Appendix F.8

TERRESTRIAL BIODIVERSITY AND PLANT SPECIES ASSESSMENT

TERRESTRIAL BIODIVERSITY AND PLANT SPECIES SPECIALIST ASSESSMENT FOR THE PROPOSED KOMATI POWER STATION SOLAR ENERGY PROJECT

Eskom Holdings SOC Ltd

Report - November 2023

Submitted to:
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Acronyms and Abbreviations

Abbreviation	Explanation
AIS	Alien Invasive Species
AOO	Area of Occupancy
BI	Biodiversity Importance
BESS	Battery Energy Storage System
CA	Conservation Areas
CBA	Critical Biodiversity Areas
CI	Conservation Importance
EIA	Environmental Impact Assessment
ESS	Environmental and Social Standard
EMP	Environmental Management Programme
EOO	Extent of Occurrence
FI	Functional Integrity
Ha	Hectare
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
LSA	Local Study Area
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
PA	Protected Areas
PS	Performance Standard
PV	Photovoltaic
QDS	Quarter Degree Square
RR	Receptor Resilience
RSA	Regional Study Area
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern

SEI	Site Ecological Importance
SWSA	Strategic Water Source Areas
ToPS	Threatened or Protected Species
WB	World Bank

Details of the Expertise of the Specialist

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Qualifications	M.Sc. Resource Conservation Biology B.Sc. Hons. Ecology and Conservation Biology B.Sc. Zoology and Grassland Science
Summary of Past Experience	Andrew Zinn is a terrestrial ecologist with Hawkhead Consulting. In this role, he conducts varied specialist ecology studies, including flora and fauna surveys, for baseline ecological assessments and ecological impact assessments. He has over a decade of experience working in the fields of ecology and conservation research, and is registered as a Professional Natural Scientist (*Pr.Sci.Nat.*) – Ecological Science, with the South African Council of Natural Scientific Professions (SACNASP). Andrew has worked on projects in several African countries including Botswana, Democratic Republic of Congo, Ethiopia, Ghana, Mozambique, South Africa, Tanzania and Zambia.

Declaration of Independence by Specialist

I, Andrew Zinn, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the proposed Komati Power Station Solar Photovoltaic and Battery Energy Storage Project;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- Do not have, nor will have, a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity; and
- Undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document.

Contents

List of Tables

List of Figures

Appendix 6 of the EIA Regulations

Where applicable, this baseline report has been written in compliance with Appendix 6 of the EIA Regulations.

Section	Requirements	Section addressed in report
1.(1)	A specialist report prepared in terms of these Regulations must contain	
(a)	Details of	
(i)	the specialist who prepared the report; and	Preceding Page
(ii)	the expertise of that specialist to compile a specialist report including a curriculum vitae	Preceding Page
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority	Preceding Page
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1
(cA)	an indication of the quality and age of base data used for the specialist report;	Section 3.0
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 7.0, 12 & 13
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3.2
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3.0
(f)	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 11.0
(g)	an identification of any areas to be avoided, including buffers;	Section 11.0
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Sections 8.0 & 11.0
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4.0
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity (including identified alternatives on the environment) or activities;	Section 12.0
(k)	any mitigation measures for inclusion in the EMPr;	Section 13.0
(l)	any conditions for inclusion in the environmental authorisation;	Section 15.0
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 14.0

(n)	a reasoned opinion—	
(i)	(as to) whether the proposed activity, activities or portions thereof should be authorised;	Section 15.0
(iA)	regarding the acceptability of the proposed activity or activities; and	
(ii)	if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(q)	any other information requested by the competent authority.	N/A
2.	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

1. Introduction

Hawkhead Consulting was appointed by WSP Africa Pty (Ltd), on behalf of Eskom Holdings SOC (Ltd) (Eskom), to conduct the terrestrial biodiversity and terrestrial plant species specialist assessments for the proposed Komati Power Station Solar Photovoltaic and Battery Energy Storage Project (hereafter referred to as the "Project"), near Kriel in Mpumalanga Province, South Africa.

The proposed Project is aimed at obtaining environmental authorisation at a national level, in line with South African legislation and applicable regulations, and financing at the international level, as per the requirements of the World Bank Environmental & Social Framework; and, World Bank Group (WBG) Environmental, Health and Safety Guidelines (EHSG).

1.1. Purposes of this Report

This specialist study report presents the integrated findings both the terrestrial biodiversity specialist assessment and the terrestrial plant species (flora) specialist assessment. The primary scope of work included:

- Reviewing and summarising pertinent biodiversity and botanical information presented in relevant ecological, conservation and biodiversity datasets and literature;
- Conducting a targeted field survey of the Project site to collect field data specific to the proposed development footprints;
- Compiling a baseline terrestrial ecosystem and floristic description, based on reviewed information and the findings of the field survey;
- Identifying and assessing potential negative impacts associated with the proposed Project; and
- Recommending appropriate mitigation, management and monitoring measures for inclusion in the proposed Project's Environmental Management Plan (EMP) and/or Biodiversity Management Plan (BMP).

Predicated on the above scope items, the purpose of this report is therefore to 1) present a baseline description of terrestrial ecosystems and flora species occurring on-site, 2) assess the potential impacts of the proposed Project on on-site ecosystems and flora ; 3) detail appropriate management and monitoring measures to avoid/mitigation identified impacts and guide on-site biodiversity management; and 4) provide an impact statement on the appropriateness of the project with respects to biodiversity conservation.

1.2. Project Location and Delimits of the Study Areas

Komati Power Station is located approximately 24 km north-east of Kriel in Mpumalanga Province (Figure 1). The site is bordered to the east and south by the R35 and R542 provincial roads respectively. Land to the immediate north and west of the site is dominated by infrastructure and facilities associated with Goedehoop Colliery.

Komati Power Station has a total of nine generating units, five 100 MW units on the east (Units 1 to 5) and four 125 MW units on the west (Units 6 to 9), with a total installed capacity of 1000 MW. The power station reached its end-of-life expectancy in September 2022 and all nine unit have ceased to be operational.

Two spatial scales were considered for this assessment:

- A Local Study Area (LSA), which encompasses the proposed Project's development footprints and all areas encompassed by the Project site boundary, within which direct impacts on biodiversity receptors (i.e., direct habitat loss) are likely to occur; and
- A Regional Study Area (RSA), which comprised the catchment within which the proposed Project is situated and is considered to be an ecologically appropriate area of analysis for the identification of sensitive biodiversity receptors with potential to occur in the LSA, and which may be indirectly impacted by the proposed Project.

These are shown in Figure 2.

1.3. Summary Project Description

Komati Power Station has reached its end-of-life, and as a result, Eskom has developed a Just Energy Plan (EJETP) aimed at repurposing the power station property and thereby reducing the negative social impacts associated with the cessation of on-site operations.

The EJETP Komati incorporates the development of a Solar Energy Facility (SEF), comprising Photovoltaic (PV) and Battery Energy Storage System (BESS) facilities. These will all be located on land owned by Eskom.

The SEF will include the development of a PV facility with a capacity of 100 MW and a BESS of up to 150 MW. These have a combined construction footprint of approximately 200-250 hectares. Key proposed Project infrastructure are listed in Table 1 and shown in Figure 3.

Table 1: Proposed Project Infrastructure

Infrastructure	Description

Solar Energy Facility	• Solar Farm A:
	  ○ Extent: 156 Ha
	  ○ Buildable Area: 127 Ha
	  ○ Capacity: Up to 71.5 MW
	• Solar Farm B:
	  ○ Extent: 54 Ha
	  ○ Buildable Area: 50 Ha
	  ○ Capacity: Up to 28.5 MW
	• Solar modules will be elevated above the ground, and will be mounted on either fixed tilt systems or tracking system

Grid Connection	• Point of connection of Solar Panels will be to the Komati High Voltage (HV) yard.
	• Power routed via a medium voltage overhead line (OHL) or underground cabling.
	• Servitude of powerlines:
	  ○ Between 36 and 40m
	  ○ Area will be approximately 26ha
	• Substations:
	  ○ Each of the Solar Sites will be equipped with collector substations.
	  ○ Infrastructure associated with the substations includes:

Infrastructure	Description
	○ O&M buildings housing the control and communication equipment ○ Access road infrastructure within the substation sites ○ Site substations and collector substations • Site Access: ○ New access roads or tracks may be required to provide access to sections of the powerline route. ○ Access roads will be mostly a two-track gravel road under the OHPL in order to access pylons for construction and maintenance purposes
Site Substation and BESS	• Three BESS facilities • Footprints: Range from 2 ha up to 6 ha. • BESS capacity: 150 MW with four hours standby time. • Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies are being considered
Associated Infrastructure	• Access roads; • Perimeter roads; • Below ground electrical cables; • Above ground overhead lines; • Meteorological Station; • Operations and Maintenance (O&M) Building including control room, server room, security equipment room, offices, boardroom, kitchen, and ablution facilities); • Spares Warehouse and Workshop; • Hazardous Chemical Store; • Security Building; • Parking areas and roads; • Temporary laydown areas; • Temporary concrete batching plant • Construction camps and temporary laydown areas; and • Onsite substations.

1.4. Environmental Screening Tool - Project Sensitivities

The proposed Project's infrastructure footprint was assessed at a desktop level using the National Web-based Environmental Screening Tool. According to the Tool, the Terrestrial Biodiversity Theme for the LSA is rated 'Very High Sensitivity' due to the presence of land mapped as 'Critical Biodiversity Area' (CBA) 2 (i.e., CBA Optimal) by the Mpumalanga Biodiversity Sector Plan (2019) and a Vulnerable Ecosystem.

The National Web Based Screening Tool also indicated that the LSA is considered to be of 'Medium Sensitivity' due to their support of three flora species of conservation concern, including *Pachycarpus suaveolens*, Sensitive Species 41 and Sensitive Species 691.

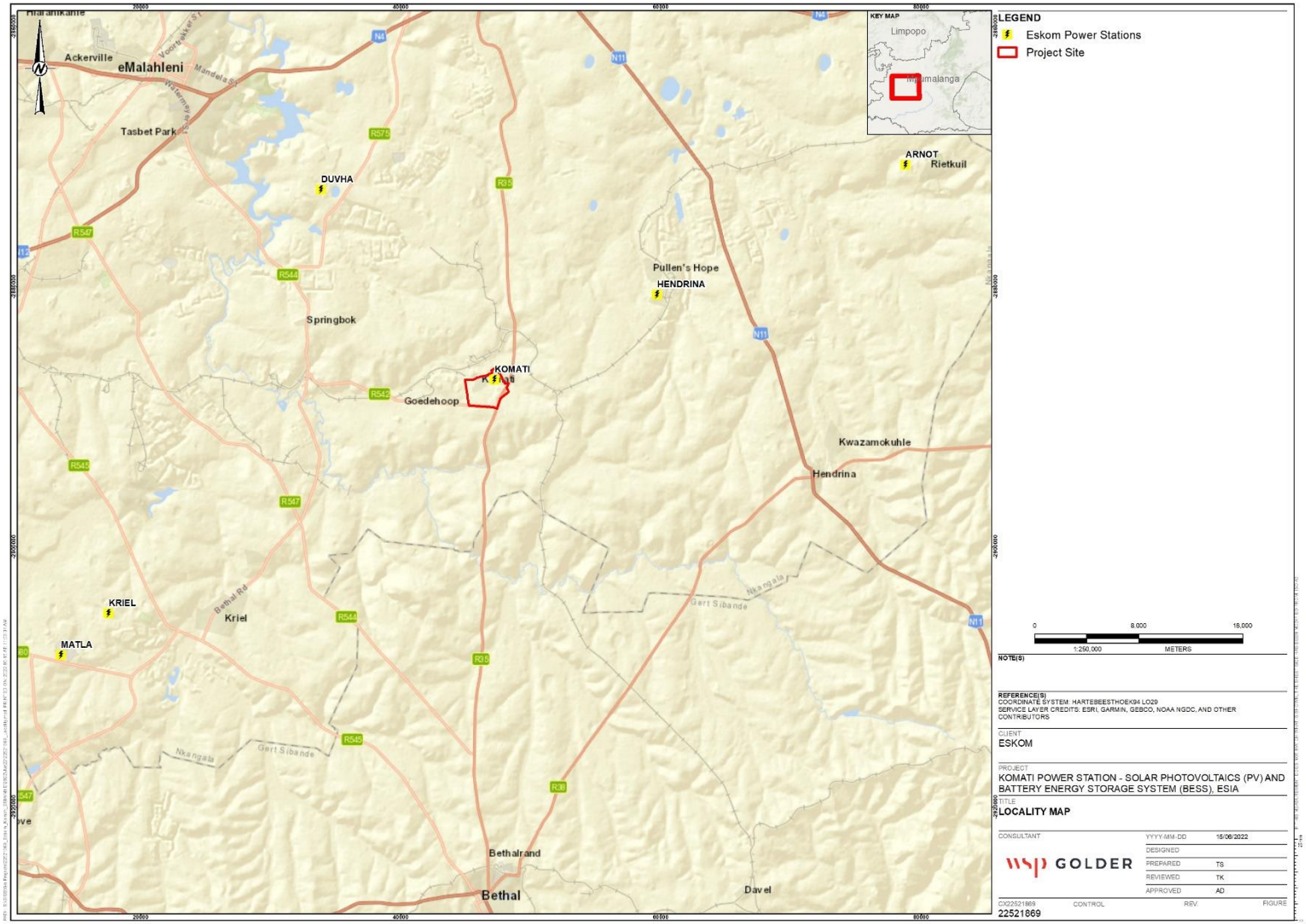

Figure 1: Regional location of Komati Power Station, in Mpumalanga Province, South Africa.

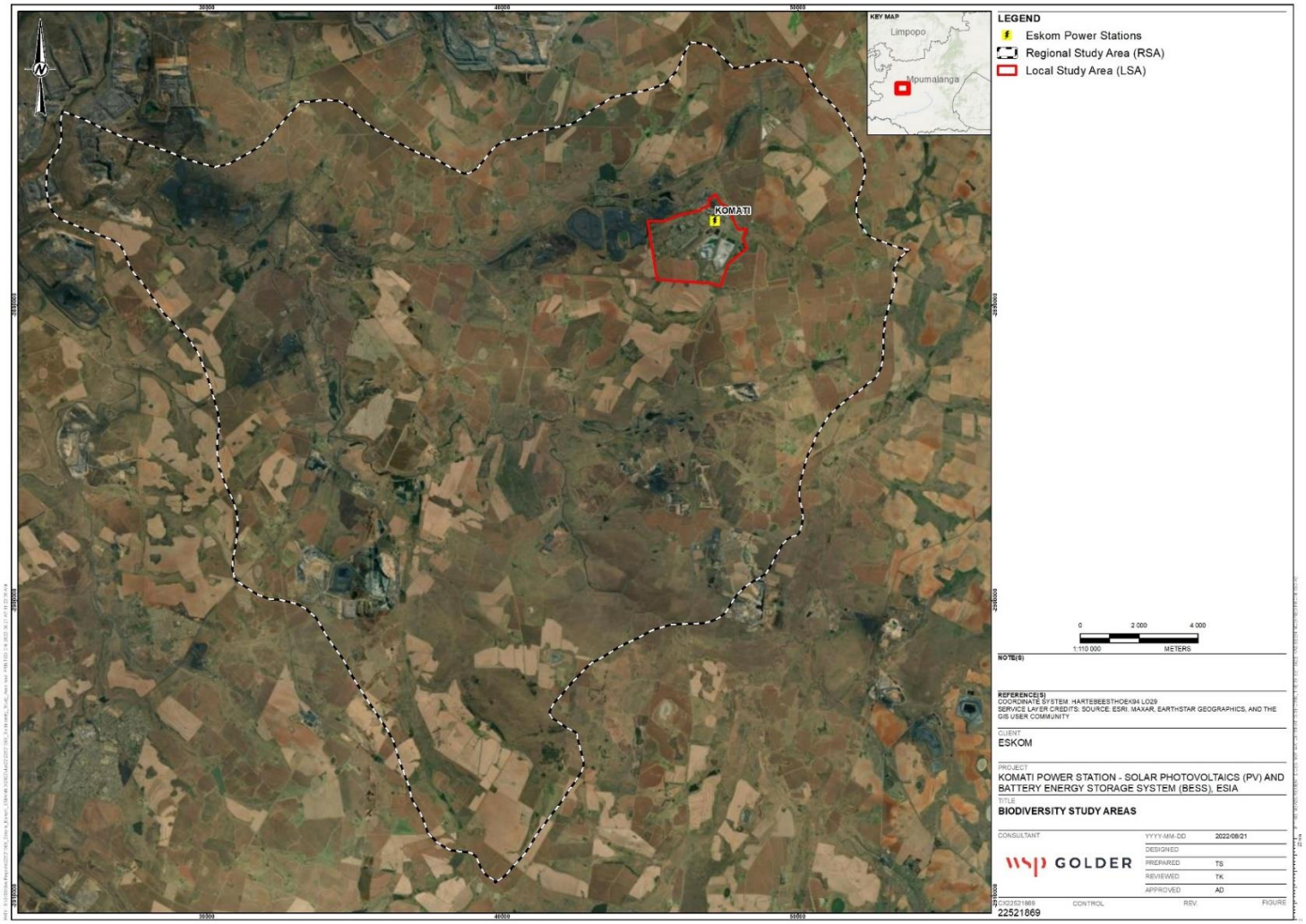

Figure 2: Aerial view showing the extent of the regional and local study areas.

