Vegetation Type	Historical (ha)	Transformed (ha)	Remaining (ha)	Conservation Target (ha)	Protected (ha)	% of Remaining required for conservation to achieve target
Kouga Grassy Sandstone Fynbos	162,112	14,590	147,522	37,286 (23%)	35,665 (22%)	1.1 % (1,621 ha)
Humansdorp Shale Renosterveld	24,653	15,038	9,615	7,149 (29%)	1,479 (6%)	58.97 % (5,670 ha)

5.2 Study Area Vegetation & Level of Disturbance

The majority of the vegetation on the proposed site is moderately intact (refer to Figure 5-1). It consists of a matrix of fynbos shrubs, restiads, grasses, scattered succulent species and bulbous geophytes. During the site visit, 110 indigenous species were identified within the study area. The dominant species on site consists mostly of graminoids and ericoid shrubs and include *Brachiaria serrata*, *Cliffortia linearifolia*, *Disparago ericoides*, *Eragrostis curvula*, *Eragrostis capensis*, *Passerina obtusifolia*, *Montinia caryophyllacea*, *Syncarpha striata*, *Elytropappus rhinocerotis*, *Thamnochortus glaber*, *Trilobium hispidum*, and *Tristachya leucothrix*. There are several rocky outcrops within the site boundary, although the majority of which contain vegetation similar to the surrounding vegetation and are not considered particularly sensitive. However, one of the rocky outcrops situated towards the north of the site (as indicated in Figure 5-1) contains vegetation which was only observed on the rocky outcrop and is therefore considered sensitive and should be protected from disturbance during construction. Additionally a pair of Blue Crane (*Anthropoides paradise*) were observed within the site boundary (possibly nesting within the site), as well as evidence of antelope droppings scattered around the site.

The adjacent substation and its related access roads, pylons, fencing and associated vegetation clearing are the main disturbances on the site visit. Several rock piles are located around the boundary of the existing substation, likely to have been dumped/stored there during the construction of the substation. Evidence of cattle grazing was also observed.

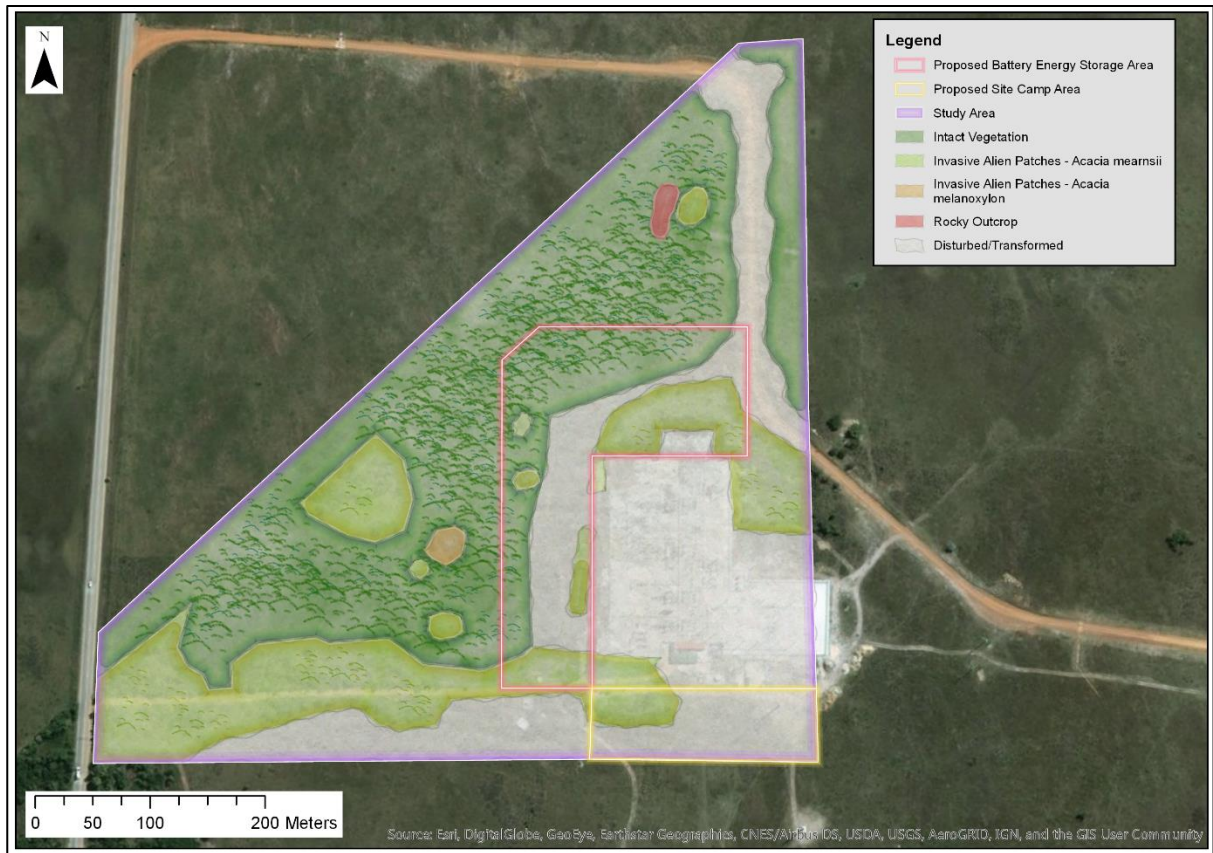






Figure 5-1: Current vegetation condition on site

Table 5-2: General site photos and disturbances

<p>Photo 1: View looking towards the southern boundary of the site from the existing substation. Note the pylons.</p>	<p>Photo 2: View looking towards the western boundary of the site from the existing substation.</p>

