PROPOSED DEVELOPMENT OF A 10MW AC SOLAR PHOTOVOLTAIC (PV) PLANT AND ASSOCIATED INFRASTRUCTURE ON PORTIONS OF FARM SCHOONGEZICHT 238 KP, DWAALBOOM, LIMPOPO PROVINCE

DRAFT TERRESTRIAL BIODIVERSITY SPECIALIST REPORT

Prepared for:

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REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

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PROJECT TEAM EXPERTISE AND DECLARATIONS

In terms of the Terrestrial Biodiversity Protocol (2020):

2.1. The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:

3.1.1. Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;

3.1.2. A signed statement of independence by the specialist.

Name of Specialist	Aidan Gouws
Position	Senior Environmental Consultant & Terrestrial Ecologist (CES)
Contact Details	Email: a.gouws@cesnet.co.za | Tel: +27 10 045 1372
Role on Project	Terrestrial Ecologist Report Author
Highest Qualification	MSc. Environmental Science (Dissertation Topic: Invasion Ecology)
SACNASP Registration No.	*Cand.Sci.Nat.* 121901
SACNASP Field of Practice	Environmental Science
Experience (no. of years)	3 years in environmental consulting and terrestrial biodiversity assessments

Aidan obtained his MSc in Environmental Science (*Cum laude*) from Rhodes University, having conducted research on the spatio-temporal dynamics of *Acacia dealbata* invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (*Cum laude*) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. Since joining CES in 2018, Aidan has been involved in several projects, including Basic Assessments, Full Scoping and Environmental Impact Assessments, Environmental Amendment Applications, Environmental Audits and Terrestrial Biodiversity Assessments. He is registered with the South African Council for Natural Scientific Professions as a Candidate Natural Scientist and with the International Association for Impact Assessments.

Declaration of Independence

- I, **Aidan Gouws**, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signed:

Date:

Name of Specialist	Tarryn Martin
Position	Principal Environmental Consultant and Botanical Specialist (CES)
Contact Details	Email: t.martin@cesnet.co.za
Role on Project	Quality Control
Highest Qualification	MSc. Botany (Dissertation Topic: Impact of fire on the recovery of C_3 and C_4 Panicoid and non-Panicoid grasses within the context of climate change)
SACNASP Registration No.	*Pr.Sci.Nat* 400018/14
SACNASP Field of Practice	Environmental Science
Experience (no. of years)	9 years conducting botanical and ecological assessments

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C3 and C4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. Tarryn specialises in conducting vegetation assessments in South Africa, Mozambique and other African countries. These assessments are often to IFC standards, specifically Performance Standard 6. Tarryn has also undertaken critical habitat assessments for areas requiring biodiversity offsets. Other botanical related work includes, developing biodiversity management and monitoring plans to IFC standards and alien management plans.

Declaration of Independence

- I, **Tarryn Martin**, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signed:

Date:

Please refer to the Curricula vitae in Appendix B for more information.

EXECUTIVE SUMMARY

PPC Cement proposes to develop a 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Dwaalboom Factory, located in Dwaalboom in the Limpopo ProvinceFigure 1.1. The proposed Solar PV plant will encompass an area of approximately 20 hectares and will be used to generate power for private consumption at the adjacent cement factory and neighbouring mine. An 11kV dual-circuit overhead line (OHL), approximately 1 750m in length, will be required to connect the new proposed plant to the existing PPC 11kV substation. An OHL to underground cable transition will also be required as the line approaches the substation.

Due to the very high sensitivity rating of the site, a full **Terrestrial Biodiversity Specialist Assessment** (this report) has been undertaken as part of the BA Process for the proposed solar PV plant.

The specialist assessment sought to assess the ecological state and current land-use of the proposed site, identify potential sensitive ecosystems and plant species, and identify potential impacts of the proposed development. The objectives for the ecological assessment are as follows:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Establish and map sensitive vegetation areas showing the suitability for development and no-go areas.
- Identify plant and animal species of conservation concern (Red Data List, PNCO and TOPS lists). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation and degradation of key ecosystems and, where feasible, provide mitigation measures to reduce these impacts.

A desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. Upon the completion of the desktop assessment a site visit was undertaken on the 14 and 15 December 2020, and 22 February 2021 to determine the actual condition of the terrestrial ecology within the study area. The vegetation and habitat composition was assessed at 17 sample points within the broader assessment footprint.

The vegetation within the assessment footprint was then mapped using a combination of data from the field assessment, the Mucina and Rutherford (2018) vegetation map and aerial imagery from Google Earth. The vegetation recorded within the assessment unit exhibited some characteristics of Western Sandy Bushveld (WSB), despite evidence of current and historical disturbance and transformation. Three vegetation subtypes were identified on site, namely the encroached WSB; the disturbed and transformed WSB; and the open, semi-natural WSB. Most of the site is comprised of the encroached WSB, characterised by dense sickle bush (*Dichrostachys cinerea*) thornveld. This is fringed by the disturbed WSB, starting at the entrance to the site in the north and following the access road in a south-easterly and south-westerly direction. The transformed areas include the PPC residential area to the west, and the PPC railway siding and Eskom SOC Limited powerline to the south.

The open, semi-natural WSB component falls mainly on the north-eastern side of the access road, with some occurring to along the south-eastern edge of the encroached area.

A total of 29 plants were identified during the site visit, none of which were Species of Conservation Concern (SCC), with all categorised as "Least Concern". Two species, *Sclerocarya birrea* and *Vachellia erioloba*, are recognised as protected trees under the National Forest Act (NFA), 1998 (Act No. 84 of 1998). In terms of Section 15(1) of the NFA "*no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister of Agriculture, Forestry and Fisheries*." Two species were categorised as AIS, namely *Lantana camara* and *Solanum elaeagnifolium*, both of which are Category 1b.

The encroached WSB was found to be of low sensitivity, due to its low conservation importance, despite the occurrence of two protected tree species within this area. The open, semi-natural WSB vegetation type has been determined to be of medium sensitivity due to its medium conservation importance, functional integrity and receptor resilience. Disturbed WSB and transformed areas have been determined to be of low and very low sensitivities, respectively.

Prior to mitigation, the proposed development is anticipated to have four impacts of HIGH and 16 of MODERATE significance, with 13 of low significance and one of very low significance. All impacts would be reduced to a VERY LOW to MODERATE significance post-mitigation, provided that the proposed mitigation measures are implemented and adhered to.

It should be noted that if the impacts are suitably planned for and mitigated (i.e. avoided or minimized) during the planning and design phase, the impacts of these will be reduced during the construction phase, even in the absence of active mitigation during construction. Similarly, if the impacts are suitably planned for during the planning and design phase, and mitigated and rehabilitated during the construction phase, the operational phase impacts will also be significantly reduced, even in the absence of active mitigation during the operational phase. That said, it is recommended that all mitigation measures are implemented during all phases.

It is the opinion of the specialist that **NO FATAL FLAWS** exist with the proposed development.

The terrestrial biodiversity and ecological impacts of all aspects for the solar PV plant were assessed and considered to be acceptable, provided that the mitigation measures provided in this report are implemented. All impacts are rated as VERY LOW to HIGH pre-mitigation. Therefore, implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will reduce impacts to VERY LOW to MODERATE significance. It is recommended that the proposed solar PV plant be authorised provided all mitigation measures in this report are implemented.

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GLOSSARY OF TERMS

TERM	DEFINITION
Alien Invasive Species	An exotic species that can spread rapidly and displace native species causing damage to the environment
Biodiversity	Term used to describe the variety of life on Earth and is defined as "*the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems*" (Secretariat of the Convention on Biological Diversity, 2005).
Habitat Fragmentation	Occurs when large expanses of habitat are transformed into smaller patches of discontinuous habitat units isolated from each other by transformed habitats such as farmland.
Key Biodiversity Area	A globally recognised site that contains significant concentrations of biodiversity.
Natural Habitat	Refers to habitats composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area's primary ecological function and species composition.
Pentad	A 5 minute x 5 minute coordinate grid super-imposed over the continent for spatial reference.
Protected Area	A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values**.** *(IUCN Definition 2008)***.**

LIST OF ACRONYMS

ACRONYM	TERM
AOO	Area of Occupancy
CBA	Critical Biodiversity Area
CES	Coastal and Environmental Services
CR	Critically Endangered
ECO	Environmental Control Officer
EDGE	Evolutionarily Distinct and Globally Endangered
EN	Endangered
ESIA	Environmental and Social Impact Assessment
EOO	Extent of Occupancy
GBIF	Global Biodiversity Information Facility
GIS	Geographical Information System
IBA	Important Birding Areas
IUCN	International Union for Conservation of Nature
KBA	Key Birding Areas
LC	Least Concern
NBSAP	National Biodiversity and Strategy Action Plan
NEMBA	National Environmental Management Biodiversity Act
NGO	Non-Government Organisation
PNCO	Provincial Nature Conservation Ordinance
SCC	Species of Conservation Concern
QDS	Quarter Degree Square
SA	South Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
TOPS	Threatened and Protected Species

1 INTRODUCTION

In terms of Section 1 of the Terrestrial Biodiversity Protocol (2020):

1.1. An applicant intending to undertake an activity identified in the Scope of this Protocol, on a site identified as being of "very high sensitivity" for terrestrial biodiversity on the national web based environmental screening tool must submit a Terrestrial Biodiversity Impact Assessment.