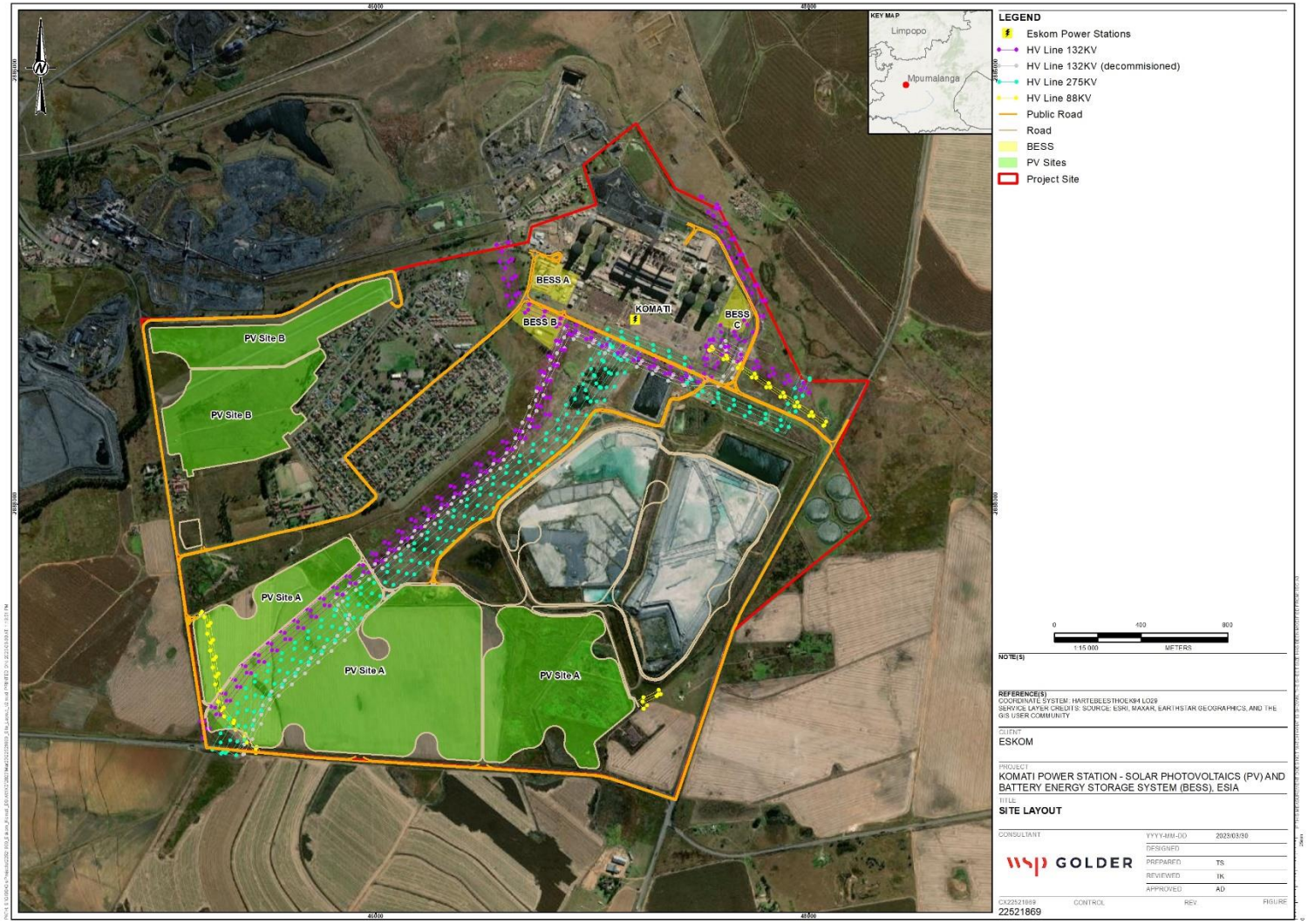

Figure 3: Location of proposed Project infrastructure in the Local Study Area

2. Relevant Legislation and Guidelines

Relevant international, national and provincial legislation, associated guidelines and policies that are relevant to the environmental and biodiversity, and which were used to guide the Terrestrial Plant Species Specialist Assessment are listed in Table 2.

Table 2: Relevant environmental and biodiversity legislation and guidelines.

Applicable Legislation and Guideline	Relevance to the Proposed Project
National Environmental Management Act, 1998 (Act No 107 of 1998) – NEMA	Section 24 of the NEMA, headed "Environmental Authorisations" sets out the provisions which are to give effect to the general objectives of Integrated Environmental Management, and laid down in Chapter 5 of the NEMA. In terms of section 24(1), the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by the NEMA with granting of the relevant environmental authorisation. In terms of section 24F(1) of the NEMA no person may commence an activity listed or specified in terms of section 24(2)(a) or (b) unless the competent authority has granted an environmental authorisation for the activity. Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA (1998), when applying for environmental authorisation, the following are relevant to this study: • Protocol for the specialist assessment and report content requirements for environmental impacts on terrestrial biodiversity; and • Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial plant species.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The NEMBA provides the framework under the NEMA for the: • Management and conservation of South Africa's biodiversity; • The protection of species and ecosystems that warrant protection; • The fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and • The establishment and functions of a South African National Biodiversity Institute (SANBI). Amongst other components, the NEMBA includes: • Lists of Critically Endangered, Endangered, Vulnerable and Protected Species (February 2007), with associated amendments (December 2007 and 3 June 2020) (ToPS); • Threatened or Protected Species Regulations (February 2007); • National list of threatened terrestrial ecosystems for South Africa (2011, and 2021 revision).

Applicable Legislation and Guideline	Relevance to the Proposed Project
	The purpose of ToPS lists and regulations are to regulate the permit system concerning restricted activities involving specimens of listed threatened or protected species. The primary purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction by identifying 'witness' sites' of exceptionally high conservation value and enabling and facilitating proactive management of these ecosystems. The NEMBA also provides a list of regulations and guidance concerning alien invasive species, including: • A guideline for Monitoring, Control and Eradication Plans (September 2015); • 2020 Alien and Invasive Species Regulations (September 2020); and • 2020 Alien and Invasive Species Lists (March 2021).
Mpumalanga Nature Conservation Act (Act No. 10 of 1998)	Amongst other provisions, the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) provides lists of specially protected and protected flora and fauna. Of particular relevance to this specialist study are species of flora that are listed under: • Schedule 11 and 12: Protected and Specialist Protected Plants.
Other Relevant national and Provincial Policies, Plans and Guidelines	Other relevant policies, plans and guidelines that were considered during this study include: • Mpumalanga Biodiversity Sector Plan; • Species Environmental Assessment Guideline (SANBI, 2020); • National Protected Area Expansion Strategy (2016); and • National Biodiversity Offset Guideline (2023), which provides guidance on the need to develop biodiversity offsets.
World Bank Environmental and Social Standard 6	The World Bank's (WB) Environmental and Social Standard 6 (ESS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources (World Bank, 2016) separates habitat into four categories for the purposes of implementing a differentiated risk management approach to habitats based on their sensitivity and values. The categories include 'Modified habitat', 'Natural habitat', 'Critical Habitat' and 'Legally protected and internationally and regionally recognized areas of biodiversity value'; each of which have varying levels of Borrower obligation in terms of biodiversity mitigation and management, and offset requirements. Whilst the assessment of Modified and Natural habitats is largely based on the establishment of the ecological condition of mapped habitat/vegetation units, and the boundaries of legally protected and/or internationally recognised areas of high biodiversity value are generally defined; the identification and assessment of Critical Habitat requires additional, focussed effort – usually focussed on the presence of Critically Endangered, Endangered, range-restricted or migratory/congregatory species in significant numbers.

3. Study Methodology

3.1. Desktop Literature Review

3.1.1. Ecosystem Attributes and Conservation Context

- General literature and data sources that were consulted during the desk-top literature review component to provide an overview of the ecological and conservation context of the LSA within the broader RSA included:
    - Mucina and Rutherford (2011) for a full description of the relevant regional vegetation type and SANBI (2013) for a biome-level description;
    - The Mpumalanga Biodiversity Sector Plan (MBSP) (2019);
    - The National List of Threatened Ecosystems (NEMBA Threatened Ecosystems, 2011 & 2021);
    - The South African Protected Areas Database website (SAPAD, 2021) to identify Protected Areas (legally gazetted), Conservation Areas, and Priority Focus Areas for protected area expansion in the surrounding landscape;
    - Marnewick, *et al*., (2015) for a description of Important Bird Areas (IBA) in the region; and
    - The Strategic Water Source Areas (SWSA) and National Freshwater Ecosystem Priority Area (NFEPA)databases for information on the hydrological setting of the RSA and LSA.

3.1.2. General Floristics

- A list of flora species that have previously been recorded in the broader region encompassing the regional study area was obtained from SANBI's online Botanical Database of Southern Africa (BODATSA);
- A list of flora species of conservation concern that have previously been recorded in the 2629AB Quarter Degree Square (QDS) in which the RSA is located was also obtained from the Mpumalanga Parks and Tourism Agency (MPTA) (refer to Section 3.4 and Section 3.5 for a discussion on the assessment of species of conservation concern); and
- Available aerial imagery was also studied to identify potential land/habitat units in the proposed Project footprints and to guide the field survey.

3.2. Field Survey

The field survey comprised a one-day field visit, conducted on the 14th December 2022. This period coincides with the wet/growing season. It is noted that sufficient rain had fallen prior to the field survey to promote new season vegetative growth and flowering, and this facilitated the collection of floristic data.

3.2.1. Flora and Vegetation

- Field work focused primarily on assessing the composition and condition of vegetation within the Project's proposed development/infrastructure footprints in the LSA;
- Vegetation was sampled along 14 meander search transects in the LSA. All flora species observed were recorded, along with estimated abundances. Notes were also made on vegetation structure, general soil characteristics, local topography and onsite/adjacent land uses and disturbances (these are shown in Appendix B);

- General habitat notes and representative photographs were also collected at 24 reference locations across the LSA (Appendix B);
- Reference works used to identify flora species included Van Wyk and Malan (1998), Van Oudtshoorn (1999), Pooley (2005), Johnson *et al.,* (2015) and Glen and Van Wyk (2016);
- Vegetation structure was defined based on Edwards (1983) structural classification system; and
- Flora nomenclature was based on Germishuizen *et al*., (2006) or more recent name changes, as presented on SANBI's Red List of South African Plants website.

3.3. Delineation and Mapping of Habitat Units

Mapping of habitat units in the LSA was conducted based on a combination of field observations and a study of available aerial/satellite imagery. It must be noted that owing to the spatial complexity and fragmentation of the LSA and the limited duration of the field survey, it was not possible to visit every non-transformed habitat patch.

3.4. Assessment of Species of Conservation Concern

Flora species of conservation concern were defined as those listed as either threatened or near threatened on the Global Red List (IUCN, 2022-2), the Regional (i.e., South African / National) Red List, and/or the Mpumalanga Provincial Red List, as well as species listed as threatened or protected according to national and/or provincial legislation. These included:

- Global IUCN[1] Red List of Threatened Species (www.iucnredlist.org, 2022-2);
- Red List of South African Plants (www.redlist.sanbi.org);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) - Threatened or Protected Species List (Notice 389 of 2013) (NEMBA ToPS List, 2007); and
- Mpumalanga nature Conservation Act (1999), specifically Schedules 11 and 12 concerning Specially Protected and Protected flora.

3.5. Habitat Suitability Assessment for Species of Conservation Concern

For species of conservation concern a 'probability of occurrence' in the RSA and LSA was established by conducting habitat suitability assessments. The following parameters were used in these assessments:

- Habitat requirements: Most threatened species have very specific habitat requirements. The presence of these habitats in and adjacent to the RSA and LSA was evaluated;
- Habitat status: The status or ecological condition of available habitat was assessed. Often a high level of habitat degradation will negate the potential presence of sensitive species; and
- Habitat linkage: Dispersal and movement between natural areas for breeding and feeding are important population-level processes. Habitat connectivity to surrounding natural habitat and corridors was evaluated to determine the likely persistence of species of conservation concern.

Probability of occurrence is presented in the following categories:

- Recorded: Any species of conservation concern observed/documented during the field visit;

[1] International Union for the Conservation of Nature.

- Probable: The species is likely to occur on the site due to suitable habitat and resources being present on the site;
- Possible: The species may occur on the site due to potential habitat and/or resources; and
- Unlikely: the species will not likely occur on the site due to lack of suitable habitat and resources, or significant differences in its Area of Occupancy (AOO) compared to its Extent of Occurrence (EOO).

3.6. Alien Invasive Flora Species

Alien invasive plant species were categorised according to the National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004) - 2020 listing of declared alien invasive species.

3.7. Flora of Medicinal Value

Many common and widespread flora species have medical or cultural utility to humans, and as such, have value to local communities. Flora of medicinal value recorded during the field survey were therefore highlighted and their purported uses described based on Van Wyk, *et al*., (2009).

3.8. Assessment of Site Ecological Importance

The ecological importance (sensitivity) of vegetation communities and habitats was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2020). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

$$BI = CI + FI$$

- **Conservation Importance** is defined as "the importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes" (SANBI, 2020).
- **Functional Integrity** is defined as "A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts" (SANBI, 2020).
- **Receptor Resilience** is defined as "the intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention" (SANBI, 2020).

For tables detailing the rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, refer to Appendix A. Table 3 presents a guideline for interpreting the SEI (SANBI, 2020).

Table 3: Guidelines for interpreting SEI in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
Source: SANBI (2020).	

4. Assumptions, Uncertainties and Gaps in Knowledge

The following assumptions, uncertainties and gaps in knowledge are highlighted for this biodiversity assessment:

- Field work was conducted over a one-day period in December 2023 and focused specifically on the proposed Project's development footprints in the LSA. The timing of the field survey coincided with the mid-summer rainy period. This is an optimal period to conduct botanical field work, however, it is possible that certain herbaceous taxa that are most readily visible or distinguishable when emergent or in flower during the late wet season, may have been overlooked during field visit;
- Given the difficulty in fully sampling and characterising the abundance and distribution of flora species in the LSA during the short period of time allocated to field work, the baseline descriptions were qualitative; and
- The delineation of habitat units was conducted using available Google Earth imagery. It is predicated on a subjective interpretation of aerial imagery and extrapolation of observations made during the field visit. It must be noted that owing to the spatially complexity and fragmentation of the LSA and limited duration of the field survey, it was not possible to visit and characterise every non-transformed habitat patch.

5. Regional Vegetation Characteristics

The RSA is located in the grassland biome and according to the regional mapping of South Africa's vegetation types, it and the LSA are dominated by the Eastern Highveld Grassland vegetation type (Figure 4). The general characteristics of the grassland biome and Eastern Highveld Grasslands, are discussed in more detail below:

5.1. Grassland Biome

The regional study area is located in the grassland biome, which covers approximately 28% of South Africa and is the dominant biome of the central plateau and inland areas of the eastern subcontinent (SANBI, 2013). Grasslands are typically situated in moist, summer rainfall regions that experience between 400 mm and 2000 mm of rainfall per year. Vegetation consists of a dominant field-layer comprising grasses and herbaceous perennials, with little- to no woody plants present.