	
<p>Photo 3: <i>Acacia mearnsii</i> infestation adjacent to the existing substation.</p>	<p>Photo 4: View of the site vegetation looking southwards from the northern boundary</p>
	
<p>Photo 5: Stockpiled rocks on site</p>	<p>Photo 6: Transformed/disturbed area adjacent to existing substation. Note dumped materials and <i>Acacia</i> infestations.</p>
	
<p>Photo 7: View of northern boundary of the site</p>	<p>Photo 8: Rocky outcrop to the north of the site</p>

5.3 Invasive Alien Species

The sections of the site on and directly adjacent to areas of disturbance are largely infested with *Acacia mearnsii*. Isolated clumps and individuals of *Acacia cyclops* (Rooikrans), *A. saligna* (Port Jackson Willow) and *A. melanoxylon* (Australian Blackwood) are scattered around the site. The surrounding area is also infested with large stands of *Acacia mearnsii* (most prominently within the surrounding wet areas). A list of invasive alien species observed within the site boundary and descriptions of the NEMBA Invasive Species Categories and their prescribed legal requirements are listed in Table 5-3 and Table 5-4 respectively.

Table 5-3: Invasive Alien Species observed on site

SPECIES	COMMON NAME	DENSITY:	MATURITY:	NEMBA Category (Eastern Cape)
		Scattered [S] Abundant [A] Dense [D]	Juvenile [J] Mature [M] Dead [D]	
<i>Acacia cyclops</i>	Rooikrans	S	M	1b
<i>Acacia mearnsii</i>	Black Wattle	A	J, M & D	2
<i>Acacia melonoxylon</i>	Australian Blackwood	S	J, M & D	2
<i>Acacia saligna</i>	Port Jackson Willow	S	J & M	1b
<i>Cirsium vulgare</i>	Spear Thistle	S	J & M	1b

Table 5-4: NEMBA (Act No. 10 of 2004) Alien and Invasive Species Classifications

Category	Classification
Category 1a (Prohibited)	A person in control of a Category 1a Listed Invasive Species must comply with the provisions of section 73(2) of the Act; immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species
Category 1b (Prohibited/ Exempted if in Possession or Under Control)	A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act. A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act
Category 2 (Permit Required)	Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be. A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit. Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3. Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control
Category 3 (Prohibited)	Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice. Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

Due to the high presence of invasive *Acacia* species in the area, the surrounding hydrology (subsurface sheet flow on top of shallow impermeable rock layer) as well as the affinity of *Acacia* species to infest saturated soils, there is a high probability of it spreading and infesting surrounding disturbed areas. Additionally, *Acacia mearnsii* regenerates and spreads rapidly after the occurrence of fire. In the light of the regular occurrences of fire in the area and the current infestation of *Acacia*

mearnsii, it is likely that the invasion will spread to disturbed areas on site, as well as surrounding areas, rapidly.

It is important that all invasive aliens currently occurring on site (as well as potential future stands which may emerge due to the proposed disturbance on site) must be monitored, controlled and eradicated as per the landowner's *Invasive Species Monitoring, Control and Eradication Plan* according to Section 76(2)(a) of NEMBA (Act No. 10 of 2004).

5.4 Species of Special Concern

Eighteen plant species of special concern (SCC) were observed within the study area during the survey. It should be noted that, although not observed during the site visits, certain SSC (as listed as occurring within *Kouga Grassy Sandstone Fynbos* and *Humansdorp Shale Renosterveld*) could potentially be present on site but could have been overlooked due to the timing of these site visits. Additionally, several SSC were observed within the surrounding area, but were not observed within the site boundary area during the site visit. It is possible that these species also occur within the site boundary. All potentially occurring SSC as well as SSC observed on site are included in Table 5-5 below.






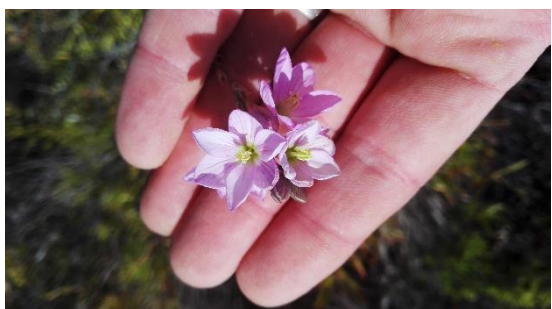
Table 5-5: List of Species of Special Concern