1.1 PROJECT LOCATION AND DESCRIPTION

PPC Cement proposes to develop a 10MW AC Solar PV Plant and associated infrastructure adjacent to the PPC Dwaalboom Factory, located in Dwaalboom in the Limpopo Province (Figure 1.1). The proposed Solar PV plant will encompass an area of less than 20 hectares and will be used to generate power for private consumption at the adjacent cement factory and neighbouring mine. An 11kV dual-circuit overhead line (OHL), approximately 1 900m in length, will be required to connect the new proposed plant to the existing PPC 11kV substation. An OHL to underground cable transition will also be required as the line approaches the substation.

1.2 PURPOSE OF THIS REPORT

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements.

According to the results of the Screening Report generated for the proposed solar PV plant, the relative terrestrial biodiversity theme sensitivity is classified as VERY HIGH due to portions of the site occurring within an Ecological Support Area (ESA) 1 (Figure 3.7). According to Section 3 (1) of GN R. 320, '*an applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment*'.

Due to the very high sensitivity rating of the site, a full **Terrestrial Biodiversity Specialist Assessment** (this report) has been undertaken as part of the BA Process for the proposed solar PV plant.

The Screening Report also indicates that the site falls within medium and low sensitivity areas in terms of terrestrial animal and plant species sensitivity, respectively. Only one sensitive animal species was recorded by the screening tool, namely Sensitive animal species A[1], which carries a medium sensitivity due to its status as a 'Vulnerable' animal species in terms of the Red Data List. No sensitive plant species were recorded by the screening tool. According to the Species Environmental Assessment Guideline (SANBI, 2020):

[1] The name has been withheld as the species may be prone to illegal harvesting and must be protected.

"Where the sensitivity indicated in the screening tool is 'medium' for the proposed development footprint . . . the presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection . . . Where SCC are found on site or have been confirmed as likely to be present, an assessment must be submitted in accordance with the requirements specified for 'very high' and 'high' sensitivity in the protocol. However, if the ISSV [initial site sensitivity verification] *step indicates that the proposed development footprint/PAOI* [project areas of influence] *consists of a 'low' sensitivity and that the screening tool incorrectly classified the area as 'very high', 'high' or 'medium', then taxon-specific specialists are not required to perform an assessment and the EAP/specialist must submit a Terrestrial Animal/Plant Species Compliance Statement . . . However, if the ISSV step indicates that the proposed development footprint/PAOI consists of a 'low' sensitivity then taxon-specific specialists are not required to perform an assessment and the EAP/specialist must submit a Terrestrial Animal/Plant Species Compliance Statement"* (SANBI, 2020, p. 11).

1.3 AIMS, OBJECTIVES AND TERMS OF REFERENCE

The specialist assessment sought to assess the ecological state and current land-use of the proposed site, identify potential sensitive ecosystems and plant species, and identify potential impacts of the proposed development. The objectives for the ecological assessment are as follows:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Establish and map sensitive vegetation areas showing the suitability for development and no-go areas.
- Identify plant and animal species of conservation concern (Red Data List, PNCO and TOPS lists). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential and recommend management procedures.
- Identify and assess the impacts of development on the site's natural vegetation and faunal species in terms of habitat loss, fragmentation and degradation of key ecosystems and, where feasible, provide mitigation measures to reduce these impacts.

1.4 RELEVANT LEGISLATION

This specialist assessment was conducted in alignment with the regulatory and legislative requirements for environmental management in South Africa. The environmental legislation relevant to the proposed development is summarised in Table 1.1 below.

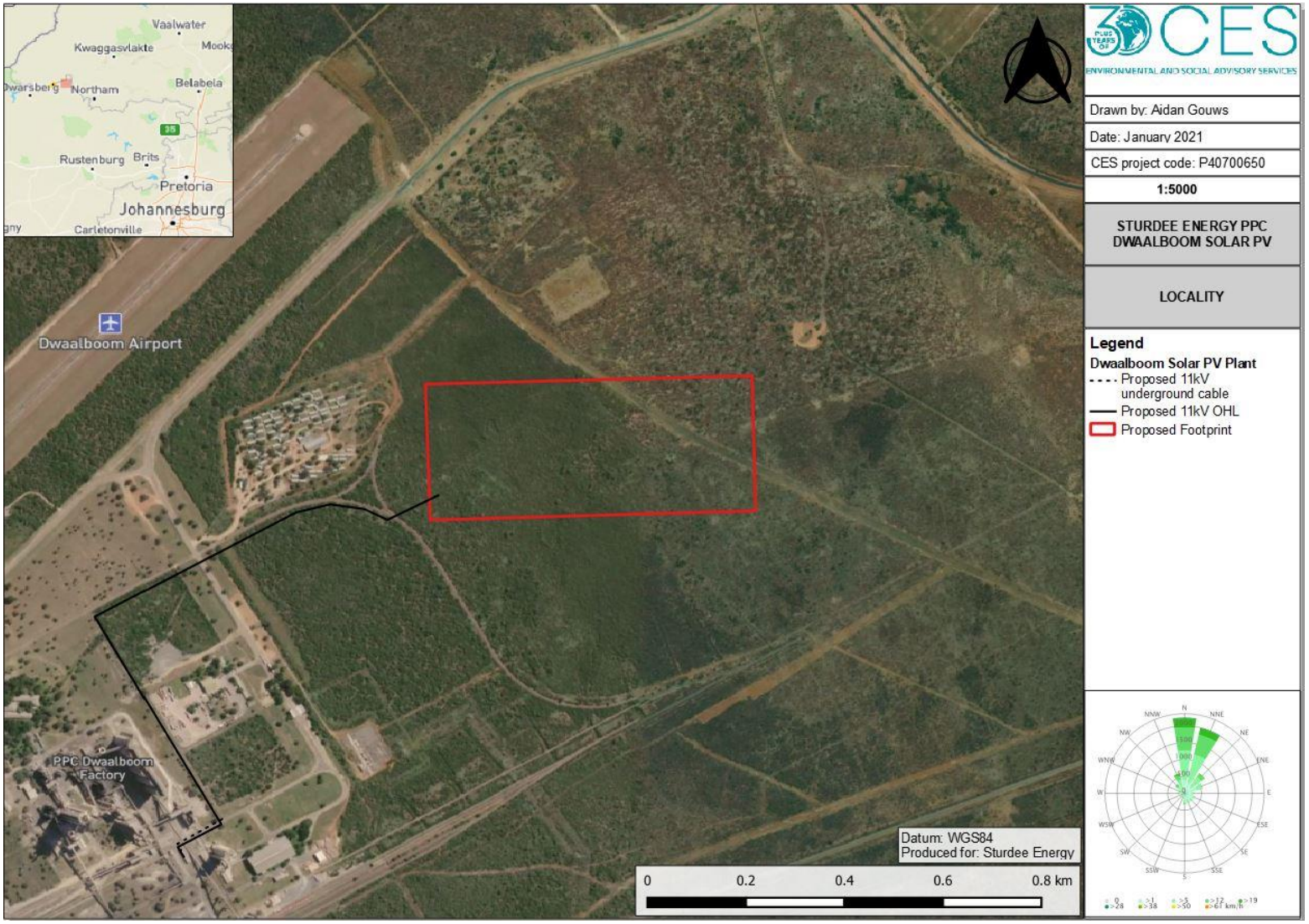


Figure 1.1: Locality of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

Table 1.1: Environmental legislation considered in the preparation of this report

LEGISLATION	DESCRIPTION	RELEVANCE
The Constitution, 1996 (Act No. 108 of 1996).	The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, including those pertaining to this Management Plan, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right: a) *To an environment that is not harmful to their health or well-being; and* b) *To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:* i. *Prevent pollution and ecological degradation;* ii. *Promote conservation; and* iii. *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	The proponent has an obligation to ensure that the proposed activity will not result in pollution and ecological degradation, as well as an obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.
National Environmental Management Act (NEMA), 1998 (Act No. 108 of 1998)	The objective of NEMA is: *"To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith."* This report has been guided by the NEMA Principles detailed in Section 2 of the Act. NEMA introduces the "duty of care" concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution, and may lead to the prosecution of responsible persons, including companies, for the conduct of the legal persons.	The undertaking of a specialist study, in this case, the terrestrial biodiversity study, in order to identify potential impacts on the terrestrial environment and to recommend mitigation measures to minimise these impacts, complies with Section 28 of NEMA. The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA.
NEMA EIA Regulations (2014, as amended)	The NEMA EIA Regulations (2014, as amended) aim to avoid detrimental environmental impacts through the regulation of specific activities that cannot commence without prior environmental authorisation. Authorisation either requires a Basic Assessment or a Full Scoping and Environmental Impact Assessment, depending on the type of	An application for Environmental Authorisation (as triggered by the EIA 2014 Regulations, as amended) is required to

LEGISLATION	DESCRIPTION	RELEVANCE
	activity. These assessments specify mitigation and management guidelines to minimise negative environmental impacts and optimise positive impacts. Should any portion of an area be proposed for development (after proclamation) these Regulations should be consulted.	be submitted to the Competent Authority.
NEMA Public Participation Guidelines (General Notice 807 of 2012)	Public consultation is a legal requirement throughout the EIA process. Developers are required to conduct public consultation throughout the Basic Assessment process. Formal EIA documents are required to be made available for public review, which include the project brief, Draft and Final BARs, and the decision of the Competent Authority. According to Regulation 41(2) of the NEMA EIA Regulations 2014 (as amended 2017) *"The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act".*	The Public Participation Process (PPP) to be followed will be described in detail in the Basic Assessment Report. The draft ecological report (this report), will be attached to the Draft BAR and will undergo a formal 30-day public commenting and review period. All proof and correspondence will be available in the Draft and Final BARs. No comments have been received to date that relates to the terrestrial ecological environment.
Terrestrial Biodiversity Protocol (2020)	This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on aquatic biodiversity for activities requiring EA. This protocol replaces the requirements of Appendix 6 of the EIA Regulations 2014, GN R. 982 (as amended), published under NEMA.	The screening tool identified the site footprint as falling within an area of "Very High Sensitivity" for Terrestrial Biodiversity, due to the presence of a Terrestrial Ecological Support Area (ESA) 1 within the site. This triggered the need for a full Terrestrial Biodiversity Assessment. This assessment and report complies with Terrestrial Biodiversity Protocol.
Plant and Animal Species Protocols (GN R. 1150 2020), and the associated	These protocols provide the criteria for the specialist assessment and minimum report content requirements for impacts on plant and animal species diversity for activities requiring EA. These protocol replaces the requirements of Appendix 6 of	The screening tool indicates that the site falls within low and medium sensitivity areas in terms of terrestrial