South Africa's grassland ecosystems are parsed into five groups, with the RSA forming part of the Mesic Highveld Grasslands group (SANBI 2013). Mesic Highveld Grasslands occur at mid-altitudes and experience warm, wet summers (MAP 700-1200 mm) and cold winters. They are typically highly productive sourveld grasslands that are dominated by long-lived perennial grasses (SANBI, 2013).

Fire is common in Mesic Highveld Grasslands and maintains these ecosystems in a relatively treeless form (SANBI, 2013). Apart from their importance as rich stores of biodiversity, grasslands are critically important water production landscapes, constituting about half of South Africa's Strategic Water Source Areas (SANBI, 2013).

5.2. Eastern Highveld Grassland

Eastern Highveld Grasslands extend from Johannesburg in the east through to Bethel, Ermelo and Piet Retief in the west. This vegetation type is found on slightly- to moderately undulating plains, low hills and wetland depressions. Grasses are typical Highveld species from the genera *Aristida, Digitaria, Eragrostis* and *Tristachya*. Indigenous woody species are mainly restricted to rocky areas and include *Celtis africana, Protea caffra, Protea welwitschii, Diospyros lycioides, Searsia magalismontana* and *Senegalia caffra* (Mucina & Rutherford, 2011).

Mucina & Rutherford (2011) note the following species, amongst several others, as important taxa in Eastern Highveld Grassland:

Shrubs: *Anthospermum rigidum* and *Seriphium plumosum*.

Graminoides: *Aristida aequiglumis, Aristida congesta, Aristida junciformis, Cynodon dactylon, Digitaria monodactyla, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Eragrostis racemosa, Heteropogon contortus, Loudetia simplex, Setaria sphacelata, Sporobolus africanus, Themeda triandra, Alloteropsis semialata* and *Monocymbium ceresiiforme*.

Herbs: *Berkheya setifera, Haplocarpha scaposa, Euryops gilfillanii, Euryops transvaalensis, Justicia anagalloides, Acalypha angusta, Chamaecrista mimosoides, Dicoma anomala, Kohautia amatymbica, Lactuca inermis, Gladiolus crassifolius, Haemanthus humilis* and *Selago densiflora*.

Endemic Taxa: The geophytic herbs *Agapanthus inapertus, Eucomis vandermerwei* and the succulent herb *Huernia insigniflora* are endemic to the region in which Eastern Highveld Grassland is prevalent.

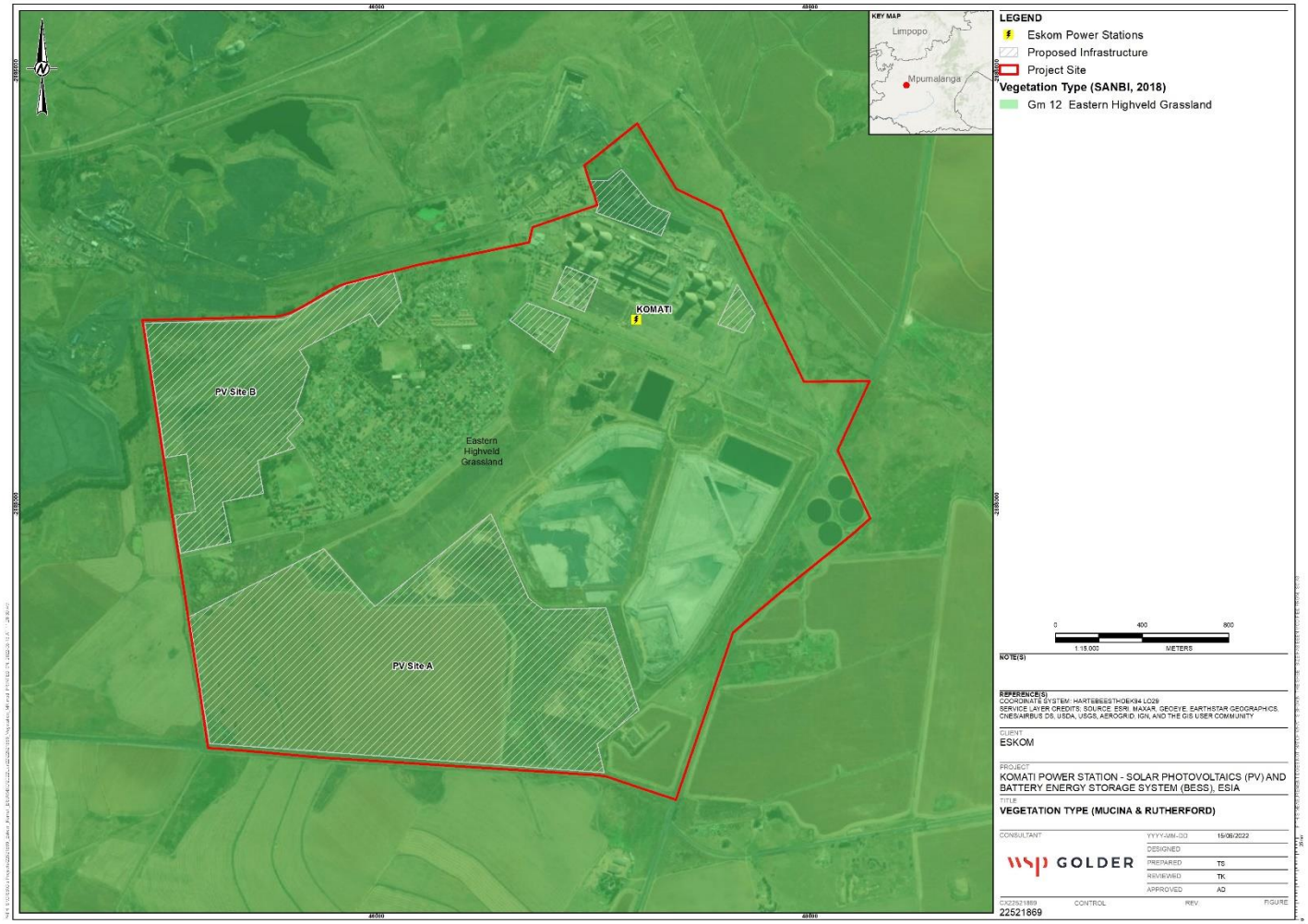

Figure 4: Local study area in relation to South Africa's regional vegetation types.

6. Regional Ecological Sensitivity and Conservation Setting

6.1. Nationally Threatened Ecosystems

Cultivation, mining, plantation forestry and other forms of development have resulted in the transformation of large areas of Eastern Highveld Grasslands, with Mucina & Rutherford (2011) indicating that 44% of this vegetation type has been modified. Accordingly, the Eastern Highveld Grassland vegetation type has up listed from Vulnerable to Endangered on the revised national list of threatened ecosystems (NEMBA Threatened Ecosystems, 2021).

6.2. Terrestrial Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

The Mpumalanga Biodiversity Sector Plan (MBSP) technical report defines five categories of conservation focus at a provincial level; protected areas, critical biodiversity areas (CBA), ecological support areas (ESA), other natural areas, and modified habitats:

- **Protected Areas**: protected areas recognised in terms of the National Environmental Management Protected Areas Act, No. 57 of 2003, that are currently considered to meet biodiversity targets in the MBSP;
- **Critical Biodiversity Area**: areas (outside of Protected Areas) that are required to meet biodiversity targets for biodiversity pattern (species and ecosystems) and ecological processes. Two CBA are recognised; CBA Irreplaceable and CBA Optimal. They should remain in a natural state that is maintained in good ecological condition;
- **Ecological Support Area**: play an important role in supporting the ecological functioning of critical biodiversity areas or for generating or delivering important ecosystem services. They support landscape connectivity and resilience to climate change adaptation. They need to be maintained in at least an ecologically functional state;
- **Other Natural Areas**: often retain much of their natural character and may contribute significantly to maintenance of viable species populations and natural ecosystem functioning, and may provide important ecological infrastructure and ecosystem services. They are not, however, prioritized for immediate conservation action in the MBSP; and
- **Modified**: often referred to as transformed, these areas have lost a significant proportion (or all) of their natural biodiversity and in which ecological processes have broken down (in some cases irretrievably), as a result of biodiversity-incompatible land-use practices such as ploughing, hardening of surfaces, mining, cultivation and the construction of houses or other built infrastructure.

According to the Mpumalanga Biodiversity Sector Plan (2019), the LSA is dominated by land categorised as 'Heavily or Moderately Modified Areas', with small patches of land categorised as 'Other Natural Areas'. An area categorised as Critical Biodiversity Area (CBA) Optimal, which overlaps with the proposed PV Site B development footprint is present in the north-west corner of the LSA – see Figure 5. Other patches of land designated as CBA Optimal are located to the north and east of the LSA.

It must be reiterated that CBA's in this context have been identified by the provincial authorities as areas that are required to meet local provincial biodiversity conservation targets for biodiversity

pattern (species and ecosystems) and ecological processes (MPTA 2014). They are **not** areas that have been identified as Critical Habitat, as defined in ESS6, paragraph 23.

According to (MPTA 2014), at a provincial level these are areas of high biodiversity value and should remain in a natural state that is maintained in good ecological condition in order to meet biodiversity conservation targets.

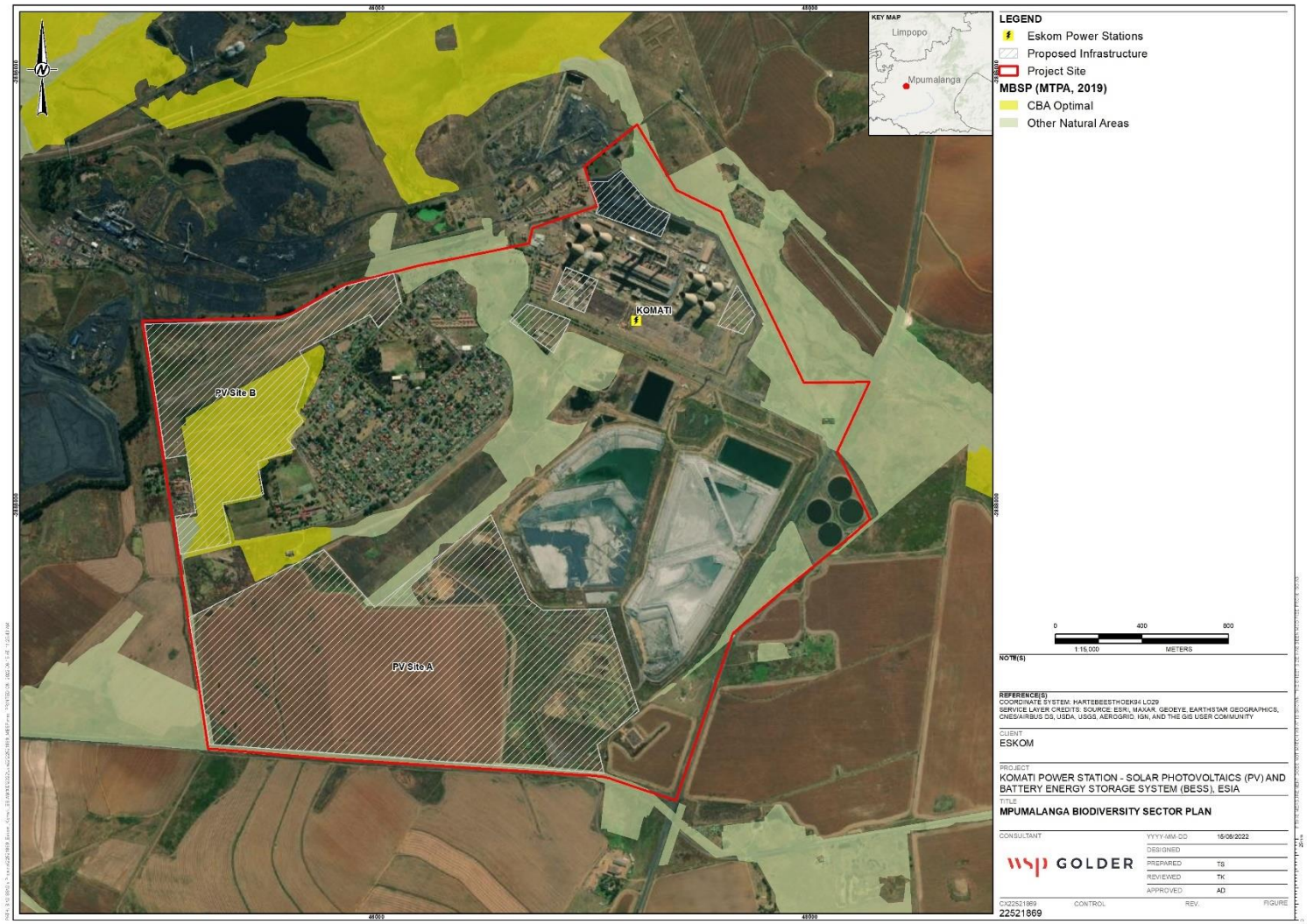

Figure 5: The Local Study Area and mapping of Critical Biodiversity Areas, as per the Mpumalanga Biodiversity Sector Plan (2019).

6.3. Water Management

6.3.1. Freshwater Ecosystem Priority Area Sub-Catchment

The closest NFEPA Water Management Area occurs approximately 40km away from the LSA, and as such are not included as receptors for the current impact assessment, or considered further in this report.

6.3.2. Strategic Water Source Areas

No strategic water source areas occur within close proximity to the LSA or indeed, the RSA (Figure 6), and as such are not included as receptors for the current impact assessment, or considered further in this report.

6.4. Indigenous Forests

No indigenous forests occur in the LSA or RSA. Both areas are dominated by modified habitats such as cultivated fields, the power station infrastructure, mining areas and residential sites, and small patches of natural wetland and grassland habitats.

6.5. Protected Areas and Conservation Areas

No Protected Areas (PA) occur within the LSA or the RSA (Figure 7). The nearest mapped PA, as per the SAPAD (2021), is Heyns Private Nature Reserve, which is located approximately 12.3 km to the north of the LSA's northern boundary (shown in Figure 7).

According to the National Protected Area Expansion Strategy, small portions of land to the immediate north and south-east of the local study area are designated as Priority Focus Areas, while other small patches designated as Priority Focus Areas are scattered across the broader landscape (SAPAD, 2021).

The nearest Important Bird Area (IBA) is Amersfoort - Bethal - Carolina District (SA018), which is situated approximately 15 km southeast of the LSA. IBA trigger species include several globally listed threatened species, such as Botha's Lark (*Spizocorys fringillaris*), Blue Crane (*Anthropoides paradiseus*), Southern Bald Ibis (*Geronticus calvus*), Black Harrier (*Circus maurus*), Blue Korhaan (*Eupodotis caerulescens*), Black-winged Pratincole (*Glareola nordmanni*), Secretarybird (Sagittarius serpentarius), Martial Eagle(*Polemaetus bellicosus*), Denham's Bustard (*Neotis denhami*),and the White-bellied Korhaan (*Eupodotis senegalensis*), as well as two regionally threatened species, namely African Grass Owl (*Tyto capensis*) and Lanner Falcon (*Falco biarmicus*) (Marnewick, *et al.* 2015).