Family	Species	Protected status	Observed on Site
AIZOACEAE	<i>Drosanthemum lique</i>	PNCO (LC)	Yes
AIZOACEAE	<i>Lampranthus lavisii</i>	PNCO; IUCN (DDD)	Yes
AIZOACEAE	<i>Ruschia sp</i>	PNCO (LC)	Yes
AIZOACEAE	<i>Ruschia uncinata</i>	PNCO (LC)	Yes
AIZOACEAE	<i>Trichodiadema fourcadei</i>	PNCO (LC)	No (occurring in Humansdorp Shale Renosterveld)
AMARYLLIDACEAE	<i>Boophone disticha</i>	PNCO (LC)	Yes
AMARYLLIDACEAE	<i>Cyrtanthus labiatus</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
AMARYLLIDACEAE	<i>Cyrtanthus montanus</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
AMARYLLIDACEAE	<i>Haemanthus sanguineus</i>	PNCO (LC)	Yes
APIACEAE	<i>Annesorhiza thunbergii</i>	IUCN (DDT)	No (occurring in Kouga Grassy Sandstone Fynbos)
APIACEAE	<i>Notobubon montanum</i>	IUCN (DDT)	No (occurring in Kouga Grassy Sandstone Fynbos)
ASCLEPIADACEAE	<i>Asclepias crispa</i>	PNCO (LC)	Yes
ASPHODELACEAE	<i>Haworthiopsis fasciata</i>	PNCO; IUCN (NT B1ab(ii,iii,iv,v))	No (observed on adjacent property)
ASTERACEAE	<i>Afroaster laevigatus</i>	IUCN (EN B1ab(iii,v)+2ab(iii,v))	No (occurring in Kouga Grassy Sandstone Fynbos)
ASTERACEAE	<i>Cullumia cirsioides</i>	IUCN (VU D2)	No (occurring in Kouga Grassy Sandstone Fynbos)
ASTERACEAE	<i>Curio crassulifolius</i>	IUCN (DDT)	Yes
ASTERACEAE	<i>Eriocephalus tenuipes</i>	IUCN (Rare)	No (occurring in Kouga Grassy Sandstone Fynbos)
ASTERACEAE	<i>Senecio crenulatus</i>	IUCN (DDT)	Yes

Family	Species	Protected status	Observed on Site
ERICACEAE	<i>Erica demissa</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
ERICACEAE	<i>Erica glandulosa subsp. glandulosa</i>	PNCO (LC)	Yes
ERICACEAE	<i>Erica pectinifolia</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
ERICACEAE	<i>Erica sparsa</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
ERICACEAE	<i>Erica thamnoides</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
FABACEAE	<i>Argyrolobium parviflorum</i>	IUCN (Rare)	No (occurring in Kouga Grassy Sandstone Fynbos)
FABACEAE	<i>Argyrolobium trifoliatum</i>	IUCN (EN B1ab(ii,v))	No (occurring in Kouga Grassy Sandstone Fynbos)
FABACEAE	<i>Aspalathus fourcadei</i>	PNCO; IUCN (Rare)	No (occurring in Kouga Grassy Sandstone Fynbos)
FABACEAE	<i>Lotononis acuminata</i>	IUCN (VU B1ab(ii, iii, iv,v))	No (occurring in Humansdorp Shale Renosterveld)
FABACEAE	<i>Otholobium carneum</i>	IUCN (Rare)	No (occurring in Kouga Grassy Sandstone Fynbos)
IRIDACEAE	<i>Babiana patersoniae</i>	PNCO (LC)	Yes
IRIDACEAE	<i>Bobartia orientalis subsp. orientalis</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
IRIDACEAE	<i>Geissorhiza heterostyla</i>	PNCO (LC)	No (occurring in Humansdorp Shale Renosterveld)
IRIDACEAE	<i>Geissorhiza roseoalba</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
IRIDACEAE	<i>Hesperantha falcata</i>	PNCO (LC)	Yes
IRIDACEAE	<i>Ixia orientalis</i>	PNCO (LC)	Yes
IRIDACEAE	<i>Moraea algoensis</i>	PNCO (LC)	Yes
IRIDACEAE	<i>Watsonia pillansi</i>	PNCO (LC)	Yes
ORCHIDACEAE	<i>Satyrium membranaceum</i>	PNCO (LC)	Yes
PROTEACEAE	<i>Leucadendron salignum</i>	PNCO (LC)	Yes
PROTEACEAE	<i>Leucospermum cuneiforme</i>	PNCO (LC)	Yes
PROTEACEAE	<i>Protea foliosa</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
PROTEACEAE	<i>Protea nitida</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
RUTACEAE	<i>Agathosma mucronulata</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
RUTACEAE	<i>Agathosma pilifera</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
RUTACEAE	<i>Agathosma puberula</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
RUTACEAE	<i>Agathosma spinosa</i>	PNCO; IUCN (Rare)	No (occurring in Kouga Grassy Sandstone Fynbos)

Family	Species	Protected status	Observed on Site
RUTACEAE	<i>Diosma prama</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
RUTACEAE	<i>Diosma rourkei</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
RUTACEAE	<i>Euchaetis vallis-simiae</i>	PNCO (LC)	No (occurring in Kouga Grassy Sandstone Fynbos)
SCROPHULARIACEAE	<i>Freylinia crispa</i>	PNCO; IUCN (VU D2)	No (occurring in Kouga Grassy Sandstone Fynbos)

Table 5-6: Photos of Species of Special Concern observed

	
Photo 9: <i>Curio crassulifolius</i> (IUCN: DDT)	Photo 10: <i>Senecio crenulatus</i> (IUCN: DDT)
	
Photo 11: <i>Moraea algoensis</i> (PNCO).	Photo 12: <i>Babiana patersoniae</i> (PNCO)
	
Photo 13: <i>Ruschia</i> species (PNCO)	Photo 14: <i>Ixia orientalis</i> (PNCO).