LEGISLATION	DESCRIPTION	RELEVANCE
Species Environmental Assessment Guideline (SANBI, 2020)	the EIA Regulations 2014, GN R. 982 (as amended), published under NEMA.	plant and animal species sensitivity, respectively. This assessment and report complies the Plant and Animal Species Protocols, as well as the Species Environmental Assessment Guideline.
National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004)	The National Environmental Management: Biodiversity Act (NEMBA), No. 10 of 2004, aims to assist with the management and conservation of South Africa's biological diversity through the use of legislated planning tools. These planning tools include the declaration of bioregions and the associated bioregional plans as well as other mechanisms for managing and conserving biodiversity. The objectives of the Act include *inter alia*: • The management and conservation of biological diversity within the Republic and of the components of such biological diversity; • The use of indigenous biological resources in a suitable manner; • The fair and equitable sharing of benefits arising from bio-prospecting of genetic material derived from indigenous biological resources; and • To give effect to ratified international agreements relating to biodiversity which are binding on the Republic. • To provide for co-operative governance in biodiversity management and conservation; and • To provide for a South African National Biodiversity Institute to assist in achieving the objectives of the Act. • In addition to this, Sections 50-62 of the Act provide details relating to the protection of threatened or protected ecosystems and species, while Sections 63-77 of the Act provide details relating to alien and invasive species with the purpose of preventing their introduction and spread, managing, controlling and eradicating of alien and invasive species.	Activities may not be carried out in threatened or protected ecosystems without first gaining authorisation for such activities. No protected species may be removed or damaged without a permit.
NEMBA National List of Threatened Ecosystems	The National List of Ecosystems is in place for the ecosystems that are threatened and in need of protection. The NEMBA provides for listing of threatened or protected ecosystems in one of the following categories:	

LEGISLATION	DESCRIPTION	RELEVANCE
(GNR 1002 of 2011)	• Critically endangered (CR) ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation; • Endangered (EN) ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems; • Vulnerable (VU) ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; • Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.	
NEMBA: Alien Invasive Species Regulations (2014)	The Alien and Invasive Species Regulations (2014) categorises the different types of alien and invasive plant and animal species and how they should be managed: • Category 1a Listed Invasive Species – species which must be combatted or eradicated. • Category 1b Listed Invasive Species – species which must be controlled. • Category 2 Listed Invasive Species – species which require a permit and must not be allowed to spread outside of the designated area. • Category 3 Listed Invasive Species – species which are subject to exemptions in terms of section requiring a permit, but where such a species occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.	An invasive species management, control and eradication plan for land/activities under their control should be developed, as part of their environmental plans in accordance with Section 11 of NEMA.

1.5 SCOPE OF ASSESSMENT AND CONTENTS OF THE SPECIALIST REPORT

The Terrestrial Biodiversity Specialist Assessment was conducted in accordance with the Terrestrial Biodiversity Protocol (2020). This protocol provides the criteria for the specialist assessment and minimum report content requirements for impacts on Terrestrial biodiversity for activities requiring EA. This protocol replaces the requirements of Appendix 6 of the EIA Regulations 2014, GN R. 982 (as amended), published under NEMA.

The assessment and reporting requirements of this protocol are associated with a level of environmental sensitivity identified by DFFE's national web-based environmental screening tool screening tool. The screening tool identified the site footprint as falling within an area of "Very High Sensitivity" for Terrestrial biodiversity, due to the presence of a Terrestrial Ecological Support Area (ESA) 1. This triggered the need for a full Terrestrial Biodiversity Assessment. Table 1.2 below indicates how the assessment complied with the requirements of the Terrestrial Biodiversity Protocol, with reference to specific sections in this report.

The screening tool identified the site footprint as falling within an area of "Medium" and "Low" sensitivity for terrestrial animal and plant species diversity, respectively. As such a botanical field survey was undertaken while the faunal assessment was done at a desktop level.

Table 1.2: Requirements of a Terrestrial Biodiversity Specialist Assessment Report

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page ii-iv and Appendix A
	3.1.2	A signed statement of independence by the specialist;	Page ii-iv
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.1.2
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 2.5
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Chapter 4
	3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 5
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Chapter 5
	3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 5
	3.1.10	The degree to which the impacts and risks can be reversed;	
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 5 and Section 6.2
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Chapter 6
	3.1.15	Any conditions to which this statement is subjected.	Section 6.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact		✓

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320		SECTION OF REPORT
	Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	

2 ASSESSMENT METHODOLOGY

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:
3.1.3. A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
3.1.4. A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;
3.1.5. A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;

The aim of the study was to assess the ecological state and current land-use of the proposed site, identify potential sensitive ecosystems and plant species, and identify potential impacts of the proposed development. The objectives for the ecological assessment are as follows:

2.1 DATA COLLECTION AND ASSESSMENT APPROACH

2.1.1 DESKTOP ASSESSMENT

A desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. For the terrestrial flora, the consideration of the following has been included:

- The South African Vegetation Map (Mucina and Rutherford, 2018);
- The Limpopo Conservation Plan (2013);
- The Waterberg Bioregional Plan (2016);
- Council for Geoscience (2013) South African Geology;
- Soil and Terrain (SOTER) Database of South Africa (2008);
- Review of the SANBI Red Data List; and
- Available literature on the regional vegetation.

Data on the known distribution and conservation status for each potential plant SCC were obtained in order to develop a list of SCC. These plant species are those that are subject to significant impacts from the proposed activity. In general, these will be species that are already known to be threatened or at risk. Efforts to provide the conservation status (SA 'red list' status) of individual species may provide additional valuable information on SCC (see http://redlist.sanbi.org). SCC have been identified by means of a combination of applicable legislation, guidelines and conservation status lists. The following lists were utilised to cross reference conservation and protection statuses of various species:

- National Environmental Management: Biodiversity Act (No. 10 of 2004) – Chapter 4, Part 2;
- Limpopo Environmental Management Act (LEMA, No. 7 of 2003) Schedule 11 – List of Specially Protected Plants and Schedule 12 – List of Protected Plants;
- 1976 List of Protected Trees (Government Gazette No. 9542 Schedule A) in the 1998 National Forest Act (NFA) as amended in November 2014; and
- SA Red Data List.

The South African Red Data List of plants use the internationally recognised IUCN Red List Categories and Criteria to measure a species risk of extinction. Since the Red List of South African plants are used widely for conservation practices throughout South Africa, this list has been modified to identify species that are at low risk of extinction but of high conservation importance. Species that are afforded special protection, which are protected by the Threatened or Protected Species (TOPS) list and by Schedule 11 and 12 of LEMA are also regarded as SCC.

A detailed faunal survey was not conducted. Although a site visit was undertaken, the faunal survey was mainly a desktop study, using information from previous ecological surveys conducted in the area. This data was supplemented by recording animal species that were observed during the site survey. Faunal distribution data were primarily sourced from the following web-based databases:

- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species Website;
- The Animal Demography Unit (ADU) Virtual Museum's Frog, Reptile and Mammal Maps;
- The iNaturalist Website; and
- The Global Biodiversity Information Facility (GBIF) website.

2.1.2 SITE ASSESSMENT

Upon the completion of the desktop assessment a site visit was undertaken to determine the actual condition of the terrestrial ecology within the study area. The site assessment was conducted on 14 and 15 December 2020, and 22 February 2021. To some extent, the season during which the assessment was conducted influenced the conditions on site at the time. The site survey was conducted in early- to late summer when most plants were at the end of the flowering stage. Early flowering species, specifically geophytes could therefore not be easily identified. However, the time available in the field, and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area.

A sampling protocol was developed that would enable us to evaluate the existing desktop interpretations of the vegetation of the study area, to improve on them if necessary, and to add detailed information on the plant communities present. The protocol considered the amount of time available for the study, the accessibility of different parts of the area, and limitations such as the seasonality of the vegetation.

A stratified random sampling approach was adopted, whereby initial assumptions were made about the diversity of vegetation, based on Google Earth, spatial planning tools and available literature and the area stratified into these basic types. In this way the time available was used much more efficiently than in random sampling, but there is a risk of bias and the eventual results may simply 'prove' the assumptions.

In general, the stratification of the site was influenced by obvious features of the vegetation, such as the presence of conspicuous species or vegetation structure. These factors may be largely independent of the floristic make-up of the vegetation, and by definition the biological communities present. Sample plots were analysed by determining the dominant species in each plot, as well as any

alien invasive species and potential SCC occurring within the plots. Each sample plot was sampled until no new species were recorded. Vegetation communities were then described according to the dominant species recorded from each type, and these were mapped and assigned a sensitivity score.

2.2 VEGETATION MAPPING

The revised SA VEGMAP (2018) maps "*floristically-based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before*." The map was developed using a wealth of data provided by a network of ecologists, biologists and conservation planners that make periodic contributions to the project. These contributions have allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. The SA VEGMAP informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012. The SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from satellite images, literature descriptions and related data gathered on the ground.