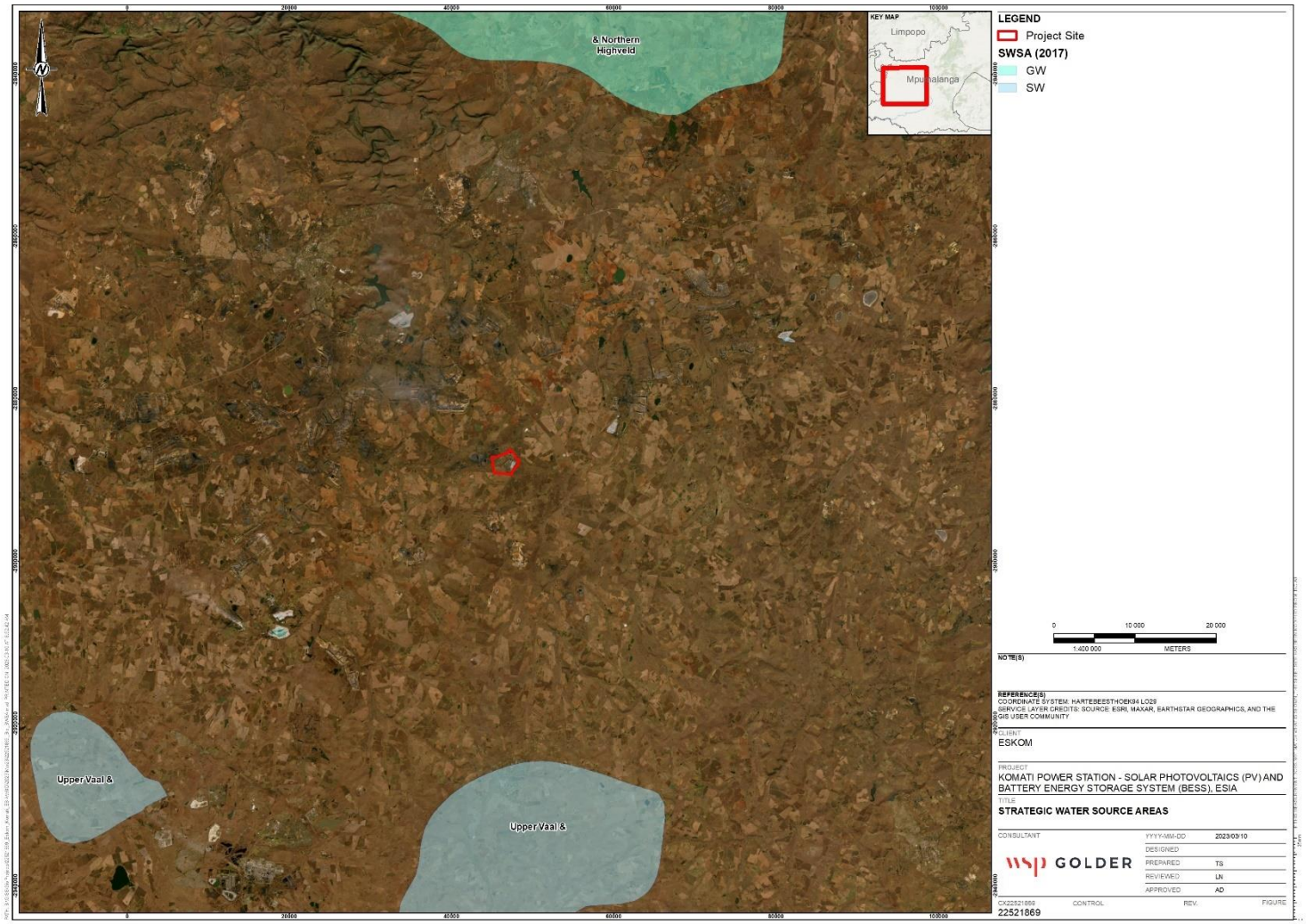

Figure 6: Strategic Water Source Areas in relation to the Local Study Area.

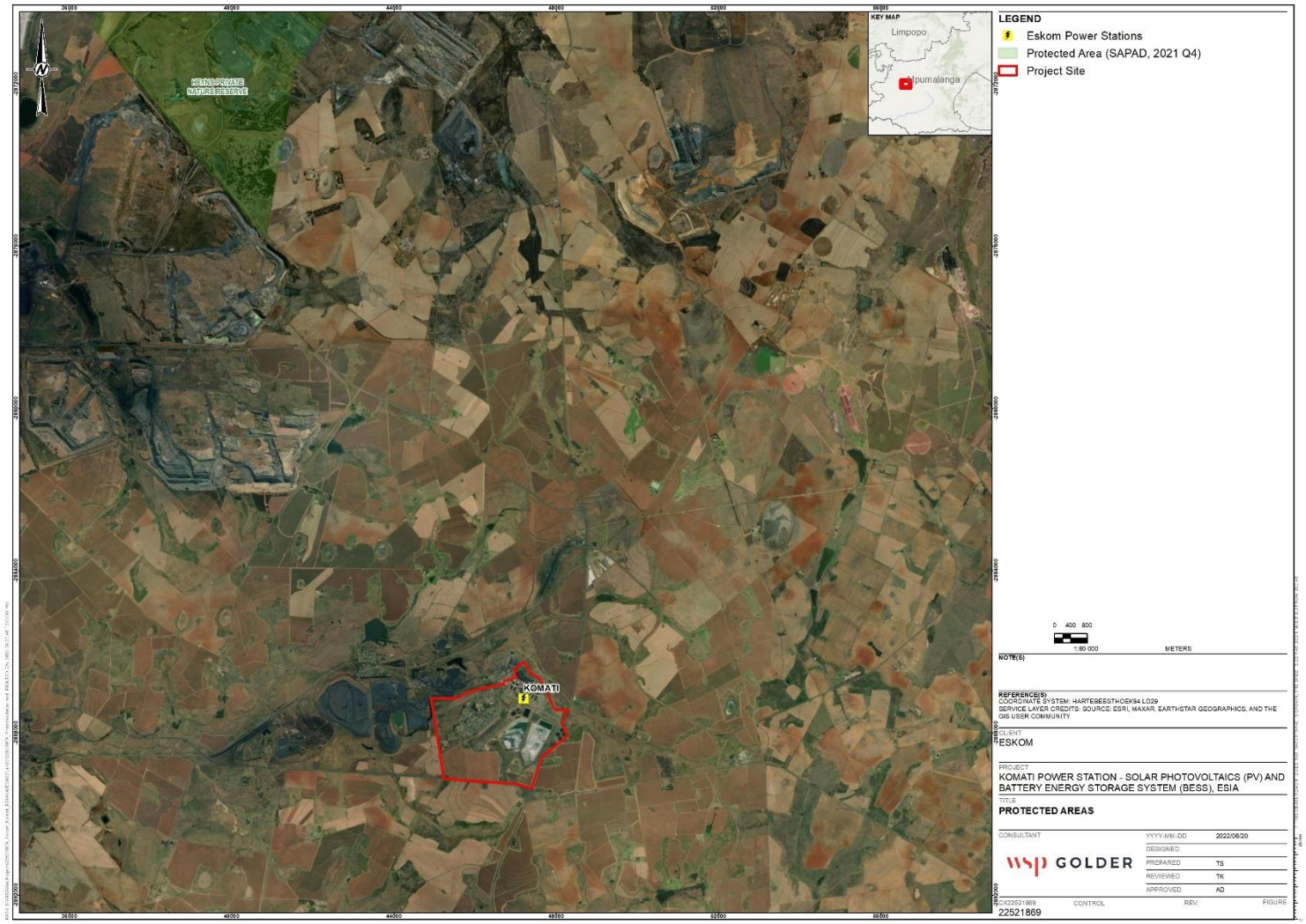

Figure 7: Protected areas in the broader landscape surrounding the local study area.

7. Landscape Context and Existing Impacts

The RSA is characterised by a mosaic of natural and modified habitats. Modified habitats are dominated by extensive areas of cultivation, with smaller areas comprising *inter alia*, various mining operations and alien tree plantations. Natural habitat is mostly confined to linear patches of grassland and wetland that are typically aligned with drainage features.

The LSA has also been heavily impacted by historic and contemporary anthropogenic activities. These are summarised below:

- Prominent infrastructure and disturbances include the power station complex and associated facilities (e.g., ash dumps, pollution control dams) (shown in Figure 8 and Figure 9) and Komati village. The village is a fully operational residential zone, with accompanying road network, police station, schools and commercial shops;
- Extensive areas are also dominated by cultivated fields, which are regularly disturbed by ploughing and crop harvesting. Cultivated fields that lie fallow are colonised by dense stands of alien weeds and pioneer flora;
- Prominent alien tree stands are present adjacent to the village. Colonisation by other alien species, including several listed invasive species, is also common and widespread throughout the LSA;
- Numerous informal drainage trenches have been excavated across the power station property in order to channel water away from access roads and improve general site accessibility. The earth works associated with these drainage trenches has resulted in vegetation clearing and disturbance, and this has facilitated the establishment of several alien invasive species;
- The LSA is also criss-crossed by large transmission line corridors which are maintained by Eskom;
- Other anthropogenic facilities and activities noted in the LSA during the field survey that have caused habitat disturbance and fragmentation include *inter alia*; gravel access roads (Figure 10), fencing, and refuse dumping (Figure 11) and burning; and
- Goedehoop Colliery is located along the northern and western boundary of the LSA. The colliery is characterised by large areas that have been completely transformed by mining activities.

The above listed features and activities have caused environmental degradation, which has reduced the overall extent and integrity of natural habitat in the LSA and in the immediate surrounding landscape, and this has impacted on-site ecological functioning and species diversity.

Figure 8: The completely transformed coal deposit area at Komati Power Station.

Figure 9: View over the ash dam facilities in the local study area.

Figure 10: Amongst other features, gravel roads and drainage trenches have fragmented habitat in the local study area, and facilitated alien invasive species colonisation.

Figure 11: Rubble and refuse dumping site adjacent to the western boundary of the local study area.

8. Vegetation and Flora Assessment

Predicated on the findings of the field survey, five habitat units were identified in the LSA. Three units meet the definition of 'modified habitat', i.e., anthropogenic activity has substantially modified primary ecological functioning and species composition. The remaining two units are classified as 'natural habitat' as they comprise viable assemblages of indigenous species and retain their primary ecological functions:

Modified Habitats

- Cultivated Fields;
- Alien Tree Stands; and
- Transformed Areas with Disturbed or Landscaped Vegetation.

Natural Habitats

- Mixed *Themeda triandra* Grassland; and
- Mixed Moist Grassland.

Table 4 presents the total extent of modified and natural habitats in the LSA. The five habitat units are described in more detail in Section 8.1 and Section 8.2, and a habitat unit map is presented in Figure 12.

Table 4: Extent of modified and natural habitats in the local study area.

Habitat Type	Habitat Units	Current Extent (Ha)
Modified Habitats	Cultivated Fields	107.49
	Alien Tree Stands	4.25
	Transformed Areas with Disturbed or Landscaped Vegetation	382.14
	Sub Total	**493.87**
Natural Habitats	Mixed *Themeda triandra* Grassland	31.01
	Mixed Moist Grassland	145.83
	Sub Total	**176.84**

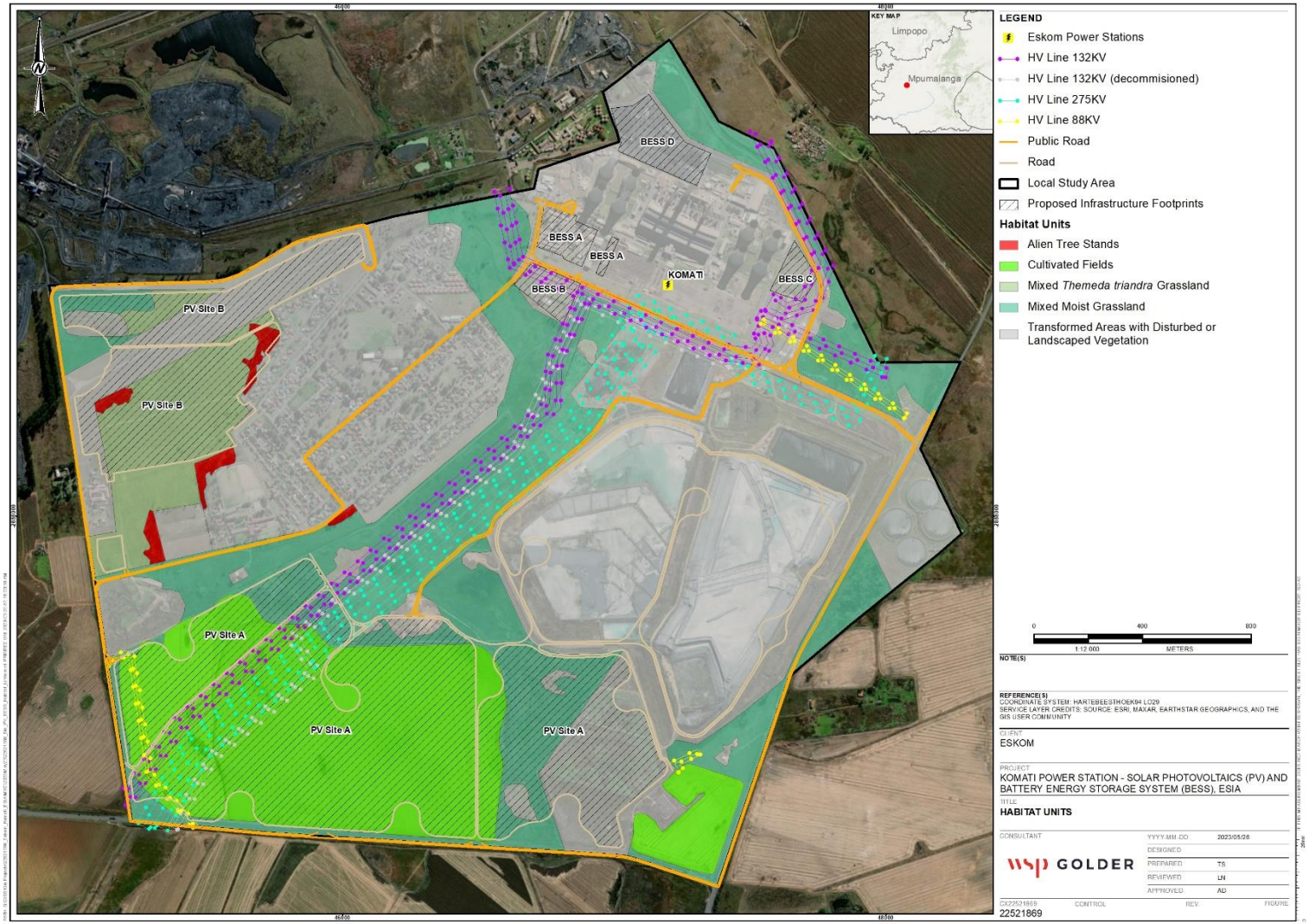

Figure 12:Habitat unit map of the local study area, showing proposed Project infrastructure, as well as existing Eskom facilities.

8.1. Modified Habitat Units

8.1.1. Cultivated Fields

Cultivated fields are located along the southern boundary of the LSA. At the time of the field survey, these were planted with maize – shown in Figure 13.

Areas characterised by this habitat unit are subject to regular anthropogenic disturbance in the form of ploughing, seeding and harvesting. They are typically denuded of indigenous vegetation or, in the case of fallow fields, dominated by ruderal alien weedy flora, and have lost all primary ecological functioning. Accordingly, cultivated fields are classified as a modified habitat.

Figure 13: Cultivated field under maize in the local study area.

8.1.2. Alien Tree Stands

This is a small habitat unit. It is defined by closely-spaced aggregations of alien trees occurring in discrete patches in the LSA. Trees range in height from short (±3 m) to tall (> 10 m). *Eucalyptus* species are the dominant taxa in this unit, with *Populus deltoides* and *Robinia pseudoacacia* (shown in Figure 14) also recorded.

This habitat unit is defined by alien tee dominated woodland, which is both compositionally and structurally incongruous with the grassland reference conditions of the landscape. The primary ecological integrity and functioning of this habitat unit is thus highly limited, and accordingly alien tree stands are classified as modified habitats.

Figure 14: Short stand of Eucalyptus trees located in the north of the local study area.

8.1.3. Transformed Areas with Disturbed or Landscaped Vegetation

This unit characterises the highly modified land associated with the power station and other developed areas (e.g., Komati village, police station, coal stockpiles) in the LSA. Most land is completely transformed and under various built-infrastructure and thus has no ecological value (shown in Figure 8).

Where vegetation does occur, it is secondary and either actively managed and landscaped (e.g., maintained lawns adjacent to infrastructure – see Figure 15), or heavily degraded and dominated by ruderal and/or invasive species (e.g., vegetation colonising the ash dams – shown in Figure 16).

Landscaped areas are regularly mown/managed, and thus are characterised by short lawn grasses such as *Cynodon dactylon, Paspalum notatum** and *Pennisetum clandestinum** or *Eragrostis* pastures grasses (*denotes alien species), as well as several alien herbaceous weeds including, *inter alia; Hypochaeris radicata, Plantago major, Richardia brasiliensis* and *Trifolium repens*.