	
<p>Photo 15: <i>Boophone disticha</i> (PNCO)</p>	<p>Photo 16: <i>Haemanthus sanguineus</i> (PNCO).</p>
	
<p>Photo 17: <i>Lampranthus lavisii</i> (IUCN: DDD)</p>	<p>Photo 18: <i>Watsonia pillansi</i> (PNCO).</p>
	
<p>Photo 19: <i>Haworthiopsis fasciata</i> (IUCN: NT)</p>	<p>Photo 20: <i>Erica glandulosa</i> (PNCO)</p>

6 Impact Assessment

Any development activity in a natural or near-natural system will have an impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study is to identify and assess the significance of the potential impacts caused by the proposed development and to provide a description of the mitigation required so as to limit such impacts on the natural environment.

6.1 Impact Assessment Methodology

The assessment of impacts will be based on the professional judgment of specialists at SRK Consulting, fieldwork, and desktop analysis. The significance of potential impacts that may result from the proposed development will be determined in order to assist the Competent Authority (CA) in making a decision.

A significance rating is allocated to each potential impact, based on consideration of the probability, intensity, extent, duration and possible mitigation of the potential impact. These terms are explained as follows:

- *Extent*: the scale of the impact on a local - national level;
- *Intensity*: the 'severity' of the impact or extent to which ecological and social processes are altered;
- *Duration*: the length of time the impact will last, which may be anything from several days to the entire lifetime of the development;
- *Probability*: the likelihood of the impact occurring;
- *Status*: positive or negative impact;
- *Reversibility*: the ability of the impacted environment to return to its pre-impacted state; and
- *Mitigation*: ways in which an impact can be avoided, minimised or managed to reduce its environmental significance.

Table 6-1: Criteria used to determine the Consequence of the Impact

Rating	Definition of Rating
A. Extent – the area over which the impact will be experienced	
None	
Local	Confined to project or study area or part thereof (e.g. site)
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic
(Inter) national	Nationally or beyond
B. Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment	
None	
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way
High	Site-specific and wider natural and/or social functions or processes are severely altered

C. Duration – the time frame for which the impact will be experienced	
None	
Short-term	Up to 2 years
Medium-term	2 to 15 years
Long-term	More than 15 years
D. 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
E. Status of impact	
+ ve	Positive (a benefit)
- ve	Negative (a cost)
F. Reversibility - Ability of the impacted environment to return to its pre-impacted state	
High	Reversible within the short-term
Medium	Reversible within the medium to long term
Low	Will never return to pre-impacted state

Each rating is based on observations made during the site visits and on professional judgement. Based on a synthesis of the above criteria, significance of an impact is rated as follows:

- *High significance*: where the impact would influence the decision to authorise the road upgrade regardless of any mitigation measures;
- *Moderate significance*: where the impact should influence the decision to upgrade the road, and where mitigation measures can, and must, be specified to reduce the overall impact;
- *Low significance*: where the impact would not have any influence on the decision to authorise the upgrading of the road;
- *Very Low significance*: the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity/development; and
- *Insignificant*: the potential impact is negligible and will not have an influence on the decision regarding the proposed activity/development.

6.2 Potential Impacts

Potential impacts that could arise as a result of the proposed road upgrade and associated activities have been identified and are assessed below.

Construction phase impacts:

- Direct loss of vegetation and habitat;
- Loss of Species of Special Concern (SSC); and
- Spread of alien invasive species.

Operational phase impacts:

- Loss of vegetation due to fire.

6.2.1 Construction Phase Impacts

All impacts identified below are relevant to the construction phase.

Impact 1: Loss of vegetation and habitat

The loss of vegetation could potentially result in loss of habitat for endemic species as well as the irreversible loss of possible species assemblages within the site boundary. In addition, if rehabilitation of disturbed areas is not adequately conducted, further impacts to areas outside the site boundary could occur due to erosion or fires.

The proposed development is located within a CBA 1 area in terms of the 2007 ECBCP (refer to Figure 4-5). The development will result in the permanent loss of approximately 1.3 ha of intact indigenous vegetation (matrix of *Kouga Grassy Sandstone Fynbos* and *Humansdorp Shale Renosterveld*) and 3.12 ha of vegetation in total. As mentioned above, the risk of fire due to construction activities could lead to additional vegetation and habitat loss if not adequately mitigated.

The conservation status of the delineated vegetation type (*Kouga Grassy Sandstone Fynbos*) is considered Least Threatened, however during the site visit it was observed that the area appears to be a transitional area between *Kouga Grassy Sandstone Fynbos* and *Humansdorp Shale Renosterveld* which is listed as Endangered.

As shown in Table 5-1 above, the historical extent of *Kouga Grassy Sandstone Fynbos* is 162,112 ha. Of this, approximately only 9% has been transformed for cultivation, although much of the vegetation has been transformed into grassy pasture as a result of too frequent burning. Approximately 22% of the vegetation type is protected in surrounding reserves and game farms. According to Mucina and Rutherford (2012) approximately 91% remains, of which 0.002% will be permanently lost for the development of the proposed BESS if it is assumed that the entire area covers *Kouga Grassy Sandstone Fynbos*.

However, since vegetation typically found in *Humansdorp Shale Renosterveld* was found, this also needs to be considered. As per Table 5-1, the historical extent of *Humansdorp Shale Renosterveld* is 24,653 ha. Of this, approximately 61% has been transformed, while only 6% is currently formally protected. According to Mucina and Rutherford (2012) approximately 39% remains, of which less than 0.032% will be permanently lost for the development of the proposed BESS.