2.3 SENSITIVITY ASSESSMENT

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (Table 2.1). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings. The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 2.1: Criteria for establishing Site Ecological importance and description of criteria

CRITERIA	DESCRIPTION
Conservation Importance (CI)	*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 & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.*
Functional Integrity (FI)	*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.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*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.*
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

2.4 IMPACT ASSESSMENT

CES has developed the following impact rating methodology which has been developed in line with the Terrestrial Biodiversity Protocol, as well as the content requirements of Appendix 6 and the impact ratings required in Appendix 1 and 3 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- **Nature**: negative or positive impact on the environment.

- **Type**: direct, indirect and/or cumulative effect of impact on the environment.
- **Significance**: The criteria in Table 2.2 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (Table 2.2).
- **Consequence:** the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- **Extent:** the spatial scale defines the physical extent of the impact.
- **Duration:** the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- **Probability:** the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- **Reversibility:** The degree to which an environment can be returned to its original/partially original state.
- **Irreplaceable loss:** The degree of irreplaceable loss which an impact may cause, e.g. loss of non-regenerative vegetation or removal of rocky habitat or destruction of wetland.
- **Mitigation potential:** The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 2.2 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 2.2: Impact rating criteria

CRITERIA	CATEGORIES	DESCRIPTION
Overall nature	**Negative**	Beneficial/positive impact.
	Positive	Detrimental/negative impact.
Type	**Direct**	Direct interaction of an activity with the environment.
	Indirect	Impacts on the environment that are not a direct result of the project or activity.
	Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	**Short term**	Less than 5 years.
	Medium term	Between 5-20 years.
	Long term	More than 20 years.
	Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	**Localised**	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
	Study area	The proposed site and its immediate environments.

CRITERIA	CATEGORIES		DESCRIPTION
	Municipal		Impacts affect the municipality, or any towns within the municipality.
	Regional		Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
	National		Impacts affect the entire country.
Consequence	**Slight**		Slight impacts or benefits on the affected system(s) or party(ies).
	Moderate		Moderate impacts or benefits on the affected system(s) or party(ies).
	Severe/Beneficial		Severe impacts or benefits on the affected system(s) or party(ies).
Probability	**Definite**		More than 90% sure of a particular fact. Should have substantial supportive data.
	Probable		Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
	Possible		Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
	Unsure		Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.
Reversibility	**Reversible**		The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
	Irreversible		The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
Irreplaceable Loss	**Resource will not be lost**		The resource will not be lost/destroyed provided mitigation measures are implemented.
	Resource may be partly lost		The resource will be partially destroyed even though mitigation measures are implemented.
	Resource will be lost		The resource will be lost despite the implementation of mitigation measures.
Mitigation Potential	**Easily achievable**		The impact can be easily, effectively and cost effectively mitigated/reversed.
	Achievable		The impact can be effectively mitigated/reversed without much difficulty or cost.
	Difficult		The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.
	Very Difficult		The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.
Impact Significance	**Low negative**	**Low positive**	Largely of HIGH mitigation potential, after considering the other criteria.
	Moderate negative	**Moderate positive**	Largely of MODERATE or partial mitigation potential after considering the other criteria.
	High negative	**High positive**	Largely of LOW mitigation potential after considering the other criteria.

2.5 ASSUMPTIONS, LIMITATIONS AND GAPS IN KNOWLEDGE

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- The report is based on a project description received from the client.

- A detailed faunal survey was not conducted. Although a site visit was undertaken, the faunal survey was mainly a desktop study, using information from previous ecological surveys conducted in the area. This data was supplemented by recording animal species that were observed during the site survey.
- A separate avifaunal survey was undertaken by a specialist and birds are therefore not included in this report.
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs will be found during construction and operation of the development.
- Sampling could only be carried out at one stage in the annual or seasonal cycle. The survey was conducted in early summer when most plants were at the end of the flowering stage. Early flowering species, specifically geophytes could therefore not be identified. However, the time available in the field, and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area.

3 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

In terms of Section 2 of the Terrestrial Biodiversity Protocol (2020):

2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint

2.3. Description of the preferred site - the following aspects, as a minimum, must be considered in the baseline description:

2.3.1. A description of the ecological drivers/processes of the system and how the proposed development will impact these;

2.3.2. Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the proposed development site;

2.3.3. The ecological corridors that the development would impede including migration and movement of flora and fauna;

2.3.4. The description of any significant landscape features (including rare or important flora/faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Areas (FEPA) sub catchments;

2.3.5. A description of terrestrial biodiversity and ecosystems on the proposed development site, including

(a) Main vegetation types;

(b) Threatened ecosystems, including Listed Ecosystems as well as locally important habitat types identified;

(c) Ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and

(d) Species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified.

2.3.7. The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:

2.3.7.1. Terrestrial critical biodiversity areas (CBAs);

2.3.7.2. Terrestrial ecological support areas (ESAs);

2.3.7.3. Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004;

2.3.7.4. Priority areas for protected area expansion;

2.3.7.5. SWSAs;

2.3.7.6. FEPA sub catchments, and

2.3.7.7. Indigenous forests.

This chapter provides a description of the affected environment within the vicinity of the proposed solar PV plant. This information is provided to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. This information has been sourced from existing information available for the area. This chapter aims to provide the context within which this assessment is being conducted.

3.1 DESKTOP ASSESSMENT

3.1.1 CLIMATE

The proposed development site is situated at the PPC Dwaalboom facility, near Dwaalboom in the Limpopo Province, characterised by a warm-temperate climate, with hot, wet summers and cool, dry winters (Mucina & Rutherford, 2018). The Mean Annual Precipitation (MAP) and Mean Annual Potential Evaporation (MAPE) of the area are 552 mm and 2 418 mm, respectively (Mucina & Rutherford, 2018). The Annual Precipitation Coefficient of Variation (APCV) of the area is recorded at 29 % (Mucina & Rutherford, 2018), with the highest average rainfall occurring in January (60 mm) and lowest in July (<1 mm) (Meteoblue, 2021). The Mean Annual Temperature (MAT) of the area is 19.3 ºC (Mucina & Rutherford, 2018), with the highest mean daily temperatures occurring in January and

December (32 ºC), and lowest occurring in June and July (4 ºC) (Meteoblue, 2021). An average of 15 days of frost are recorded in the area per year (Mucina & Rutherford, 2018). A summary of the climate at Dwaalboom is provided in Figure 3.1 below.

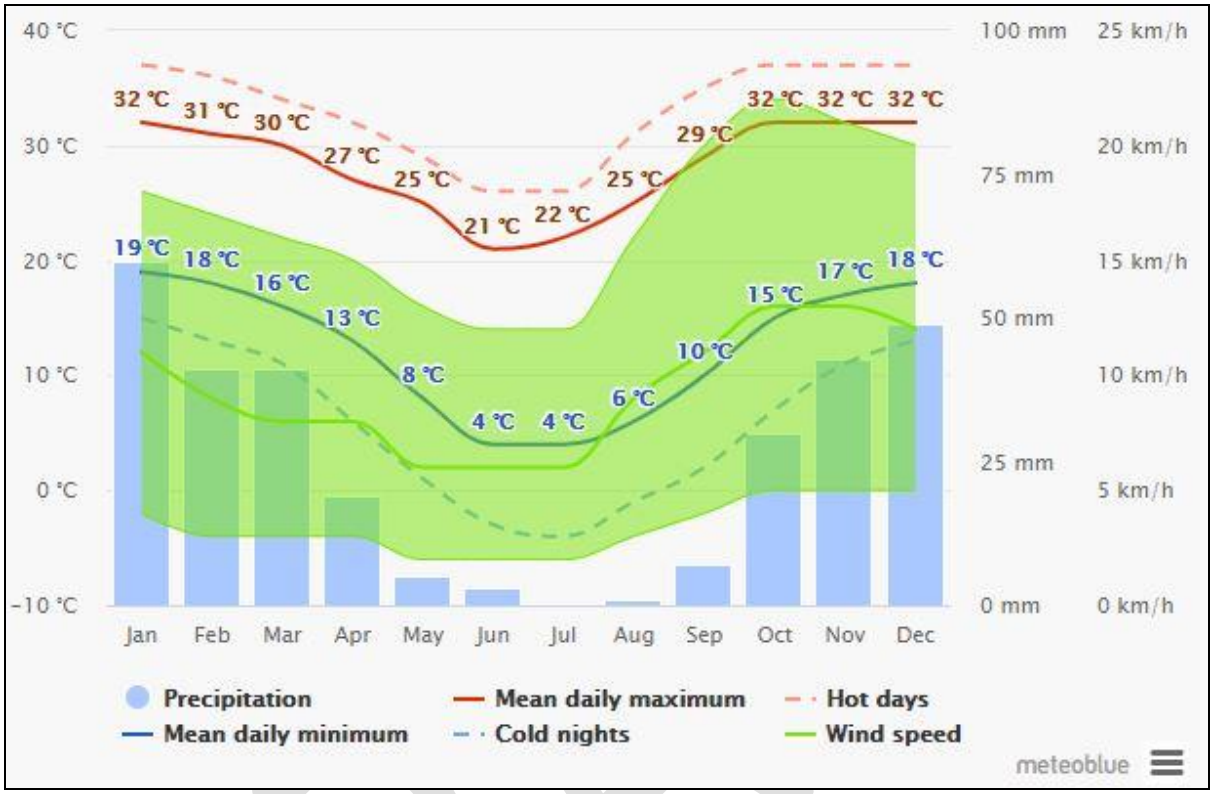


Figure 3.1: Climatic data for Dwaalboom, Limpopo (Meteoblue, 2021).