Ruderal vegetation growing in degraded sites comprises a mixture of indigenous and alien herbaceous species, as well as aggregated or scattered alien woody species. Recorded herbaceous species include graminoides such as *Cenchrus ciliaris, Cyperus esculentus*, Eragrostis curvula, Hyparrhenia dregeana*, *Imperata cylindrica* and *Pennisetum clandestinum*,* and alien forbs like *Cirsium vulgare, Datura stramonium, Melilotus albus* and *Verbena bonariensis*. Alien woody species recorded in these areas include *Acacia mearnsii, Nicotiana glauca* and *Tamarix ramosissima.*

This habitat unit has been derived from, and continues to be defined by, ongoing anthropogenic activities and disturbances. As a result, most ecological functioning has either been completely lost or is severely diminished. Although some indigenous pioneer flora species are present, there is a general dominance of alien flora, many of which are listed invasive species. Rehabilitation potential is also severely limited. Accordingly, areas of this unit are classified as modified habitat.

Figure 15: Landscaped lawns adjacent to the Komati cooling towers.

Figure 16: Vegetated side slopes of the Komati ash dam.

8.2. Natural Habitat Units

The LSA is characterised by two primary natural habitat units, namely Mixed *Themeda triandra* Grassland and Moist Mixed Grassland. Despite variable degrees of anthropogenic disturbance and the localised presence of alien invasive species, both units are characterised by viable assemblages of indigenous vegetation and retain a degree of ecological functioning. These habitat units are described in more detail below:

8.2.1. *Mixed Themeda triandra* Grassland

The habitat unit mostly characterises the patch of natural dry grasslands in the north-west corner of the LSA, with smaller patches embedded within Mixed Moist Grassland also present. Although localised disturbances are present, in general Mixed *Themeda triandra* Grasslands are relatively species rich and considered a primary vegetation community (Figure 17).

Structurally, this community is characterised by low closed grassland, as per Edwards (1983). In terms of composition, apart from the dominant *Themeda triandra,* other commonly recorded grass species in this unit include *Brachiaria serrata, Eragrostis curvula, Eragrostis chloromelas* and *Heteropogon contortus.*

Commonly recorded forbs include *inter alia*; *Chamaecrista comosa, Haplocarpha scaposa, Hilliardiella aristata, Helichrysum harveyanum, Helichrysum nudifolium var. pilosellum, Helichrysum rugulosum, Hypoxis acuminata, Hypoxis hemerocallidea, Ipomoea ommaneyi* and *Pelargonium luridum.* Woody species mostly occur as scattered individual plants, and include indigenous taxa such as *Elephantorrhiza elephantina, Seriphium plumosum* and *Ziziphus zeyheriana,* and alien taxa including *Eucalyptus* trees and *Populus deltoides.*

Embedded within this habitat unit are small patches that are characterised by a dominance of *Eragrostis* grass species and low forb diversity – typical traits of a more secondary grassland community resulting from historic disturbances, such soil disturbances.

Three flora SCC were recorded in this habitat unit, namely *Eulophia ovalis var. ovalis, Orthochilus leontoglossus* and an unidentified *Gladiolus* species (no flowers). These are discussed in more detail in Section 8.3.2.

Figure 17: Typical patch of Mixed Themeda triandra Grassland in the local study area.

8.2.2. Mixed Moist Grassland

Mixed Moist Grassland dominates most of the non-transformed land on the power station property and immediately adjacent areas. In the LSA, this broad habitat unit has been impacted by various on-site operations, such as the excavation of a network of drainage channels (Figure 18) and the maintenance of a transmission line servitude, and accordingly, certain portions are highly disturbed.

Vegetation structure ranges from low- to tall closed grassland (*sensu*. Edwards 1983). In terms of composition, species such as *Phragmites australis, Typha capensis* and various Cyperaceae species typically dominate the more permanently moist areas (Figure 19), while several other herbaceous species are common throughout this unit, including graminoids such as *Agrostis lachnantha, Eragrostis curvula, Imperata cylindrica, Juncus effusus, Juncus oxycarpus, Kyllinga erecta, Leersia hexandra* and *Panicum schinzii;* and various forbs such as *inter alia, Chironia palustris, Haplocarpha scaposa, Helichrysum aureonitens, Helichrysum nudifolium* var. *pilosellum, Nidorella anomala* and *Pseudognaphalium luteo-album**. In terms of woody taxa, *Seriphium plumosum* was noted to be a common species, particularly beneath the transmission line servitude (Figure 20).

Sites that have been disturbed by earth works are typically dominated by the alien invasive lawn grass *Pennisetum clandestinum* (Figure 21), as well as several other weedy taxa including commonly *Melilotus albus*, and the listed invasive species *Flaveria bidentis, Nicotiana glauca* and *Tamarix ramosissima.*

In terms of SCC, an unidentified Orchidaceae species (senescent flowers) was recorded in this habitat unit.

Figure 18: Drainage channels that have been excavated by power station management to prevent the flooding of access roads.

Figure 19: Typical area of mixed moist grassland in the local study area, characterised by species such as Agrostis lachnantha and Typha capensis.

Figure 20: Seriphium plumosum dominated area of mixed moist grassland below the powerline servitude.

Figure 21: Pennisetum clandestinum, amongst other invasive species, dominate disturbed sites in this habitat unit.

8.3. Floristic Analysis

8.3.1. General Floristics

In total, 121 flora species, representing 39 families, were identified during the field survey. The most represented family is the Poaceae with 39 species, followed by the Asteraceae with 21 species and Fabaceae with 9 species. The majority of identified species are indigenous taxa (64%), with the remaining 36% comprising alien taxa.

The most abundant growth form are herbs with 51 species, followed by graminoids with 48 species. Sixteen tree / shrub species, two dwarf trees and four geophytes were also recorded. For a list of flora species identified in the LSA during the field survey refer to Appendix C.

8.3.2. Flora Species of Conservation Concern

In line with the internationally endorsed IUCN Red List Categories and Criteria, the Red List of South African Plants and the Mpumalanga Red List recognise three categories of threatened species, namely Critically Endangered (CR), Endangered (EN) and Vulnerable (VU), and five 'other categories of conservation concern' that are recognised as having high conservation importance, namely Near Threatened (NT), Critically Rare, Rare, Declining, and Data Deficient – Insufficient Information (DDD). Flora species listed under all eight categories are regarded as being of conservation concern. Moreover, as they are subject to national and/or provincial environmental legislation and require specific conservation management, flora species that are listed as either threatened or protected on the NEMBA ToPS List (2007) and Mpumalanga Nature Conservation Act (Act No. 10 of 1998) are also included as flora SCC and discussed in this section.

In terms of SCC, four protected species were recorded in the LSA during the field visit, namely *Eulophia ovalis var. ovalis* (Figure 22)*, Orthochilus leontoglossus* (Figure 23) and an unidentified Orchid and *Gladiolus* species (no flowers). These are not listed as threatened on the Global, Regional or Mpumalanga Red Lists, but they are listed at 'Protected' according to Mpumalanga Nature Conservation Act (Act No. 10 of 1998). Refer to Table 5 for the number and co-ordinates of flora SCC.

The National Web Based Screening Tool indicated that the LSA is an area of 'Medium Sensitivity' for plant species, with three sensitive features potentially present, namely *Pachycarpus suaveolens*, Sensitive Species 41 and Sensitive Species 691. These are discussed in Table 6, along with other flora SCC potentially occurring in the RSA and LSA, as per review literature and datasets.

Table 6 includes the habitat preferences and a 'probability of occurrence' (as informed by habitat suitability assessments) of SCC. It must be noted that none of these species are listed as threatened on the Global Red List (IUCN, 2022-2) or on the NEMBA ToPS List (2007).

Table 5: Location of protected flora species recorded in the local study area

Species	Number of Plants	Co-ordinates
Orthochilus leontoglossus	1	S26 05.977 E29 27.131
Eulophia ovalis var. ovalis	1	S26 05.927 E29 27.131
Eulophia ovalis var. ovalis	1	S26 05.914 E29 27.129
Orchid species (no flowers)	1	S26 05.993 E29 27.845
Gladiolus species (no flowers)	6	S26 06.129 E29 27.329

Figure 22: Eulophia ovalis var. ovalis

Figure 23: Orthochilus leontoglossus

Table 6: Flora species of conservation concern recorded or potentially occurring in the regional- and local study areas.

Family	Scientific Name	IUCN Status (2022-2)	Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Habitat Preferences	Probability of Occurrence	
							Regional Study Area	Local Study Area
Aizoaceae	*Khadia carolinensis*	-	Vulnerable	Vulnerable	-	This species favours highveld grassland where it occurs on well-drained, sandy loam soils among rocky outcrops, or at the edges of sandstone sheets, at an altitude of 1700 m (Lotter, *et al.,* 2007a)	Possible	Unlikely - no suitable habitat present.
Amaryllidaceae	*Boophone disticha*	-	Least Concern	-	Least Concern	Open grassland habitat.	Probable	Probable – Suitable habitat present.
Amaryllidaceae	*Crinum bulbispermum*	-	Least Concern	-	Declining	Range of grassland habitats, including wetlands.	Probable	Probable – Suitable habitat present.
Apocynaceae	*Pachycarpus suaveolens*	-	Vulnerable	Vulnerable		Favours short, annually burn grassland, between 1400-2000m. EOO estimated at 19 900 km^2 (Lotter et al., 2007b)	Probable	Possible – Suitable habitat present.
Hyacinthaceae	*Eucomis autumnalis*	-	Least Concern	Declining	Protected	Favours damp open grassland and wetland habitats, from the coast to 2450 m (Williams, *et al*., 2016)	Probable	Probable – Suitable habitat present.
Iridaceae	*Gladiolus elliotii*	-	Least Concern	-	Protected	Highveld grasslands.	Probable	Probable – Suitable

Family	Scientific Name	IUCN Status (2022-2)	Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Habitat Preferences	Probability of Occurrence	
							Regional Study Area	Local Study Area
								habitat present.
Orchidaceae	*Disa woodii*	-	Least Concern	-	Protected	Found in damp grasslands, from seas level to 1 400 m (Johnson, *et al.,* 2015).	Probable	Probable – Suitable habitat present.
Orchidaceae	*Orthochilus leontoglossus*	-	Least Concern	-	Protected	Open grassland from sea level to 1 800 m (Johnson, *et al.,* 2015).	-	Recorded
Orchidaceae	*Eulophia ovalis var. ovalis*	-	Least Concern	-	Protected	Open grassland, between 500-1900m (Johnson, *et al.,* 2015).	-	Recorded
Orchidaceae	*Brachycorythis conica* subsp. *transvaalensis*	-	Critically Endangered	-	Critically Endangered	Occurs in open grassland and woodland, where is prefers sandy gravel, overlying dolomite and occasionally quartzite. Between 100 - 1705 m (von Staden *et al*., 2015)	Possible	Unlikely – no Suitable habitat present.
-	Sensitive Species 41	-	Vulnerable	Vulnerable	Protected	Widespread (EOO < 19 940 km^2), but rare species with a AOO of < 2000 km^2. Favours high altitudes wetlands that remain wet for most of the year.	Probable	Possible – Suitable habitat present.
-	Sensitive Species 691	-	Vulnerable	Near Threatened		Favours damp areas in undulating grasslands. Thought to occur in less than 10 locations and with an EOO	Probable	Possible – Suitable habitat present.

Family	Scientific Name	IUCN Status (2022-2)	Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Habitat Preferences	Probability of Occurrence	
							Regional Study Area	Local Study Area
						estimated between 445 and 11158 km^2.		

8.3.3. Declared Alien Invasive Species

Nineteen NEMBA declared alien invasive plant species were recorded in the LSA during the field survey - listed in Table 7. For a list of declared alien invasive plant species recorded in the different habitat units during the field survey, refer to Appendix C.

Several of these taxa including *Nicotiana glauca*, *Pennisetum clandestinum, Tamarix ramosissima* and *Verbena bonariensis* are particularly abundant in disturbed sites in the LSA (Figure 24 and Figure 25).

Table 7: Declared alien invasive species recorded in the local study area.

Scientific Name	Common Name	Growth Form	NEMBA Category
Acacia dealbata	Silver Wattle	Tree	2
Acacia mearnsii	Black Wattle	Tree	3
Acacia melanoxylon	Blackwood	Tree	2
Acer buergerianum	Chinese Maple	Tree	2
Argemone ochroleuca	White-flowered Mexican Poppy	Herbaceous forb	1b
Campuloclinium macrocephalum	Pom Pom Weed	Herbaceous forb	1b
Cirsium vulgare	Spear Thistle	Herbaceous forb	1b
Datura stramonium	Common Thorn-apple	Herbaceous forb	1b
Eucalyptus spp.	Gum	Tree	1b or 2
Flaveria bidentis	Smelter's Bush	Herbaceous forb	1b
Fraxinus sp.	Ash	Tree	3
Nicotiana glauca	Wild Tobacco	Tree	2
Pennisetum clandestinum	Kikuyu	Graminoid	1b
Pinus sp.	Patula Pine	Tree	2
Robinia pseudoacacia	Black Locust	Tree	1b
Solanum sisymbriifolium	Dense-throned Bitter Apple	Herbaceous forb	1b
Solanum mauritianum	Bugweed	Tree	1b
Tamarix ramosissima	Pink Tamarisk	Tree	1b
Verbena bonariensis	Verbena	Herbaceous forb	1b

Figure 24: Nicotiana glauca

Figure 25: Tamarix ramosissima

8.3.4. Flora of Medicinal Value

Nine flora species recorded in the LSA have recognised medicinal value. These are listed in Table 8, accompanied by a description of their use, as per Van Wyk *et al*., (2009).

Table 8: Flora species of medicinal value recorded in the local study area.

Scientific Name	Medicinal Use*
Datura stramonium	Relieves asthma and acts to reduce pain. Weak infusions are used as an aphrodisiac.
Elephantorrhiza elephantina	Used as a remedy for diarrhoea and dysentery, stomach ailments and haemorrhoids.
Gomphocarpus fruticosus	Dried leaves are used to treat headaches and tuberculosis. The roots are purported to treat stomach pain and general body ache.
Helichrysum species	Treats a variety of afflictions, including coughs, colds, fever, headaches and infections.
Hypoxis species	Infusions of the corm are used to treat dizziness, bladder disorders and insanity.
Pelargonium luridum	Taken orally to treat diarrhoea and dysentery.
Rumex crispus	Used as a remedy for internal parasites, as well as vascular diseases and internal bleeding.
Typha capensis	Decoctions used to treat venereal disease, as well as diarrhoea, dysentery and enhance male libido.
*Medicinal use, as per Van Wyk, *et al*. (2009).	

9. Key Ecological Attributes and Processes in the Local Study Area

9.1. Habitat Corridors, Resources and Refugia

The LSA is highly fragmented and large portions are dominated by anthropogenic infrastructure, such as the power station and its associated facilities (ash dams), the Komati village, and cultivated fields. Patches of natural habitat are present; however, these are typically either bounded by built infrastructure or enclosed by fencing (e.g., concrete palisade fence). The immediate landscape surrounding the LSA is similarly transformed and fragmented, and thus habitat connectivity across the LSA and the surrounding landscape is poor.

9.2. Key Ecological Processes and Drivers of Change

The following notes summarise the key processes and drivers of change that are present in the LSA and surrounding landscape and their possible influence on the character of on-site terrestrial flora:

9.2.1. Wildfire – Grassland Burning

Fire is considered a natural, albeit often human initiated disturbance agent in grassland ecosystems. Mesic Highveld Grasslands are considered fire-prone and fire-dependent landscapes, and fire is essential to the maintenance of biodiversity patterns and ecological processes (SANBI, 2013). Key ecological benefits of fire, include *inter alia*:

- Removes moribund vegetation and enhances plant primary productivity and palatability, which improves grazing for wild herbivores. Fire also stimulates germination / flowering of fire-adapted flora species (e.g., certain orchid species);
- Controls the encroachment of both alien and indigenous woody plant species and weeds; and

- Increases overall habitat heterogeneity by creating a structural mosaic of tall- and short grassland.

A review of available historic satellite imagery indicates that grassland habitat in the LSA does burn occasionally. Fires are likely set either intentionally or accidentally by local community members and are not part of a formal burning programme. This notwithstanding, fire is considered an important driver of change in the LSA.