The impact was rated with the following considerations in mind:

- The development falls within a CBA 1 area (as per the 2007 ECBCP);
- Several sections within the site have already been transformed or disturbed by previous construction activities (related to the construction of the adjacent substation);
- A significant proportion of *Kouga Grassy Sandstone Fynbos* is already protected and almost meets the conservation target (only 1.1% of the remaining vegetation is required to meet the conservation target - Table 5-1); and
- The proportion of the two vegetation types on site that will be lost through the proposed development (in relation to what remains) is small (less than 0.04%).

Table 6-2 illustrates the impact rating applicable to the potential impacts on habitat types in the area.

Table 6-2: Significance rating of Impact 1 and recommended mitigation measures

	Spatial Extent	Intensity	Duration	Consequence	Probability	Significance	+ -	Confidence	Reversibility
Before Management	Regional	Low	Long term	Medium	Definite	MEDIUM	-	High	Low
Management Measures									
<ul style="list-style-type: none"> • During the construction phase, the construction area (including site camp, laydown areas and access tracks) must be clearly demarcated and all other areas deemed as no-go areas for the duration of construction; • The position of the construction site camp should be on an already disturbed area and should be identified in consultation with the Environmental Control Officer (ECO); • Stripping of topsoil during the site clearing activities at the commencement of construction and appropriate storage for the duration of construction; • Harvesting and collection of any flora, other than that performed under a permit from the Department of Economic Development, Environmental Affairs & Tourism, must be strictly prohibited; • A fire officer shall be appointed and shall be responsible for co-ordinating rapid, appropriate responses in the event of a fire; • No burning of vegetation, whether to clear the vegetation, or of cleared vegetation, shall be permitted; • No open fires should be allowed on site; • A designated smoking area, outside of any areas where the risk of fire is prevalent, must be designated. Smoking shall not be permitted outside of designated smoking area; • Sufficient fire-fighting equipment shall be maintained and be accessible on sites at all times. In particular, such firefighting equipment shall be readily on hand in areas where hot work may be required; • The objective of rehabilitation of natural areas must be to re-establish indigenous vegetation (coverage of at least 80% should be attained); • Rehabilitation of disturbed areas must commence immediately after construction has been completed in that area. General rehabilitation measures include: <ul style="list-style-type: none"> ○ Loosen compacted soils within construction footprint which do not form part of the BESS footprint (e.g. access roads, site camp area, stockpile and laydown areas, etc.); ○ Spread stored topsoil over disturbed areas and water regularly until vegetation has sufficiently established; and ○ All area undergoing rehabilitation must be demarcated as no-go areas; • During construction, erosion control measures must be implemented in areas sensitive to erosion such as exposed soil, areas with dispersive soils, etc. These measures include but are not limited to the use of sand bags, hessian sheets, silt fences and/ or replacement of vegetation. 									
After Management	Regional	Low	Medium-term	Low	Definite	LOW	-	High	Low

Impact 2: Loss of Species of Special Concern (SCC)

Species of special concern (SSC) in this area are species which are endemic to this region and occur within an isolated habitat type and/or are provincially protected species.

The proposed development and associated works could result in the complete loss of SSC on site if no species are rescued before construction commences. If construction activities extend to outside the construction footprint boundaries, this would have further impacts.

Eighteen species of special concern were observed within the site boundary. Although none of the SSC observed on site are listed as endangered, there are several other species which may occur within site boundary and are listed in the relevant vegetation types and habitat type on site, which were not observed during the site visit but are listed as endangered or rare according to the SANBI Red List (IUCN). Although these species were not specifically observed during the site visit, it is possible that they exist on the site. The impact for the development is rated as Medium (-ve) but can be reduced to Very Low (-ve) should proper mitigation measures be implemented, including a Search and Rescue

exercise. The site is easily accessible and open, therefore allowing for the possibility of a large percentage of SSCs to be rescued.

Several rocky outcrops exist within the study area, however the species composition within these outcrops is consistent with the surrounding vegetation. However, one rocky outcrop (indicated in Figure 5-1) contains species which were not observed within the surrounding area. This isolated species composition is potentially sensitive and should therefore be protected against disturbance.

Table 6-3 illustrates the impact rating applicable to the potential impacts on SSC within the site boundary.

Table 6-3: Significance rating of Impact 2 and recommended mitigation measures

	Spatial Extent	Intensity	Duration	Consequence	Probability	Significance	+-	Confidence	Reversibility
Before Management	Local	Medium	Medium term	Low	Definite	LOW	-	High	Medium
Management Measures									
<ul style="list-style-type: none"> Apply for relocation and destruction permits from the relevant authority (DEDEAT); Conduct a Search and Rescue exercise before the start of construction, ahead of any clearing of vegetation; A suitably qualified and experienced individual should oversee the Search and Rescue operation; Sufficient time for Search and Rescue must be allowed before construction commences; Replant rescued SSCs in adjacent similar habitat on site preferably within a nearby reserves such as Lombardini Game Farm or African Whisper Private Game Reserve; A construction width of 15 m adjacent to the BESS area must be maintained in order to restrict the width of disturbance (site camp, laydown areas and access tracks outside of the proposed battery storage facility area) that may infringe upon the populations of SSC; and Demarcate a no-go area around the rocky outcrop indicated on Figure 5-1. No construction related activities should be allowed to take place within the demarcated no-go areas. 									
After Management	Local	Low	Short-term	Very Low	Definite	VERY LOW	-	High	Medium