3.1.2 TOPOGRAPHY

The topography of the area is characterised by flats and undulating plains (Mucina & Rutherford, 2018). The terrain across the site is nearly flat, with a slight eastward slope (1.3 %) and elevations ranging from 1 126-1 133 m above mean sea level (amsl). The topographical profile and map of the site are provided in Figure 3.2 and Figure 3.3, respectively.

Figure 3.2: Topographic profile of the proposed site from west to east.

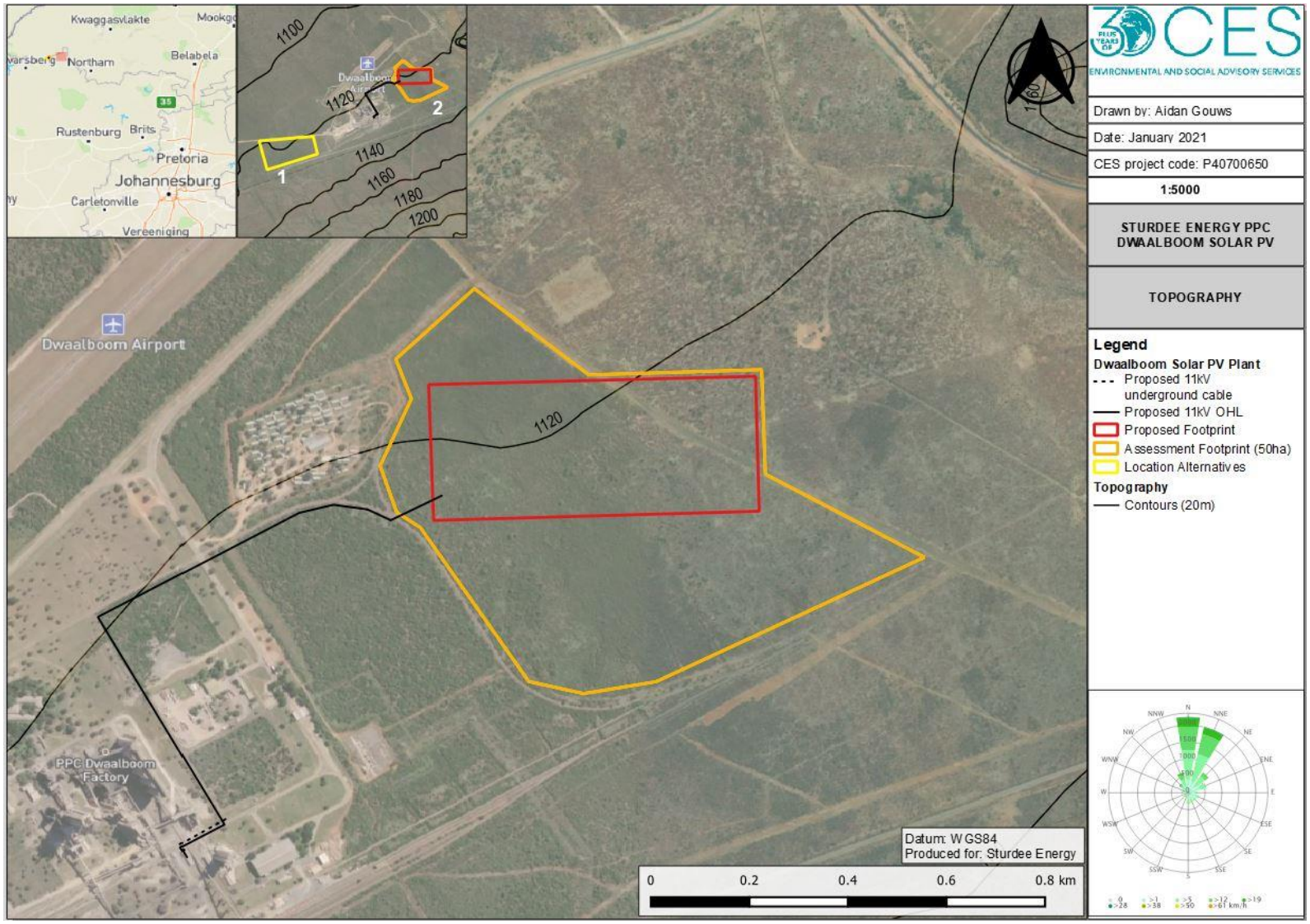


Figure 3.3: Topographic map of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

3.1.3 GEOLOGY AND SOILS

The geology of the area consists primarily of sedimentary rock, granite and gneiss, overlain by type AR soils, which includes red, yellow and greyish excessively drained sandy soils (Arenosols) (**Figure** 3.4), associated with the Western Sandy Bushveld vegetation type. According to Mucina & Rutherford (2018), the Western Sandy Bushveld found within the site is typically supported by sandstone and mudstone geology of the Matlabas Subgroup and sandstone, subordinate conglomerate, siltstone and shale of the Kransberg Subgroup (both Mokolian Group), as well as granite and gneiss of the Swazian Erathem (Bushveld Igneous Complex). Further to the west, soils are dominated by type D1, which includes black and red, strongly structured clayey soils with high base status (association of Vertisols, Phaoezems, Kastanozems and Nitisols, associated with the Dwaalboom Thornveld vegetation type). According to Mucina & Rutherford (2018), the Dwaalboom Thornveld is supported by variably clayey soils, ranging from sandy clay loams in areas to vertic black, ultramafic clays.

The agricultural assessment of the proposed development site supports the above, noting the following:
"The southern portion of the site is located on sedimentary material and in the northern part, on granitic material. The general soil patterns for land in the region as indicated by DALRRD, are red and yellow apedal soils with moderately developed blocky structure. The clay content of the soil is normally less than 15%.

Observations made on the site shows an accumulation of clay deeper in the profile. The subsoil has a clay content of more than 45%. This is likely due to hill wash from the dolomite and igneous rock. The soil is sticky when wet and has a high water holding capacity but has a slow water infiltration rate. There were no flakes on the surface where standing water was found, indicating that the soil has little smectic clays.

Calcium concretions are common and can be found throughout the profile. The soil consists of deep red and brown clay loam with moderate and poorly developed blocky structure. The soil is largely free of mottles and course fragments that would impede arability. Because of the soil properties discussed above, and as confirmed by the places there vehicles got stuck, is difficult to cultivate in the wet state. The dominant soil forms identified are Hutton and Shortlands.

The underlying material is calcareous deposits. Soils that occur on site are generally shallow, is dark greyish sandy clay with poorly developed blocky and single grain structure. This is also the case on the land where the transmission line is proposed. Limestone banks and loose rock occurs on all of the sites. Isolated patches of deeper soils were found in an area of shallow Mispah and Glenrosa soil forms. Generally the soil depth is less than 200 mm. No high or medium potential soils were found; the land is not arable because it has shallow and rocky soils" (Index (Pty) Ltd, 2021, pp. 10-11).

3.1.4 LAND USE AND COVER

The primary land use and cover within the assessment footprint is woodlands, with old fields / fallow lands and formal residential areas occurring along the north-eastern and north-western edges of the assessment footprint, respectively (Figure 3.5). The PPC mining area is found approximately 1 km to the south west of the assessment footprint (Figure 3.5).

3.1.5 DRAINAGE, RIVER AND WETLAND ECOSYSTEM CONTEXT

The assessment footprint falls entirely within Quaternary Catchment A32E, situated in the lower reaches of the Marico River. The lower Marico is part of the Limpopo Water Management Area (WMA). Within this quaternary catchment, three main tributaries drain into the Marico River, which in turn drain into the Crocodile River. These are the Lenkwane, the Lengope la Kgamanyane and the Elandslaagtespruit tributaries, which occur more than 15 km north to north-west of the proposed development site. A few non-perennial drainage lines occur within the vicinity of the proposed development site, however, all of these fall more than 500 m of the assessment boundary (Figure 3.6). A number of artificial wetlands also occur within the broader area, with two of these falling within 500 m of the assessment boundary. These include an open reservoir to the north and a dam to the east (Figure 3.6).