9.2.2. Alien Invasive Species Colonisation

Nineteen AIS were recorded in the LSA during the field survey. If not actively controlled, many AIS have the capacity to spread into adjacent natural habitat, where they could competitively exclude many indigenous woody and herbaceous species. This will have several deleterious impacts on the integrity and functioning of these habitats, such as *inter alia*:

- A loss of floristic diversity, with the resulting habitat patches unable to support diverse flora communities;
- A reduction in grass productivity for grazing herbivores, and
- Increased exposed soil surfaces and incidences of erosion.

Several species recorded in the LSA are highly invasive and adept at colonising undisturbed grassland and wetland habitats, such as *Acacia dealbata, Acacia mearnsii, Campuloclinium macrocephalum, Flaveria bidentis* and *Verbena bonariensis.* The spread of alien invasive vegetation is therefore considered a significant driver of change in the LSA and surrounding landscape, and one capable of severely negatively impacting botanical diversity.

10. Combined Analysis of Site Ecological Importance

This section presents summary comment on the ecological importance of identified habitat units in the study area, as per the SANBI (2020) protocol. It is informed by the combined findings of both the Terrestrial Biodiversity and Terrestrial Plant Species Specialist Assessments (i.e., this report) and the Terrestrial Animal Species Specialist Assessment for the proposed Project. A map of ecological importance is shown in Figure 26, while a summary matrix is shown in Table 9.

The Cultivated Fields, Alien Tree Stands, and Transformed Areas with Disturbed or Landscaped Vegetation habitats units are either transformed or subject to high levels of ongoing anthropogenic disturbance and are classified as modified habitat, I.e., anthropogenic activity has substantially modified primary ecological functioning and species composition. In line with the SANBI (2020) rating criteria, the biodiversity importance of Cultivated Fields, Alien Tree Stands, and Transformed Areas with Disturbed and Landscaped Vegetation is rated Very Low.

Mixed *Themeda triandra* Grassland and Mixed Moist Grassland are considered natural habitat. I.e., these areas are comprised of viable assemblages of indigenous species and retain their primary ecological functions. The ecological importance of Mixed *Themeda triandra* Grassland is rated high, while that of Mixed Moist Grassland is rated medium.

Table 9: Ecological importance of habitat units identified in the local study area.

Habitat Unit	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Ecological Importance
Cultivated Fields	Very Low	Very Low	Very Low	Low	Very Low
Alien Tree Stands	Very Low	Very Low	Very Low	Low	Very Low
Transformed Areas with Disturbed or Landscaped Vegetation	Very Low	Very Low	Very Low	Low	Very Low
Mixed Themeda triandra Grassland	High	High	High	Medium	High
Mixed Moist Grassland	High	Medium	Medium	Medium	Medium

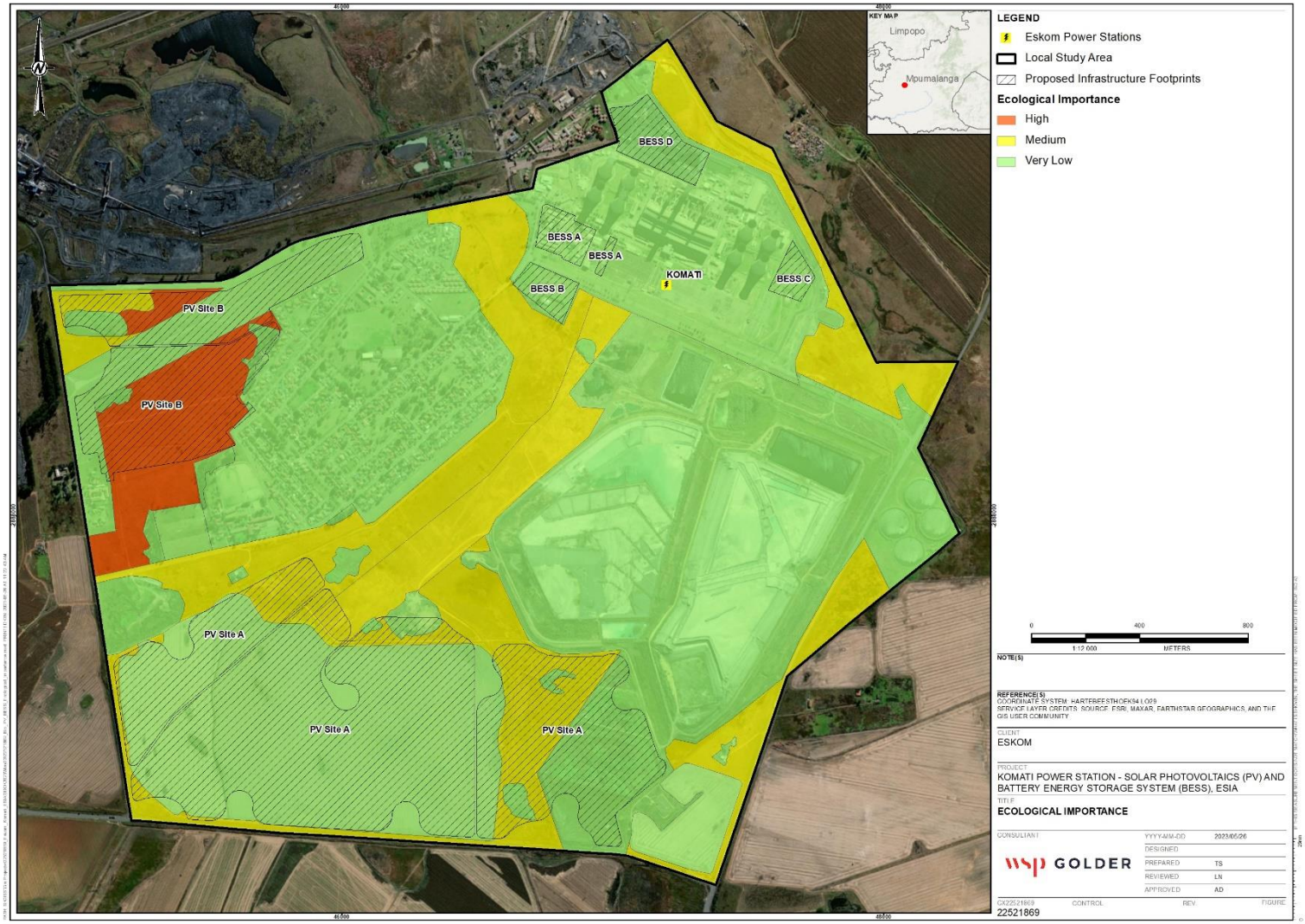

Figure 26: Ecological importance of habitat units in the local study area.

11. Impact Assessment

11.1. Impact Methodology

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[2], indirect[3], secondary[4] as well as cumulative[5] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e., residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[6] presented in Table 10.

Table 10: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action

[2] Impacts that arise directly from activities that form an integral part of the Project.
[3] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[4] Secondary or induced impacts caused by a change in the Project environment.
[5] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects
[6] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

11.2. Impact Mitigation

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or

restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in Figure 27 below.

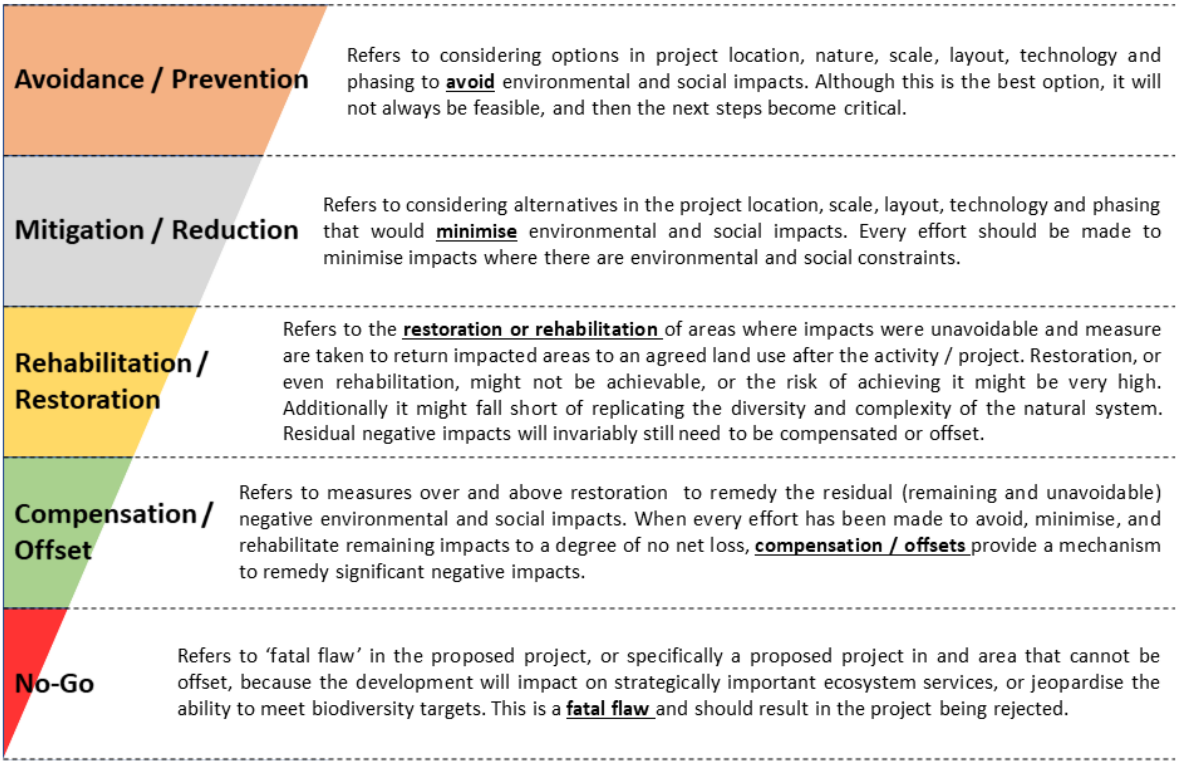

Figure 27: Mitigation Sequence/Hierarchy

A discussion on assessed impacts for each phase (i.e., Construction Operational and Decommissioning) of the proposed Project is provided in Section 11.3 to Section 11.5, with a summary table presented in Table 12.

11.3. Construction Phase

11.3.1. Loss and Disturbance of Flora Habitat

Habitat loss and disturbance refers to the removal or degradation of natural habitat. In terrestrial ecosystems, this primarily occurs through vegetation clearing and bulk earth works during construction.

In total, the proposed layout of Project will result in the direct loss of 48.43 ha of natural habitat and 147.28 ha of modified habitat - refer to Table 11 and shown in Figure 12:

- The proposed PV Site A footprint mostly impacts modified habitat, specifically the Cultivated Fields and Transformed Areas with Disturbed or Landscaped Vegetation habitat units, with some Mixed Moist Grassland impacted;
- The proposed PV Site B footprint comprises a mixture of modified and natural habitats, with both Mixed *Themeda triandra* Grassland and Mixed Moist Grassland directly impacted.;
- The BESS sites are all located on land designated under the Transformed Areas with Disturbed or Landscaped Vegetation habitat unit; and

The loss of modified habitats is not considered an impact of concern. However, the loss natural habitat is an impact of concern, and has been assessed separately for the Mixed *Themeda triandra* Grassland and Mixed Moist Grassland habitat units.

Table 11: Extent of habitat loss associated with proposed Project activities.

Habitat Type	Habitat Units	Approx. Extent (Ha) of Loss
Modified Habitats	Cultivated Fields	92.75
	Alien Tree Stands	1.73
	Transformed Areas with Disturbed or Landscaped Vegetation	52.80
	Sub Total	**147.28**
Natural Habitats	Mixed *Themeda triandra* Grassland	21.48
	Mixed Moist Grassland	26.95
	Sub Total	**48.43**

Although localised disturbances are present in the Mixed *Themeda triandra* Grassland, in general, this habitat unit is considered a primary vegetation community and representative of Eastern Highveld Grassland vegetation type. It is rated as having a high ecological importance. This is consistent with the MBSP delineation of this portion of the LSA as CBA Optimal. Prior to mitigation, the loss of Mixed *Themeda triandra* Grassland habitat is considered an impact of very high magnitude, permanently affecting vegetation within and potentially adjacent to the development footprints (local). It is also considered to have a definite probability, resulting in a before impact rating of “very high” significance.

With the application of standard mitigation, which includes the avoidance of all land designated as CBA Optimal, the impact magnitude can be reduced to low. Impact extent will be reduced to the site only, and duration will be long-term (i.e., project life), while probability will be reduced to medium.

This results in an after-mitigation impact of “low” significance for the loss of Mixed *Themeda triandra* Grassland.

With respect to the Mixed Moist Grassland, this habitat unit is rated as having a medium ecological importance on account of various disturbances. Prior to mitigation this impact has a magnitude of high and will have a local extent. Duration will be permanent and it is definite that the impact will occur. This results in an impact significance of “high”. With the implementation of standard mitigation measures, this impact can be reduced to a low magnitude, with a long-term duration. Spatial extent will be reduced to the site only and probability will decrease from definite to medium. After mitigation, the loss of Mixed Moist Grassland is also rated to be of “low” significance.

11.3.2. Establishment and Spread of Alien Invasive Species

Habitat disturbances caused by vegetation clearing and earth works during construction can facilitate the establishment and spread of AIS. Alien plant infestations can spread exponentially, suppressing or replacing indigenous vegetation. This may compromise ecosystem functioning resulting in a loss of biodiversity.

Nineteen NEMBA listed AIS were recorded in the study area (refer to Section 8.3.3). Proposed Project activities will cause the physical disturbance of vegetation and soils, which will facilitate the spread of AIS.

Before mitigation, impact magnitude is high, while duration is long term and it has a high probability. The spatial extent of AIS spread is local. Prior to mitigation, the establishment and spread of AIS is rated an impact of “moderate” significance.

This impact is relatively easy to mitigate. With the implementation of active control during the construction phase, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring as predicted would be reduced to low. After mitigation, this impact is rated to be of “very low” significance.

11.3.3. Loss of Flora Species of Conservation Concern

Based on reviewed literature and datasets, several flora SCC are known from the region and potentially occur in patches of natural habitat in the study area (refer to Section 8.3.2). No Red List flora species were recorded in the study area during the field survey. However, the provincially protected *Eulophia ovalis* var. *ovalis* and *Orthochilus leontoglossus* were recorded within, or in close proximity to, the proposed PV Site B footprint and these and potentially other flora SCC may be impacted during vegetation clearing.

Before mitigation, impact magnitude is very high, while duration is permanent. It has a high probability of occurrence. The spatial extent of the impact is at the local scale. Prior to mitigation, this impact is rated of “high” significance.

With mitigation, which includes restricting vegetation clearing to the immediate development footprints and rescuing and relocating SCC occurring within the development footprints, this impact can be reduced to a medium magnitude, and will remain of permanent duration. Spatial extent will be maintained at the site only, but probability will be reduced to low. After mitigation this impact is rated to be of “low” significance.

11.4. Operational Phase

11.4.1. Establishment and Spread of Alien Invasive Species

The potential establishment and spread of AIS in the study area will continue to be an impact of concern during the operational phase.

Before mitigation, impact magnitude is high, while duration is long term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of "moderate" significance.

With the continued implementation of an active alien species control programme during the operational phase this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and probability at low. After mitigation, this impact is rated to be of "very low" significance.

11.5. Decommissioning Phase

11.5.1. Establishment and Spread of Alien Invasive Species

As Project infrastructure is dismantled and removed from site during the decommissioning phase, the associated disturbances are likely to facilitate alien invasive species colonisation in, and immediately adjacent to, the study area.

Before mitigation, impact magnitude is high, while duration is long term and the impact has a high probability of occurring as predicted. The spatial extent of alien invasive species spread is local. Prior to mitigation, the establishment and spread of alien invasive species is rated an impact of "moderate" significance.

With the continued implementation of an active alien species control programme during decommissioning, this impact can be reduced to a low magnitude, with a short-term duration. Spatial extent will be reduced to the site only and the probability of the impact occurring would be low. After mitigation, this impact is rated to be of "very low" significance.

12. Cumulative Impacts

The RSA is characterised by large areas of modified habitat, principally resulting from agriculture, but also increasingly mining. The progressive loss of natural grassland habitat in the RSA as a consequence of this Project and other development projects, is a cumulative loss of concern.