Impact 3: Spread of Invasive Alien Species

A major change in plant communities where development is concerned, is generally the result of invasion of alien weeds and invasive plants. The proposed development will result in an increase in the risk of Invasive Alien Plants (IAPs) establishing in the disturbed sites and spreading to the surrounding areas during and after construction. The potential for IAP infestation is relatively high due to the presence of large infestations of invasive species (predominantly *Acacia mearnsii*) within the surrounding area as well as existing infestations within the site boundary (refer to Figure 5-1). The seasonally saturated soils around the site would also aid in the propagation and spread of invasive alien species (most specifically invasive *Acacia* species). Approximately 23.5% of the study area (45,930 m²) is currently infested with invasive alien species. Of this infested area, approximately 23.6% will be cleared and transformed permanently for the construction of the battery storage facility. The stands of IAPs remaining within the study area need to be controlled, and preferably eradicated (as per the requirement of Section 76 (2)(a) of NEMBA (Act 10 of 2004). If not, the remaining stands pose a risk of invading areas disturbed by construction activities.

The impact is rated with a Medium (-ve) significance without mitigation, but can be reduced to Very Low (-ve) if the recommended measures are applied. Table 6-4 illustrates the extent to which this impacts the environment.

Table 6-4: Significance rating of Impact 3 and recommended mitigation measures

	Spatial Extent	Intensity	Duration	Consequence	Probability	Significance	+-	Confidence	Reversibility
Before Management	Regional	Medium	Medium term	Medium	Probable	MEDIUM	-	High	Medium
Management Measures									
<ul style="list-style-type: none"> All invasive alien species cleared for the construction of the battery storage facility must be collected and disposed of as waste. Care must be taken not to disperse seeds or seed pods in the surrounding environment during the removal thereof; Remove any new alien invasive plant species in the construction footprint as soon as they are detected, preferably by physical removal or by spraying herbicides should physical removal not be feasible (to be conducted in conjunction with the ECO); Monitoring and removing of alien invasive plants should be conducted from the start of the construction phase, during clearing, until rehabilitation has been complete at the end of the liability period; An item should be included in the Bill of Quantities for the contractor for control of alien species. In addition, allowance should be made for multiple site visits by the ECO for the duration of the construction contract, including the defects liability period, to assess and assist in all invasive alien plant eradication and control activities; and After construction, ongoing control of invasive alien plants must be addressed by the property owner. 									
After Management	Local	Low	Medium term	Very Low	Probable	VERY LOW	-	High	Medium

6.2.2 Operational Phase Impacts

All impacts identified below are relevant to the operational phase.

Impact 4: Loss of Vegetation due to Fire

Batteries are chemical storage devices subject to thermal runaway (cascading ignition) under abnormal conditions. Storing large amounts of energy, including the presence of flammable chemicals used in battery storage technology presents a risk of fire if the correct monitoring, maintenance and operation is not applied. If fire were to spread to the surrounding vegetation, vegetation and habitat would be temporarily lost with potentially detrimental impacts to the associated fauna. Subsequently, in the period after the fire, invasive alien vegetation could potentially invade the area inhibiting the indigenous vegetation from re-establishing.

The vegetation type within the site boundary (matrix of Fynbos and Renosterveld vegetation types) presents a high fire risk scenario. Fynbos especially, has an affinity towards fire, due in part to the dry grassy and woody shrub plants which dominate fynbos, as well as the fact that several fynbos species depend on fire for germination of seeds and continued growth. The large stands of *Acacia mearnsii* surrounding the perimeter of the Melkhout Substation pose an additional fire risk, as they are easily ignited.

The impact is rated with a Medium (-ve) significance without mitigation, but can be reduced to Insignificant (-ve) if the recommended measures are applied. Table 6-4 illustrates the extent to which this impacts the environment.

Table 6-5: Significance rating of Impact 4 and recommended mitigation measures

	Spatial Extent	Intensity	Duration	Consequence	Probability	Significance	+-	Confidence	Reversibility
Before Management	Regional	High	Medium term	High	Possible	MEDIUM	-	Medium	Medium
Management Measures									

<ul style="list-style-type: none"> • All invasive alien species currently surrounding the substation should be removed and disposed of as waste at a registered landfill site; • Appropriate fire-fighting equipment must be available on site at all times and serviced at regular intervals; • No smoking shall be allowed in the vicinity of flammable substances and relevant signage must be displayed; and • It is recommended that an 8 m fire break be maintained around the perimeter of the battery storage facility for the duration of the operational phase. The fire break should be maintained on a regular basis. 									
After Management	Local	Medium	Short-term	Very Low	Possible	INSIGNIFICANT	-	Medium	Medium

7 Conclusion

According to the National Vegetation Map by Mucina and Rutherford (2012), the proposed site falls within *Kouga Grassy Sandstone Fynbos* (FFs 28), listed as Least Concern. However, during the site visit it was noted that the vegetation on site consists of a mix of species related to *Kouga Grassy Sandstone Fynbos* (FFs 28) as well as *Humansdorp Shale Renosterveld* (FRs 19). *Humansdorp Shale Renosterveld* is mapped 2.9 km from the boundary of the site. It is likely that the site falls within a transitional zone between the two vegetation types and contains a matrix of species associated with both vegetation types. Therefore, potential species occurring within the area as well as impact ratings have been assessed with this vegetation matrix in mind. *Humansdorp Shale Renosterveld* is classified as Endangered according to Mucina and Rutherford (2012).