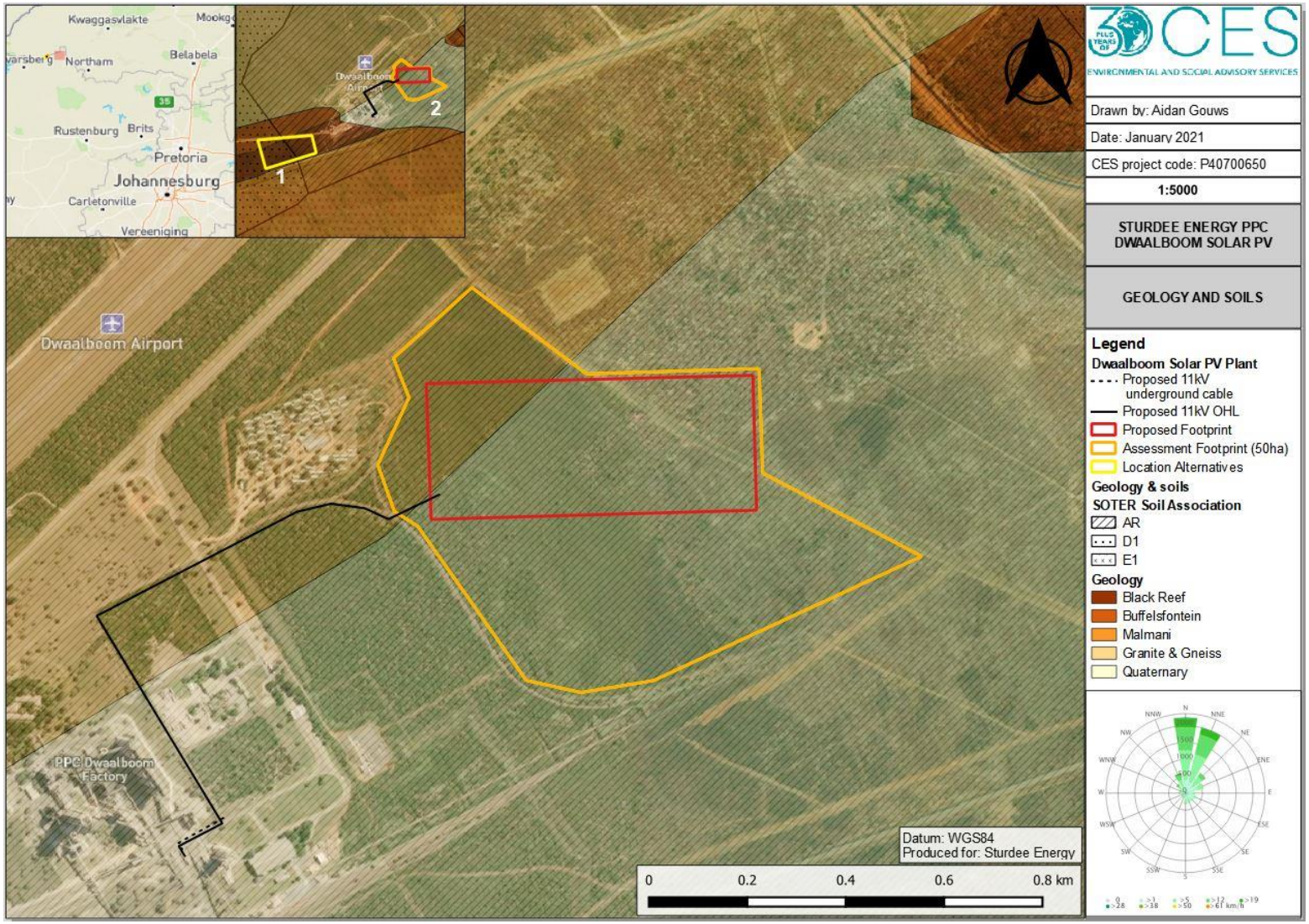


Figure 3.4: Geology and soil map of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

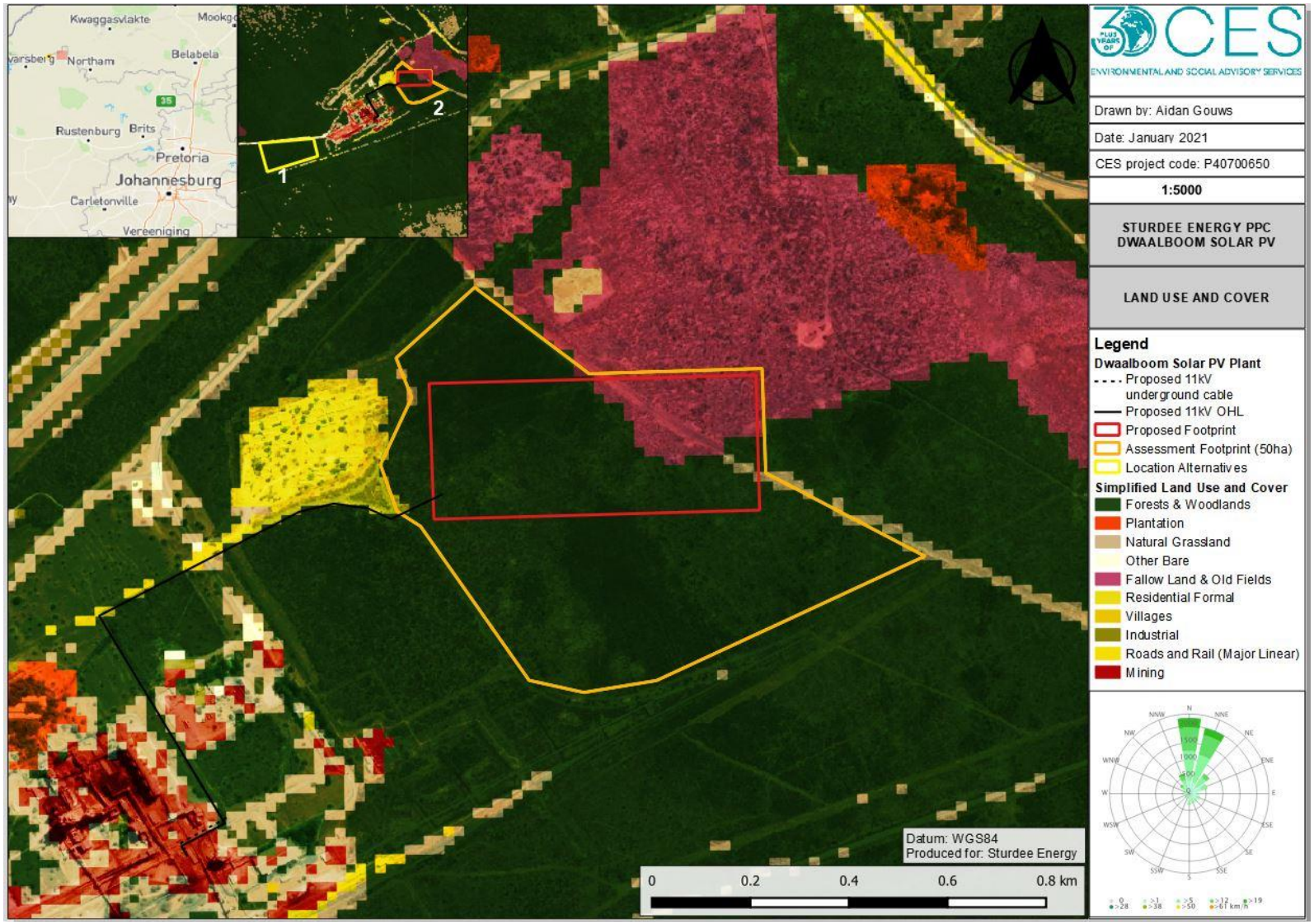


Figure 3.5: Land use and cover map of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

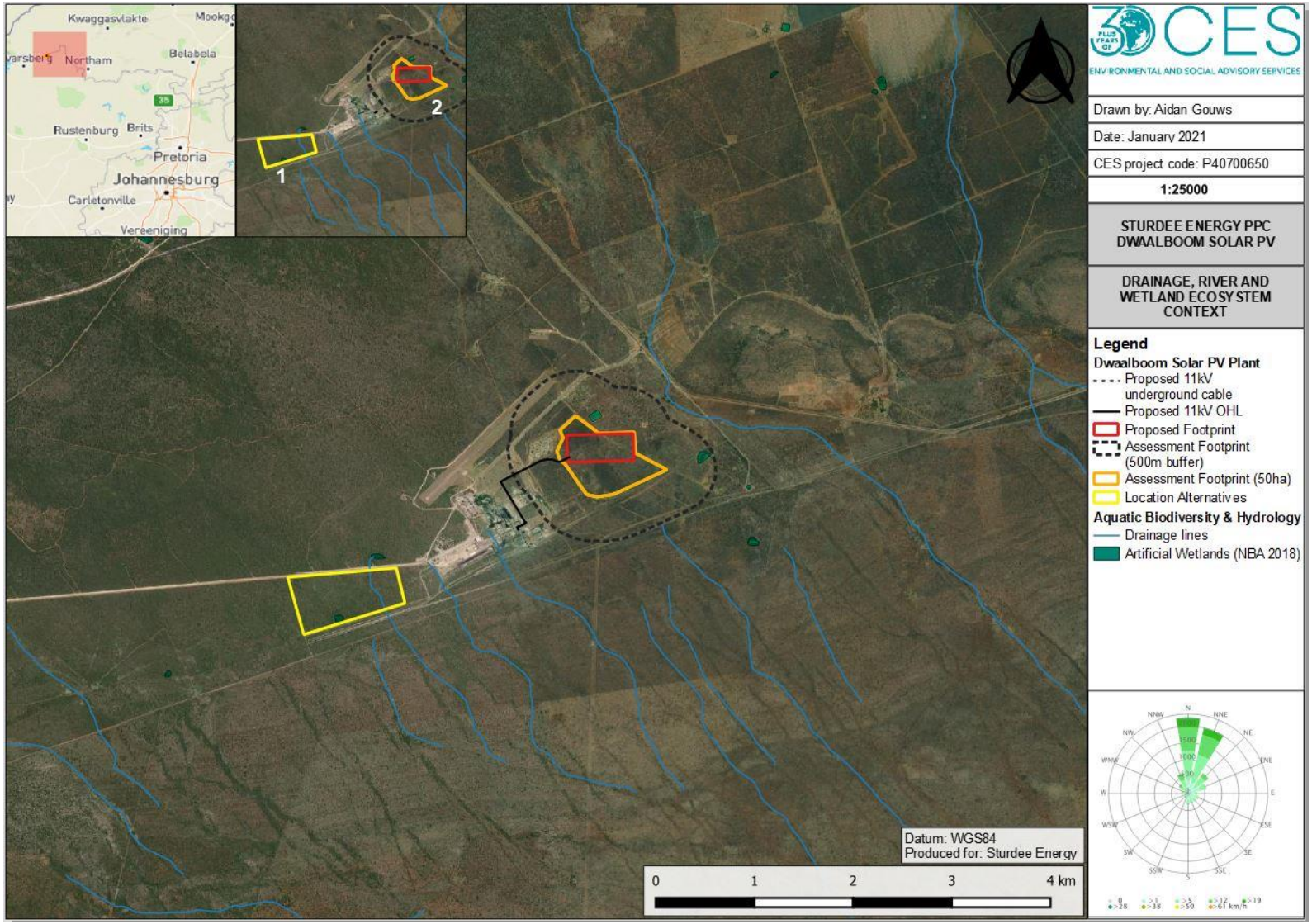


Figure 3.6: Drainage, River and Wetland map of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

3.1.6 SCREENING TOOL: SENSITIVE TERRESTRIAL BIODIVERSITY AND SPECIES

According to the results of the Screening Report generated for the proposed solar PV plant, the relative terrestrial biodiversity theme sensitivity is classified as VERY HIGH due to portions of the site occurring within an Ecological Support Area (ESA) 1 (Figure 3.7). The Department of Forestry, Fisheries and the Environment (DFFE) pre-application screening tool recently included a category for species specific environmental assessment to ensure the inclusion of specific flora and fauna species in the environmental assessment process (SANBI, 2020).