Cumulative habitat loss is rated an impact of very high magnitude, permanently affecting habitat within and adjacent to the development footprints (local). It is also considered to have a high probability, resulting in a before impact rating of "high" significance. With mitigation, the impact magnitude can be reduced to medium. Impact extent will be retained at local, and duration will be long-term (i.e., project life), while probability will be reduced to low probability. This results in an after-mitigation impact of "low" significance.

Table 12: Summary of Impact Scoring for each phase of the proposed Project.

CONSTRUCTION

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Flora Habitat and Species	Loss and disturbance of natural habitat - Mixed Themeda triandra Grassland	Construction	Negative	Moderate	5	2	5	5	5	**85**	**N5**	2	1	3	4	4	**30**	**N2**
					Significance	**N5 - Very High**							**N2 - Low**						
Impact 2:	Flora Habitat and Species	Loss and disturbance of habitat - Moist Mixed Grassland	Construction	Negative	moderate	4	2	3	5	5	**70**	**N4**	2	1	2	4	3	**30**	**N2**
					Significance	**N4 - High**							**N2 - Low**						
Impact 3:	Flora Habitat and Species	Establishment and spread of alien invasive species	Construction	Negative	High	4	2	1	4	4	**44**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
Impact 4:	Flora SCC	Loss of flora species of conservation concern	Construction	Negative	Moderate	5	2	5	5	4	**68**	**N4**	3	1	3	5	2	**24**	**N2**
					Significance	**N4 - High**							**N2 - Low**						

OPERATIONAL

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Flora Habitat and Species	Establishment and spread of alien invasive species	Operational	Negative	High	4	2	1	4	4	**44**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						

DECOMISSIONING

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Flora Habitat and Species	Establishment and spread of alien invasive species	Decommissioning	Negative	High	4	2	1	4	4	**44**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						

CUMULATIVE

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Flora Habitat and Species	Loss and disturbance of natural habitat	Cumulative	Negative	Moderate	5	2	5	5	4	**68**	**N4**	3	2	3	4	2	**24**	**N2**
					Significance	**N4 - High**							**N2 - Low**						

13. Mitigation Measures

The following section presents the proposed impact management actions to avoid, minimise and/or manage the potential impacts/risks which were assessed Section 11.

As with the assessment of potential impacts/risks, the impact management actions have been arranged according to the following main Project phases:

- Construction;
- Operational; and
- Decommissioning

For each impact management action, the following information is provided:

- Category: The category within which the potential impact/risk occurs;
- Potential impact/risk: Identified potential impact/risk resulting from the pre-construction, construction, operation, and decommissioning of the proposed Project;
- Description: Description of the possible impact management action;
- Prescribed standards or practices: Prescribed environmental standards or practices with which the impact management action must comply. Note that only key standards or practices have been listed;
- Mitigation type: The type of mitigation measure. This includes the following:
    - Avoidance;
    - Minimisation;
    - Rehabilitation or restoration;
    - Offsetting;
- Time period: The time period when the impact management actions must be implemented; and
- Responsible persons: The persons who will be responsible for the implementation of the impact management actions.

Table 13**Error! Reference source not found.** presents a summary of the proposed impact mitigation actions during the construction, operational, and decommissioning phases of the proposed Project.

Table 13: Summary of proposed impact mitigation actions.

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
1. Construction phase							
1.1	Flora Habitat and Species	Loss and disturbance of natural habitat	<u>Avoidance and Minimisation</u> • Project infrastructure should be positioned to avoid clearing all land designated as CBA Optimal; • As much of the proposed Project infrastructure as possible should be located on areas of modified habitat; • All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas; • The footprints to be cleared of vegetation should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone; • Temporary facilities associated with construction, such as contractor site offices, portable toilets, storage and laydown areas,	N/A	Avoidance, Minimisation, Rehabilitation	During Construction Phase	Project Manager

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			should be located on land that is currently transformed or developed; • Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. <u>Rehabilitation</u> • A comprehensive rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction.				
1.2	Flora Habitat and Species	Establish and spread of alien invasive species	An AIS control and eradication plan must be developed for the Project that focuses on controlling and eradicating all AIS occurring throughout the LSA. The plan must include: • Identification of AIS management units • Prioritisation of sites and species requiring control; • Targets and indicators of success; • Scheduling of AIS control;	Guidelines for Monitoring, Control and Eradication of AIS (DEA, 2015)	Minimisation	During Construction Phase	Project Manager

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			• Species-specific control methods, using a combined approach of both chemical and mechanical control methods; and • Provision for follow-up treatments, as informed by regular AIS monitoring.				
1.7	Terrestrial Flora SCC	Loss of flora of conservation concern	• Surveys of each development footprint should be conducted to identify and record the number of flora SCC that require rescue and relocation; • Based on the findings of the SCC survey, application(s) for rescue and relocation permits should be submitted to the relevant authority. • No vegetation clearing or rescue and relocation operations should be allowed until the correct permits have been obtained; and • Rescued plants should be relocated to an adjacent area of similar natural habitat, and correctly cared for after relocation until such a time as out-planting has been deemed successful.	N/A	Avoidance / Minimisation	Prior to construction phase	Project Manager
2. Operational phase							

Ref No.	Category	Potential impact/risk	Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
2.1	Flora Habitat and Species	Establish and spread of alien invasive species	Active alien invasive species control should continue throughout the operational phase, as per the approved AIS control and eradication programme.	Guidelines for Monitoring, Control and Eradication of AIS (DEA, 2015)	Minimisation	During Operational Phase	Facility Manager
3. Decommissioning phase							
3.1	Flora Habitat and Species	Establish and spread of alien invasive species	Active alien invasive species control should continue during the decommissioning phase and follow up control should be carried out for a five- year period following decommissioning.	Guidelines for Monitoring, Control and Eradication of AIS (DEA, 2015)	Minimisation	During decommissioning and for a five-year period after decommissioning	Facility Manager
3.2	Flora Habitat and Species	General habitat restoration	To limit the potential for AIS encroachment, soil erosion and dust generation, all Project footprints and sites that were disturbed during decommissioning, should be actively rehabilitated using local occurring indigenous flora species.	N/A	Rehabilitation	During the Decommissioning Phase	Facility Manager

14. Monitoring Measures

The following section presents the proposed monitoring actions for monitoring and reporting on the implementation of the impact mitigation actions presented in the preceding Section 13.

The content of this section is largely based on the monitoring requirements outlined in Appendix 4 of the EIA Regulations, 2014.

For each monitoring action, the following information is provided:

- Category: The category within which the potential impact and/or risk occurs
- Potential impact/risk: Identified potential impact/risk resulting from the pre-construction, construction, operation, and decommissioning of the proposed Project
- Method for monitoring : The method for monitoring the implementation of the recommended mitigation measures
- Time period: The time period over which the monitoring actions must be implemented
- Frequency of monitoring: The frequency of monitoring the implementation of the recommended mitigation measures
- Mechanism for monitoring compliance: The mechanism for monitoring compliance with the impact management actions
- Responsible persons: The persons who will be responsible for the implementation of the monitoring actions

As with the impact management actions, the proposed monitoring actions have been arranged according to the following project phases:

- Construction;
- Operational; and
- Decommissioning.

Table 14 presents a summary of the proposed monitoring actions during the construction, operational and decommissioning phases.

Table 14: Summary of monitoring measures

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
1. Construction phase						
1.1	Alien invasive species	• Annual on-site alien invasive species monitoring should be conducted. Monitoring should focus on all sites disturbed during the construction phase; and • Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control with respects to priority sites and priority species.	Wet/growing season	Annual	Annual Monitoring Report	Project Manager
2. Operational phase						
2.1	Alien invasive species	• Ongoing AIS monitoring should be conducted on an annual basis throughout the operational phase. • AIS monitoring should focus on all sites disturbed by Project activities, and where previous AIS control has been implemented, and • Monitoring should assess species type and density, and these data should inform the	Wet/growing season	Annual	Annual Monitoring Report	Facility Manager

Ref. No.	Category	Method for monitoring	Time period	Frequency of monitoring	Mechanism for monitoring compliance	Responsible person
		scope of ongoing alien invasive species control with respects to priority sites and priority species.				
3. Decommissioning phase						
3.1	Alien invasive species	• Alien invasive species monitoring should be conducted on an annual basis during decommissioning and on a biennial basis for a six-year period following decommissioning; • Monitoring should focus on all sites disturbed by decommissioning activities; • Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control and the need for additional rehabilitation/revegetation interventions.	Wet/growing season	Annually during decommissioning & biennially for a period of six years after decommissioning	Annual and biennially Monitoring Report	Facility Manager

15. Reasoned Opinion and Environmental Impact Statement

The following section presents a summary of the key findings of the study:

The LSA is centred on Komati Power Station and Komati residential village. Accordingly, large portions of the LSA are under built infrastructure or are highly modified. Natural habitat that is present, is confined to small patches of land that are typically bounded or enclosed by infrastructure, such as roads and fences.

The LSA is located in the Eastern Highveld Grassland vegetation type, which is currently listed as Endangered at a national level (NEMBA, 2021). According to the Mpumalanga Biodiversity Sector Plan (2019), land in the north-west corner of the LSA is categorised as CBA Optimal. This area overlaps with the proposed PV Site B development footprint and is characterised by the Mixed *Themeda triandra* Grassland habitat unit, which was rated as having High ecological importance on account of its relatively undisturbed nature and the presence/potential presence of flora SCC. It must be noted that CBA's in this context, have been identified by the provincial authorities as areas that are required to meet local provincial biodiversity conservation targets for biodiversity pattern (species and ecosystems) and ecological processes (MPTA 2014). They are not areas that have been identified as Critical Habitat, as defined in ESS6, paragraph 23.

The Environmental Screening Tool rates the terrestrial biodiversity theme for the entire LSA as 'Very High Sensitivity'. This rating however, is only partly supported by the findings of this study. Most of the LSA is either modified or disturbed and therefore is not of very high sensitivity. Only the area of Mixed *Themeda triandra* Grassland, most of which is designated as CBA Optimal, is rated as having a High ecological importance. The Environmental Screening Tool sensitivity rating for the terrestrial plant species theme is 'Medium Sensitivity'. This rating is confirmed by the findings of this study.

The loss of natural habitat through vegetation clearing, particularly the land designated as CBA Optimal in the north-west corner of the LSA, is an impact of concern. However, by avoiding this CBA Optimal area, amongst other measures, the residual impact significance of natural habitat loss can be reduced to low.

Apart from direct habitat loss and disturbance, several other direct- and indirect impacts have also been identified and assessed for significance (Table 15**Error! Reference source not found.** presents a summary of the potential impacts/risks associated with the proposed Project). These impacts can be restricted to the proposed development footprints and/or successfully mitigated through the correct application of the management and mitigation measures outlined in this report.

Table 15: Summary of identified impacts on terrestrial flora

Aspect	Potential Impact/Risk	Significance without Mitigation	Significance with Mitigation
Construction			
Flora Habitat and Species	Loss and disturbance of habitat – Mixed *Themeda triandra* grassland	Very High	Low
Flora Habitat and Species	Loss and disturbance of habitat – Mixed Moist Grassland	High	Low

Aspect	Potential Impact/Risk	Significance without Mitigation	Significance with Mitigation
Flora Habitat and Species	Establishment and spread of alien invasive species	Moderate	Very Low
Flora SCC	Loss of flora of conservation concern	Moderate	Low
Operational Phase			
Flora Habitat and Species	Establishment and spread of alien invasive species	Moderate	Very Low
Decommissioning			
Flora Habitat and Species	Establishment and spread of alien invasive species	Moderate	Very Low
Cumulative			
Flora Habitat and Species	Loss and disturbance of natural habitat	High	Low

15.1. Conditions to be Included in the Environmental Authorisation

No additional conditions are recommended for inclusion in the EA.

15.2. Specialist Opinion

In accordance with the outcomes of the impact assessment (Section 11) and taking cognisance of the baseline conditions as presented in Section 6 through to Section 10, as well as the impact management measures prescribed in Section 13, Section 14 and Section 0, the proposed Project, is not deemed to present significant negative environmental issues or impacts, and it should thus be authorised.

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Appendix A: Curricula vitae for Andrew Zinn

Hawkhead Consulting

Curriculum Vitae of Andrew Zinn (Pr.Sci.Nat.)

Details

Andrew David Zinn
Terrestrial Ecologist
B.Sc. (Hons.), M.Sc., Pr.Sci.Nat.

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Address: 58 Central Rd, Linden Ext., Johannesburg, 2195
South Africa
Date of birth: 14 July 1982
Nationality: South African

Profile

I am an ecologist with an M.Sc. Degree in Resource Conservation Biology and 15 years of experience working in biodiversity consulting and ecological research. I am registered with the South African Council of Natural Scientific Professions as a Professional Natural Scientist. I currently work as an independent consulting ecologist, with Hawkhead Consulting. During my career I have worked on projects in remote areas in several African countries including South Africa, Botswana, Democratic Republic of the Congo, Ethiopia, Ghana, Mozambique, Tanzania and Zambia. I have also previously worked in the United Kingdom and the United Arab Emirates.

Education and Qualifications

- University of the Witwatersrand, M.Sc. Resource Conservation Biology (2013).
- University of KwaZulu-Natal, BSc. Hons. Ecology and Conservation Biology (2005).
- University of KwaZulu-Natal, BSc. Zoology and Grassland Science (2004).
- Bryanston High School, Johannesburg. Matric Exemption. (2000).

Affiliations

- Member of the South African Wildlife Management Association
- Member of the South African Council of Natural Scientific Professions – Professional Natural Scientist (400687/15).

Work Experience

1. **Independent Ecologist**

Hawkhead Consulting, South Africa
September 2020 – Present

Consulting ecologist focusing on terrestrial ecology. I specialise in conducting baseline flora and fauna surveys, ecological impact assessments, and developing mitigation and management programmes for projects and operations in various industry sectors. Core services and responsibilities include, amongst others:

- Biodiversity study design and implementation;
- Biodiversity baseline and impact assessment reporting;
- Mitigation measure design and application;
- Vegetation surveys and vegetation community mapping;
- Fauna surveys for mammals, birds, reptiles and amphibians;
- Development of biodiversity management plans;
- Development of rehabilitation and revegetation plans; and
- Alien invasive species control and eradication plans.

2. Ecologist

Golder Associates Africa, South Africa
June 2011 – September 2020

Ecologist responsible for the management and implementation of baseline biodiversity studies and ecological impact assessments for development projects in the mining, power generation, transport, land development and industrial development sectors throughout sub-Saharan Africa. Role responsibilities included project management, technical review, biodiversity study design and implementation, flora and fauna surveys, biodiversity baseline and impact assessment reporting, development of biodiversity management plans, rehabilitation plans and alien invasive species control and eradication plans. These studies were conducted to satisfy national environmental regulations and/or international financing requirements, including the International Finance Corporation's (IFC) Performance Standard 6 (PS6)

3. Independent Ecologist

Subcontracted to KPMG, United Arab Emirates
March – April 2011

Subcontracted to KPMG as a subject matter expert (ecology) on the internal audit of Sir Bani Yas Island's Conservation Department (United Arab Emirates). The audit focused on evaluating the efficacy of the island's various conservation practices, including game management, feed provisioning, carnivore breeding and monitoring, veterinary care and vegetation maintenance.

4. Environmental Consultant

WSP Environment and Energy, South Africa
August 2008 – March 2011

Environmental consultant, responsible for a range of environmental projects and services including managing environmental authorisation processes (BAs and EIAs), facilitating stakeholder engagement processes,
conducting compliance audits, developing environmental management programmes and conducting specialist ecological studies.

5. Research Technician

Yale University, Kruger National Park, South Africa
October 2007 – May 2008

Research technician on the Savanna Convergence Experiment (SCE). The SCE project was a long-term cross-continental study that investigated the role of mega-herbivores in fire-grazing interactions and their influence on vegetation dynamics. Responsible for collecting and analysing vegetation composition and productivity data, as well as herbivore distribution data.

Publications

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Appendix B: Methodology Supplement:

Appendix B (1): Location of surveying locations.