The majority of the vegetation on the proposed site is moderately intact. It consists of a matrix of fynbos shrubs, restiads, grasses, scattered succulent species and bulbous geophytes. During the site visit, 110 indigenous species were identified within the site boundary. There are several rocky outcrops within the site boundary, although the majority of which contain vegetation similar to the surrounding vegetation and are not considered particularly sensitive. However, one of the rocky outcrops situated towards the north of the site contains vegetation which was only observed on the specific rocky outcrop and is therefore considered sensitive as a microhabitat and should be protected from disturbance during construction. No structures or infrastructure is planned in this area. The adjacent substation and its related access roads, pylons, fencing and associated vegetation clearing are the main disturbances on the site visit. Several rock piles are located around the boundary of the existing substation, likely to have been dumped/stored there during the construction of the substation. Evidence of cattle grazing was also observed.

Eighteen plant species of special concern (SCC) were observed within the study area during the survey. It should be noted that, although not observed during the site visits, certain SSC (as listed as occurring within *Kouga Grassy Sandstone Fynbos* and *Humansdorp Shale Renosterveld*) could potentially be present on site but could have been overlooked due to the timing of these site visits. Additionally, several SSC were observed within the surrounding area, but were not observed within the site boundary area during the site visit. It is possible that these species also occur within the site boundary.

The sections of the site on and directly adjacent to areas of disturbance are largely infested with *Acacia mearnsii*. Isolated clumps and individuals of *Acacia cyclops* (Rooikrans), *A. saligna* (Port Jackson Willow) and *A. melanoxylon* (Australian Blackwood) are scattered around the site. The surrounding area is also infested with large stands of *Acacia mearnsii* (most prominently within the surrounding wet areas). It is important that all invasive aliens currently occurring on site (as well as potential future stands which may emerge due to the proposed disturbance on site) must be monitored, controlled and eradicated as per the landowner's Invasive Species Monitoring, Control and Eradication Plan according to Section 76(2)(a) of NEMBA (Act No. 10 of 2004).

A number of potential impacts relating to loss of indigenous vegetation, loss of protected plant species, proliferation of alien invasive species, risk of vegetation degradation due to fire are predicted to occur as a result of the proposed BESS. Mitigation measures are proposed to lower the significance of these impacts. Provided these mitigation measures are fully adhered to and implemented as part of the Environmental Management Programme (EMPr) during the construction and operational phases the proposed BESS is expected to have a low to insignificant long term impact on vegetation in the area.

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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Appendix A: Indigenous Botanical Species Observed on Site

DENSITY	
D	Dense
A	Abundant
S	Scattered

FAMILY	SPECIES ²	DENSITY
ACANTHACEAE	<i>Barleria pungens</i> †	S
ACANTHACEAE	<i>Thunbergia capensis</i> †	S
AIZOACEAE	<i>Drosanthemum lique</i>	S
AIZOACEAE	<i>Lampranthus lavisii</i> ‡	S
AIZOACEAE	<i>Ruschia sp</i>	S
AIZOACEAE	<i>Ruschia uncinata</i>	S
AMARYLLIDACEAE	<i>Boophone disticha</i>	S
AMARYLLIDACEAE	<i>Haemanthus sanguineus</i>	S
ANACARDIACEAE	<i>Searsia crenata</i>	S
ANACARDIACEAE	<i>Searsia incisa</i>	S
ANACARDIACEAE	<i>Searsia rosmarinifolia</i>	S
ASCLEPIADACEAE	<i>Asclepias crispa</i>	S
ASPARAGACEAE	<i>Asparagus capensis</i>	S
ASPARAGACEAE	<i>Ledebouria sp</i>	S
ASPHODELACEAE	<i>Gasteria nitida</i>	S
ASPHODELACEAE	<i>Trachyandra ciliata</i>	S
ASTERACEAE	<i>Arctotis acaulis</i> †	S
ASTERACEAE	<i>Athanasia dentata</i>	A
ASTERACEAE	<i>Berkheya angustifolia</i>	S
ASTERACEAE	<i>Berkheya heterophylla</i>	S
ASTERACEAE	<i>Chrysocoma ciliata</i>	S
ASTERACEAE	<i>Curio crassulifolius</i>	S
ASTERACEAE	<i>Dimorphotheca ecklonis</i>	S
ASTERACEAE	<i>Disparago ericoides</i> ‡	A
ASTERACEAE	<i>Elytropappus rhinocerotis</i> †	A
ASTERACEAE	<i>Euryops algoensis</i>	S
ASTERACEAE	<i>Gazania krebsiana subsp. krebsiana</i> ‡	S
ASTERACEAE	<i>Gerbera piloselloides</i> †	S
ASTERACEAE	<i>Helichrysum anomalum</i> †	S
	<i>Helichrysum appendiculatum</i>	S

² Listed vegetation type as per Mucina and Rutherford (2012)