The screening report illustrates that in terms of plant species sensitivity, the site falls within a low sensitivity area (Figure 3.8). The screening report illustrates that the proposed project area (EIA application area) in relation to animal species is of low to medium sensitivity (Figure 3.9) (DFFE, 2020). Only one sensitive animal species was recorded by the screening tool, namely Sensitive animal species A, which carries a medium sensitivity due to its status as a 'Vulnerable' animal species in terms of the Red Data List. This species is near-endemic to South Africa, inhabiting the rocky hillsides of mixed Acacia / Combretum woodlands, tropical Bushveld and Thornveld, ranging from dense, short shrubland to open tree savanna (Hofmeyr & Boycott, 2017). Its distributional ranges extend from the north-eastern parts of the North West Province, eastwards through northern Gauteng and adjacent parts of Mpumalanga and northwards into Limpopo, south of the Soutpansberg (Broadley & Boycott, 2008; TTWG, 2017).

Figure 3.7: Terrestrial biodiversity theme sensitivity for the proposed project area (DFFE, 2020).

Figure 3.8: Plant species sensitivity for the proposed project area (DFFE, 2020).

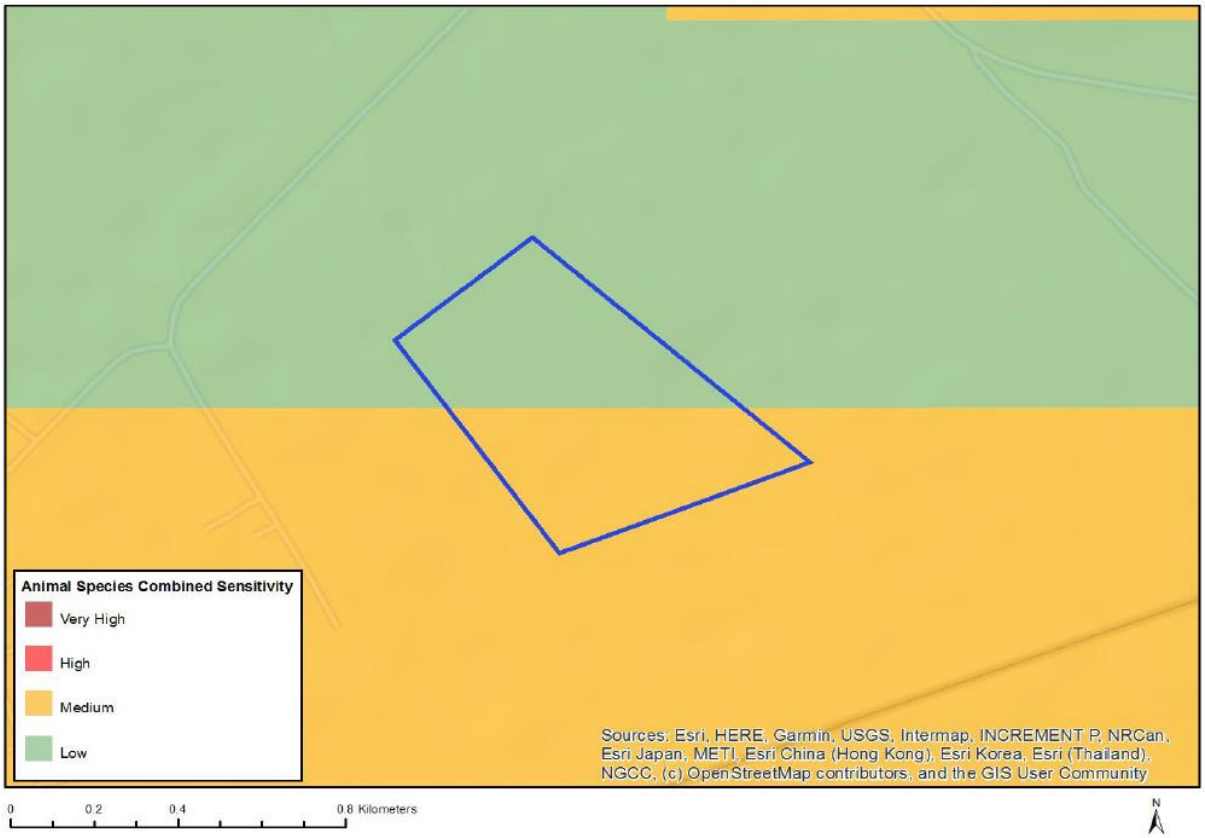


Figure 3.9: Animal species sensitivity for the proposed project area (DFFE, 2020).

3.1.7 DESCRIPTION OF VEGETATION AND FLORA

3.1.7.1 NATIONAL VEGETATION MAP

The PPC Dwaalboom site falls within the Western Sandy Bushveld, with Madikwe Dolomite Bushveld occurring approximately 600 m south and Dwaalboom Thornveld occurring approximately 2.5 km west of the assessment footprint (Mucina & Rutherford, 2018). According to the NBA (2018), most of the assessment unit has retained its natural bushveld vegetation, with the exception of the area corresponding to the old fields / fallow lands along the north-eastern edge of the site (Figure 3.10).

The **Western Sandy Bushveld** occurs along flats and undulating plains in the Limpopo and North West Provinces, extending northwards from Assen past Thabazimbi to Steenbokpan, along the western side of the Waterberg Mountains (Mucina & Rutherford, 2018). The bushveld is characterised by a tall open woodland to low woodland, dominated by *Senegalia erubescens*, *Combretum apiculatum* and *Terminalia sericea*, with other common woody species including *Euclea undulata, Dichrostachys cinerea, Grewia flava* and *Sclerocarya birrea* subsp. *caffra* (Mucina & Rutherford, 2018). Dominant graminoids include *Anthephora pubescens, Digitaria eriantha* subsp. *eriantha* and *Eragrostis pallens* (Mucina & Rutherford, 2018). In terms of its conservation status, this vegetation type is categorised as "Least Concern" (NBA, 2018).

The **Madikwe Dolomite Bushveld** occurs in the North West and Limpopo Provinces, in the region of Ramotswa in the west, running eastwards towards Tlhapitse, Maakane and Modimong (Mucina & Rutherford, 2018). These landscapes are characterised by gentle ridges and low hills, dominated by species such as *Combretum apiculatum* and *Kirkia wilmsii*, with other important woody species including *Sclerocarya birrea* subsp. *caffra*, *Ozoroa paniculosa, Searsia lancea*, *Searsia leptodictya* and *Ziziphus mucronata*. Dominant graminoids include *Enneapogon scoparius* and *Heterpogon contortus*. This vegetation type is categorised as "Least Concern" (NBA, 2018).

The **Dwaalboom Thornveld** occurs around Dwaalboom on the flats north of the Dwarsberge and the associated ridges west of the Crocodile River, as well as to the south, running eastwards from Nietverdiend to Northam, in the North West and Limpopo Provinces (Mucina & Rutherford, 2018). This vegetation type is characterised by a scattered thorny shrub layer, dominated by species such as *Senegalia erubescens, Vachellia nilotica* and *Vachellia tortilis*, with a near continuous grassy layer, dominated by, *inter alia*, *Aristida biparta*, *Digitaria eriantha* subsp. *eriantha* and *Panicum maximum* (Mucina & Rutherford, 2018). In terms of its conservation status, this vegetation type is also categorised as "Least Concern" (NBA, 2018).