KEY MAP
Limpopo
Mpumalanga
KOMATI
LEGEND
Survey locations
Tracks
Eskom Power Stations
Local Study Area
0
400
800
1:12 000
METERS
NOTE(S)
REFERENCE(S)
COORDINATE SYSTEM: HARTEBEESTHOEK94 LO29
SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
CLIENT
ESKOM
PROJECT
KOMATI POWER STATION - SOLAR PHOTOVOLTAICS (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS), ESIA
TITLE
SURVEY SITE LOCATIONS
CONSULTANT
GOLDER
YYYY-MM-DD 2023/03/16
DESIGNED
PREPARED TS
REVIEWED LN
APPROVED AD
CONTROL
REV.
FIGURE
22521869

Appendix B (2): Rating criteria for Conservation Importance, Functional Integrity and Receptor Resilience and the scoring matrices, as per (SANBI, 2020).

The ecological sensitivity of habitats in the study area was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2020). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

$$BI = CI + FI$$

- **Conservation Importance** is defined as "the importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystems types, through predominantly natural processes" (SANBI, 2020).
- **Functional Integrity** is defined as "A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts" (SANBI, 2020).
- **Receptor Resilience** is defined as "the intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention" (SANBI, 2020).

Table 1: Conservation Importance (CI) criteria.

Conservation Importance (CI)	Fulfilling Criteria
Very High	• Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10km^2; • Any area of natural habitat of a CR ecosystem type or large area (>0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type; and • Globally significant populations of congregatory species (>10% of global population).
High	• Confirmed of highly likely occurrence of CR, EN, VU species that have a global EOO of > 10km^2, IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining; • Small area (>0.01% but <0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (>0.1%) of natural habitat of VU ecosystem type; • Presence of Rare species; • Globally significant populations of congregatory species (>1% but < 10% of global population).
Medium	• Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals; • Any area of natural habitat of threatened ecosystem type with status of VU; • Presence of range-restricted species; and • >50% of receptor contains natural habitat to support SCC.
Low	• No confirmed or highly likely populations of SCC; • No confirmed or highly likely populations of range-restricted species; and • <50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	• No confirmed and highly unlikely populations of SCC; • No confirmed and highly unlikely populations of range-restricted species; and • No natural habitat remaining.

Table 2: Functional Integrity (FI) criteria.

Functional Integrity (FI)	Fulfilling Criteria
Very High	• Very large (>100 ha) intact area for any conservation status of ecosystem type or >5a ha for CR ecosystem type; • High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches; • No or minimal current negative ecological impacts with no signs of major disturbance (e.g., ploughing)
High	• Large (>5 ha but < 100 ha) intact area for any conservation status ecosystem types; • Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches; and • Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	• Medium (>5ha but< 20 ha) semi-intact area for any conservation status ecosystem type or >20 ha for VU ecosystem type; • Only narrow corridors of good connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches; • Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	• Small (> 1 ha but <5ha) area; • Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential; and • Several minor and major current negative ecological impacts.
Very Low	• Very small (<1 ha) area; • No habitat connectivity except for flying species or flora with wind-dispersed seeds; • Several major current negative ecological impacts.

BI = CI + FI

Biodiversity Importance (BI) Rating Matrix

Biodiversity Importance (BI)		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 3: Receptor Resilience criteria (RR)

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (˜less than 5 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (˜ 5-10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Habitat that can recover slowly (˜ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ˜less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

SEI = BI + RR

Site Ecological Importance (SEI) Rating Matrix

Site Ecological Importance		Biodiversity Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Receptor Resilience	**Very Low**	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Table 4: Guidelines for interpreting SEI in the context of the proposed development activities.

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

Appendix C: List of Flora Species Recorded in the Local Study Area During the Field Survey.

Family	Species Name	Growth Form	Origin	Conservation Status			Habitat Units		
				Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Transformed Areas with Disturbed or Landscaped Vegetation	Mixed Moist Grassland	Mixed *Themeda triandra* Grassland
Amaranthaceae	*Chenopodium album**	Herb	Alien	NE	-	-	X	X	
Amaranthaceae	*Gomphrena celosioides**	Herb	Alien	NE	-	-	X		
Anacardiaceae	*Searsia lancea*	Tree	Indigenous	LC	-	-			X
Apocynaceae	*Gomphocarpus fruticosa*	Herb	Indigenous	LC	-	-	X		
Apocynaceae	*Nerium oleander**	Tree	Alien	NE	-	-	X		
Asteraceae	*Bidens bipinnata**	Herb	Alien	NE	-	-			
Asteraceae	*Campuloclinium macrocephalum**	Herb	Alien (NEMBA Category 1b)	NE	-	-		X	X
Asteraceae	*Cirsium vulgare**	Herb	Alien (NEMBA Category 2)	NE	-	-		X	
Asteraceae	*Conyza bonariensis**	Herb	Alien	NE	-	-	X		
Asteraceae	*Cosmos bipinnatus**	Herb	Alien	NE	-	-	X	X	
Asteraceae	*Flaveria bidentis**	Herb	Alien (NEMBA Category 1b)	NE	-	-	X		
Asteraceae	*Haplocarpha scaposa*	Herb	Indigenous	LC	-	-	X	X	X
Asteraceae	*Helichrysum aureonitens*	Herb	Indigenous	LC	-	-		X	X
Asteraceae	*Helichrysum harveyanum*	Herb	Indigenous	LC	-	-		X	X
Asteraceae	*Helichrysum nudifolium var. pilosellum*	Herb	Indigenous	LC	-	-		X	X
Asteraceae	*Helichrysum rugulosum*	Herb	Indigenous	LC	-	-			X
Asteraceae	*Hilliardiella aristata*	Shrub	Indigenous	LC	-	-			X
Asteraceae	*Hypochaeris radicata**	Herb	Alien	NE	-	-	X	X	
Asteraceae	*Lactuca serriola**	Herb	Alien	NE	-	-			
Asteraceae	*Nidorella anomala*	Herb	Indigenous	LC	-	-		X	X
Asteraceae	*Nidorella podocephala*	Herb	Indigenous	LC	-	-			
Asteraceae	*Pseudognaphalium luteo-album**	Herb	Alien	NE	-	-	X	X	
Asteraceae	*Schkuhria pinnata**	Herb	Alien	NE	-	-			
Asteraceae	*Senecio inornatus*	Herb	Indigenous	LC	-	-			X
Asteraceae	*Seriphium plumosum*	Shrub	Indigenous	LC	-	-		X	X
Asteraceae	*Tagetes minuta**	Herb	Alien	NE	-	-	X		
Campanulaceae	*Wahlenbergia cf. undulata*	Herb	Indigenous	LC	-	-			X
Caryophyllaceae	*Dianthus mooiensis*	Herb	Indigenous	LC	-	-			X
Commelinaceae	*Commelina erecta*	Herb	Indigenous	LC	-	-		X	
Convolvulaceae	*Ipomoea ommaneyi*	Herb	Indigenous	LC	-	-			

Family	Species Name	Growth Form	Origin	Conservation Status			Habitat Units		
				Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Transformed Areas with Disturbed or Landscaped Vegetation	Mixed Moist Grassland	Mixed *Themeda triandra* Grassland
Cyperaceae	*Bulbostylis cf. hispidula.*	Graminoid	Indigenous	LC	-	-			
Cyperaceae	*Cyperus esculentus*	Graminoid	Alien	NE	-	-	X	X	
Cyperaceae	*Cyperus obtusiflorus*	Graminoid	Indigenous	LC	-	-		X	X
Cyperaceae	*Cyperus sp.*	Graminoid	Indigenous	-	-	-	X	X	
Cyperaceae	*Kyllinga erecta*	Graminoid	Indigenous	LC	-	-	X	X	
Cyperaceae	*Pycreus macranthus*	Graminoid	Indigenous	LC	-	-			
Fabaceae	*Acacia dealbata**	Tree	Alien (NEMBA Category 2)	NE	-	-	X		
Fabaceae	*Acacia mearnsii**	Tree	Alien (NEMBA Category 2)	NE	-	-	X		
Fabaceae	*Acacia melanoxylon**	Tree	Alien (NEMBA Category 2)	NE	-	-	X		
Fabaceae	*Chamaecrista comosa*	Herb	Indigenous		-	-	X		X
Fabaceae	*Elephantorrhiza elephantina*	Dwarf Tree	Indigenous	LC	-	-			X
Fabaceae	*Indigofera cf. cryptantha*	Herb	Indigenous	LC	-	-			X
Fabaceae	*Melilotus albus**	Herb	Alien	NE	-	-	X	X	
Fabaceae	*Robinia pseudoacacia**	Tree	Alien (NEMBA Category 1b)	NE	-	-			X
Fabaceae	*Trifolium repens**	Herb	Alien	NE	-	-	X	X	
Gentianaceae	*Chironia palustris*	Herb	Indigenous	LC	-	-		X	
Geraniaceae	*Pelargonium luridum*	Herb	Indigenous	LC	-	-			X
Hyacinthaceae	*Ledebouria ovatifolia*	Geophyte	Indigenous	LC	-	-			X
Hypoxidaceae	*Hypoxis acuminata*	Geophyte	Indigenous	LC	-	-			X
Hypoxidaceae	*Hypoxis hemerocallidea*	Geophyte	Indigenous	LC	-	-			X
Iridaceae	*Gladiolus sp.* (no flowers)	Herb	Indigenous	-	-	Protected			X
Juncaceae	*Juncus effusus*	Graminoid	Indigenous	LC	-	-		X	
Juncaceae	*Juncus oxycarpus*	Graminoid	Indigenous	LC	-	-		X	X
Liliaceae	*Dipcadi sp.*	Herb	Indigenous	-	-	-		X	
Lobeliaceae	*Lobelia flaccida*	Herb	Indigenous	LC	-	-		X	
Malvaceae	*Hermannia transvaalensis*	Herb	Indigenous	LC	-	-			X
Malvaceae	*Sida rhombifolia*	Herb	Indigenous	LC	-	-			X
Myrtaceae	*Eucalyptus sp.**	Tree	Alien (NEMBA Category 2)	NE	-	-	X		X
Oleaceae	*Fraxinus sp.**	Tree	Alien (NEMBA Category 3)	NE	-	-	X		X
Onagraceae	*Oenothera rosea**	Herb	Alien	NE	-	-	X		
Orchidaceae	*Eulophia ovalis var. ovalis*	Herb	Indigenous	LC	-	Protected			X
Orchidaceae	*Orthochilus leontoglossus*	Herb	Indigenous	LC	-	Protected			X

Family	Species Name	Growth Form	Origin	Conservation Status			Habitat Units		
				Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Transformed Areas with Disturbed or Landscaped Vegetation	Mixed Moist Grassland	Mixed *Themeda triandra* Grassland
Orchidaceae	Unidentified orchid (senescent flowers)	Herb	Indigenous	-	-	Protected		X	
Orobanchaceae	*Striga asiatica*	Herb	Indigenous	LC	-	-			X
Oxalidaceae	*Oxalis latifolia*	Herb	Alien	NE	-	-			
Papaveraceae	*Argemone ochroleuca**	Herb	Alien (NEMBA Category 1b)	NE	-	-	X		
Pinaceae	*Pinus sp.**	Tree	Alien (NEMBA Category 2)	NE	-	-			
Plantaginaceae	*Plantago major**	Herb	Alien	NE	-	-	X	X	
Poaceae	*Agrostis eriantha*	Graminoid	Indigenous	LC	-	-	X		
Poaceae	*Agrostis lachnantha*	Graminoid	Indigenous	LC	-	-	X	X	
Poaceae	*Brachiaria serrata*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Bromus cf. catharticus**	Graminoid	Alien	NE	-	-	X		
Poaceae	*Cenchrus ciliaris*	Graminoid	Indigenous	LC	-	-	X		
Poaceae	*Chloris gayana*	Graminoid	Indigenous	LC	-	-	X		
Poaceae	*Cynodon dactylon*	Graminoid	Indigenous	LC	-	-	X	X	X
Poaceae	*Dactyloctenium sp.*	Graminoid	Indigenous	LC	-	-	X		
Poaceae	*Digitaria eriantha*	Graminoid	Indigenous	LC	-	-	X		X
Poaceae	*Diheteropogon amplectens*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Eragrostis capensis*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Eragrostis cf. trichophora*	Graminoid	Indigenous	LC	-	-		X	
Poaceae	*Eragrostis chloromelas*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Eragrostis curvula*	Graminoid	Indigenous	LC	-	-	X	X	X
Poaceae	*Eragrostis gummiflua*	Graminoid	Indigenous	LC	-	-		X	X
Poaceae	*Eragrostis lehmanniana*	Graminoid	Indigenous	LC	-	-	X		
Poaceae	*Eragrostis sp.*	Graminoid	Indigenous	-	-	-			X
Poaceae	*Helictotrichon turgidulum*	Graminoid	Indigenous	LC	-	-	X		X
Poaceae	*Heteropogon contortus*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Hyparrhenia dregeana*	Graminoid	Indigenous	LC	-	-	X	X	
Poaceae	*Hyparrhenia hirta*	Graminoid	Indigenous	LC	-	-	X	X	X
Poaceae	*Imperata cylindrica*	Graminoid	Indigenous	LC	-	-	X	X	X
Poaceae	*Koeleria capensis*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Leersia hexandra*	Graminoid	Indigenous	LC	-	-		X	
Poaceae	*Panicum maximum*	Graminoid	Indigenous	LC	-	-			
Poaceae	*Panicum schinzii*	Graminoid	Indigenous	LC	-	-		X	
Poaceae	*Paspalum dilatatum**	Graminoid	Alien	NE	-	-	X		
Poaceae	*Paspalum notatum**	Graminoid	Alien	NE	-	-	X		
Poaceae	*Paspalum urvillei**	Graminoid	Alien	NE	-	-		X	

Family	Species Name	Growth Form	Origin	Conservation Status			Habitat Units		
				Regional Red List Status	Mpumalanga Red List Status	Mpumalanga Nature Conservation Act (1998)	Transformed Areas with Disturbed or Landscaped Vegetation	Mixed Moist Grassland	Mixed *Themeda triandra* Grassland
Poaceae	*Pennisetum clandestinum**	Graminoid	Alien (NEMBA Category 1b)	NE	-	-	X		
Poaceae	*Phragmites australis*	Graminoid	Indigenous	LC	-	-		X	
Poaceae	*Pogonarthria squarrosa*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Setaria pallide-fusca*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Setaria sp.*	Graminoid	Indigenous	-	-	-			X
Poaceae	*Sorghum cf. bicolor*	Graminoid	Indigenous	LC	-	-	X		
Poaceae	*Sporobolus africanus*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Stipagrostis sp.*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Themeda triandra*	Graminoid	Indigenous	LC	-	-			X
Poaceae	*Tristachya leucothrix*	Graminoid	Indigenous	LC	-	-			X
Polygalaceae	*Polygala hottentota*	Herb	Indigenous	LC	-	-			X
Polygonaceae	*Rumex crispus**	Herb	Alien	NE	-	-	X		
Rhamnaceae	*Ziziphus zeyheriana*	Dwarf Tree	Indigenous	LC	-	-			X
Rubiaceae	*Richardia brasiliensis**	Herb	Alien	NE	-	-	X		
Salicaceae	*Populus deltoides**	Tree	Alien	NE	-	-	X		X
Solanaceae	*Datura stramonium**	Herb	Alien (NEMBA Category 2)	NE	-	-	X	X	
Solanaceae	*Nicotiana glauca**	Tree	Alien (NEMBA Category 2)	NE	-	-	X		
Solanaceae	*Solanum mauritianum**	Tree	Alien (NEMBA Category 1b)	NE	-	-		X	
Solanaceae	*Solanum sisymbriifolium**	Herb	Alien (NEMBA Category 1b)	NE	-	-	X		
Tamaricaceae	*Tamarix ramosissima**	Tree	Alien (NEMBA Category 1b)	NE	-	-	X	X	
Typhaceae	*Typha capensis*	Graminoid	Indigenous	LC	-	-		X	
Ulmaceae	*Ulmus parvifolia**	Tree	Alien	NE	-	-	X		
Verbenaceae	*Verbena bonariensis**	Herb	Alien (NEMBA Category 2)	NE	-	-	X	X	
-	*Unidentified geophyte A (no flowers)*	Geophyte		-	-	-			X

Red List Categories
NE = Not Evaluated
LC = Least Concern

**Indicates alien species*

89