† *Humansdorp Shale Renosterveld*

‡ *Kouga Grassy Sandstone Fynbos*

ASTERACEAE	<i>Helichrysum cymosum</i> subsp. <i>calvum</i>	S
ASTERACEAE	<i>Helichrysum nudiflorum</i> †	S
ASTERACEAE	<i>Metalasia densa</i> †	D
ASTERACEAE	<i>Oedera genistifolia</i> †	A
ASTERACEAE	<i>Oedera imbricata</i>	S
ASTERACEAE	<i>Othonna gymnodiscus</i>	S
ASTERACEAE	<i>Senecio crenulatus</i>	S
ASTERACEAE	<i>Stoebe plumosa</i> ‡	S
ASTERACEAE	<i>Syncarpha striata</i>	D
ASTERACEAE	<i>Ursinia scariosa</i>	S
BRASSICACEAE	<i>Heliophila sauvissima</i>	S
CARYOPHYLLACEAE	<i>Silene crassifolia</i> subsp. <i>primuliflora</i>	S
CRASSULACEAE	<i>Adromiscus maculatus</i>	S
CRASSULACEAE	<i>Crassula capitella</i> subsp. <i>capitella</i>	S
CRASSULACEAE	<i>Crassula cotyledonis</i>	S
CRASSULACEAE	<i>Crassula ericoides</i> subsp. <i>ericoides</i>	S
CRASSULACEAE	<i>Crassula pellucida</i>	S
CRASSULACEAE	<i>Kalanchoe rotundifolia</i>	S
CYPERACEAE	<i>Bulbostylis contexta</i>	S
CYPERACEAE	<i>Ficinia laciniata</i>	S
CYPERACEAE	<i>Ficinia nigrescens</i> †	S
DIPSACACEAE	<i>Scabiosa columbaria</i>	S
EBENACEAE	<i>Diospyros dichrophylla</i>	S
EBENACEAE	<i>Euclea natalensis</i>	S
ERICACEAE	<i>Erica glandulosa</i> subsp. <i>glandulosa</i>	S
EUPHORBIACEAE	<i>Clutia alaternoides</i> ‡	S
EUPHORBIACEAE	<i>Clutia laxa</i>	S
EUPHORBIACEAE	<i>Euphorbia silenifolia</i>	S
FABACEAE	<i>Aspalathus angustifolia</i>	S
FABACEAE	<i>Aspalathus spinosa</i>	S
FABACEAE	<i>Vachellia karroo</i>	S
GERANIACEAE	<i>Pelargonium laevigatum</i>	S
GERANIACEAE	<i>Pelargonium pulverulentum</i>	S
GERANIACEAE	<i>Pelargonium reniforme</i> †	S
HYACINTHACEAE	<i>Albuca virens</i> subsp. <i>virens</i>	S
HYACINTHACEAE	<i>Drimia anomola</i>	S
HYACINTHACEAE	<i>Drimia ciliata</i>	S
HYACINTHACEAE	<i>Ornithogalum dubium</i>	S
HYPOXIDACEAE	<i>Hypoxis villosa</i>	S
IRIDACEAE	<i>Babiana patersoniae</i>	S
IRIDACEAE	<i>Hesperantha falcata</i>	S
IRIDACEAE	<i>Ixia orientalis</i>	S

IRIDACEAE	<i>Moraea algoensis</i>	S
IRIDACEAE	<i>Tritonia gladiolaris</i>	S
IRIDACEAE	<i>Watsonia pillansi</i>	S
LOBELIACEAE	<i>Grammatotheca bergiana</i>	S
LOBELIACEAE	<i>Lobelia tomentosa</i>	S
MALVACEAE	<i>Grewia occidentalis</i>	S
MALVACEAE	<i>Hermannia flammea</i> †	S
MALVACEAE	<i>Hermannia salviifolia</i>	S
MONTINIACEAE	<i>Montinia caryophyllacea</i>	A
OROBANCHACEAE	<i>Hyobanche sanguinea</i>	S
ORCHIDACEAE	<i>Satyrium membranaceum</i> †	S
OXALIDACEAE	<i>Oxalis punctate</i> †	S
OXALIDACEAE	<i>Oxalis purpurea</i>	S
PLANTAGINACEAE	<i>Plantago lanceolata</i>	A
POACEAE	<i>Brachiaria serrata</i> †	D
POACEAE	<i>Cymbopogon marginatus</i> ‡	S
POACEAE	<i>Eragrostis capensis</i> †	A
POACEAE	<i>Eragrostis curvula</i> † ‡	D
POACEAE	<i>Harpochloa falx</i>	S
POACEAE	<i>Melinis repens</i> ‡	S
POACEAE	<i>Sporobolus africanus</i> †	A
POACEAE	<i>Trilobium hispidum</i> † ‡	A
POACEAE	<i>Tristachya leucothrix</i> † ‡	D
POLYGALACEAE	<i>Muraltia squarrosa</i>	S
POLYGALACEAE	<i>Polygala ericaefolia</i>	S
POLYGALACEAE	<i>Polygala myrtifolia</i> ‡	S
PROTEACEAE	<i>Leucadendron salignum</i> ‡	S
PROTEACEAE	<i>Leucospermum cuneiforme</i>	S
RANUNCULACEAE	<i>Anemone vesicatoria</i>	S
RESTIONACEAE	<i>Restio sp</i>	A
RESTIONACEAE	<i>Thamnochortus glaber</i>	A
ROSACEAE	<i>Cliffortia linearifolia</i>	D
RUSCACEAE	<i>Eriospermum paradoxum</i>	S
RUSCACEAE	<i>Eriospermum sp</i>	S
SCROPHULARIACEAE	<i>Zaluzianskya capensis</i>	S
SOLANACEAE	<i>Lycium oxycarpum</i>	S
THYMELAEACEAE	<i>Passerina obtusifolia</i> ‡	A
THYMELAEACEAE	<i>Struthiola parviflora</i>	S

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