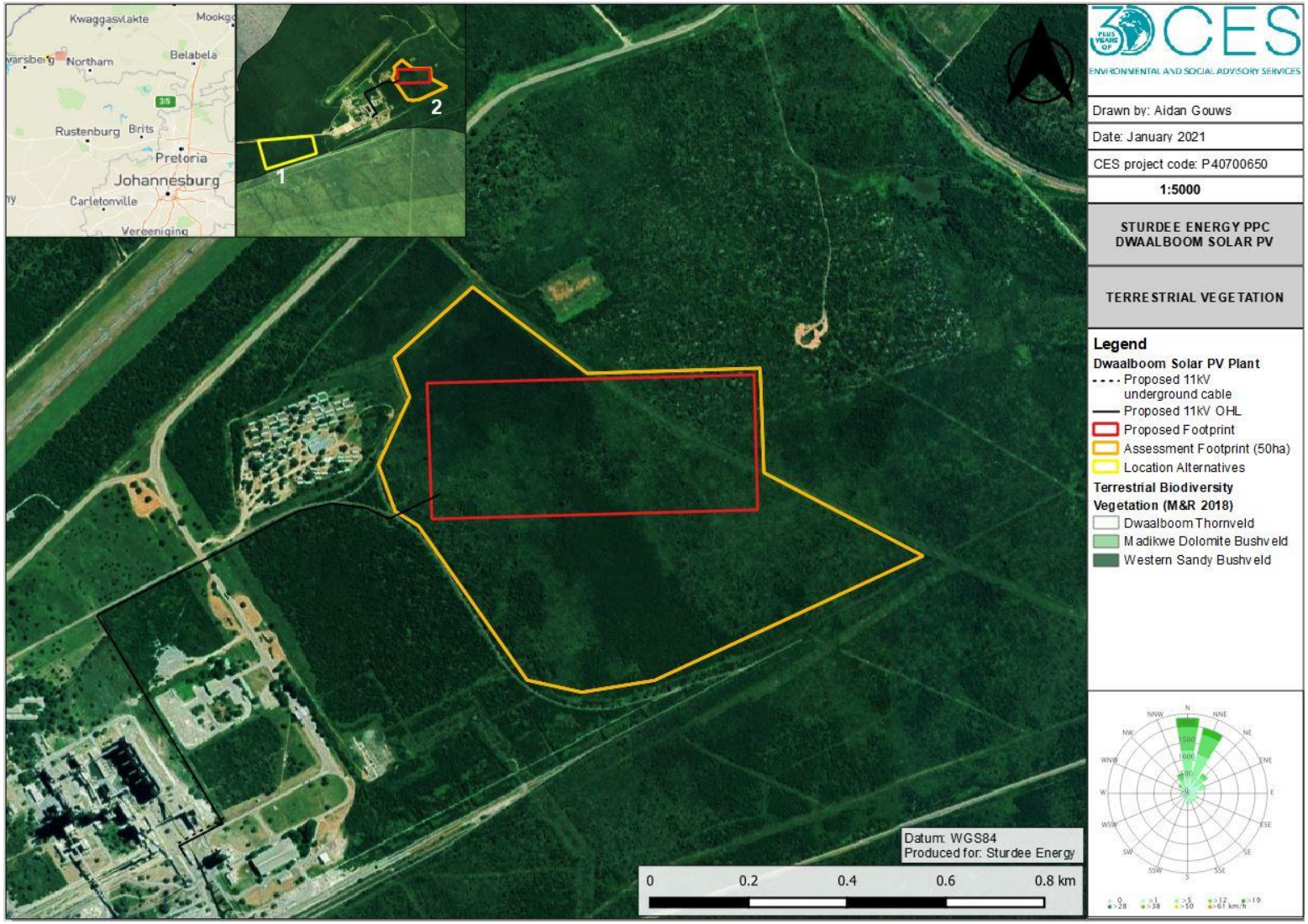


Figure 3.10: Mucina & Rutherford Vegetation map of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

3.1.7.2 SPECIES OF CONSERVATION CONCERN

Plant species of conservation concern (SCC) comprise those species that are either threatened (Critically Endangered, Endangered, Vulnerable), rare or declining. The South African National Biodiversity Institute (SANBI) Plants of Southern Africa (POSA) plant database (http://posa.sanbi.org) was consulted (Figure 3.11), along with the categories indicated in the SANBI Threatened Species Programme website (http://redlist.sanbi.org/index.php) to identify potential SCCs within the proposed study area. In addition to SANBI, the international IUCN Red Data list, the Threatened or Protected Species (TOPS) list, LEMA (No. 7 of 2003) and Convention on International Trade in Endangered Species (CITES), was consulted to compile a list of plant SCCs that may potentially be found within the study area.

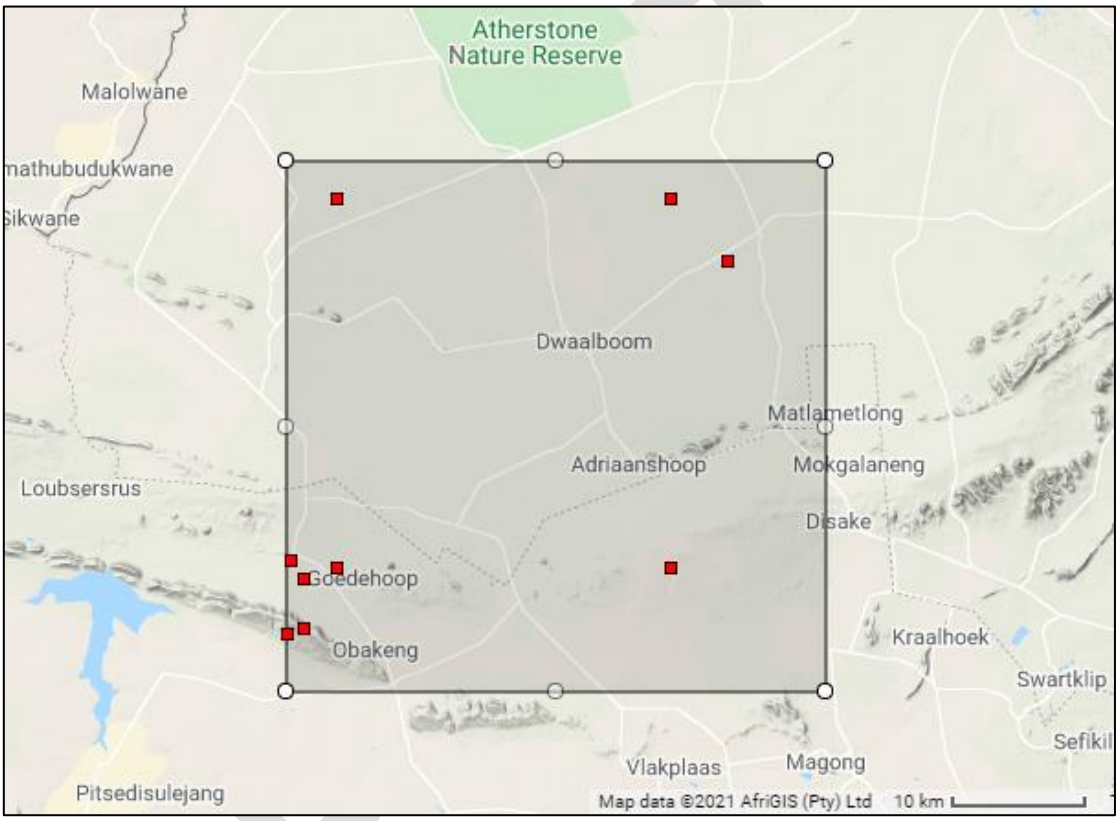


Figure 3.11: POSA search area highlighting botanical records (red).

No records of plant SCCs were found using the POSA search. However, one South African endemic species was noted, namely *Crotalaria obscura*. If any SCCs are found on site during the construction phase, then these species may require permits for their destruction and/or relocation. A full list of the potential species found within the study area is included in Table 9.1.

3.1.7.3 ALIEN INVASIVE SPECIES

Only one alien species was recorded in the area according to the POSA search, namely *Dichanthium aristatum*. Although a non-indigenous, naturalised species, it is not categorised as an invasive species and is not classified in terms of the NEMBA's Alien Invasive Species Regulations (2014).

3.1.8 DESCRIPTION OF FAUNA

South Africa is a faunally diverse country, with approximately 1 663 terrestrial vertebrate faunal species of which 850 species are birds, 343 species are mammals, 350 species are reptiles and 120 species are amphibians spread across seven biomes and 122 million km². The Limpopo Province is home to approximately 234 reptile species, 63 amphibian species, 299 mammal species and 675 bird species (ADU, 2021; Lepage, 2021). Since a separate avifaunal study has been undertaken, birds are not discussed further in this report.

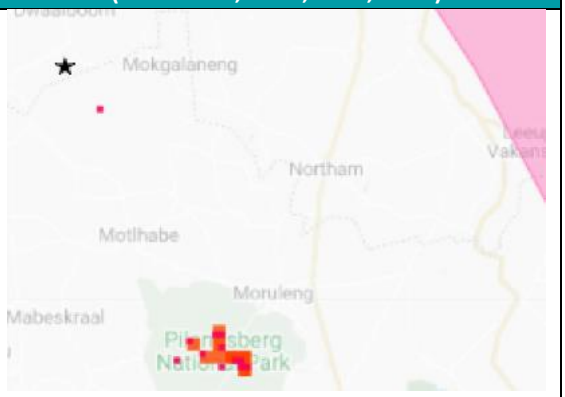
3.1.8.1 AMPHIBIANS

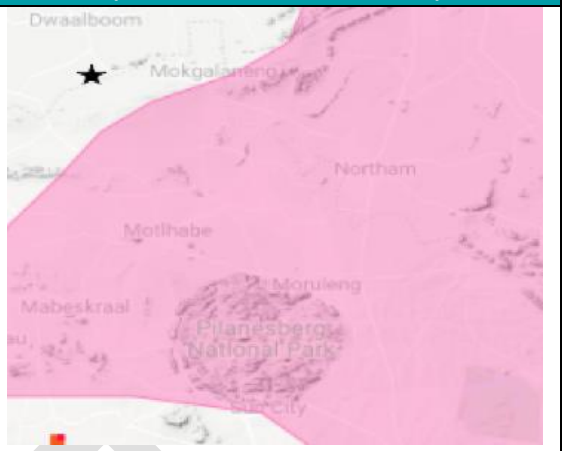
Of the 63 amphibian species in Limpopo Province, 27 species have a distribution range which includes the proposed development site (ADU, 2021; iNaturalist, 2021; IUCN, 2021). No SCCs are likely to be found on site and species likely to occur on site are all listed as of least concern. A full list of amphibian species with a distribution range which includes the proposed development area is provided in Table 10.1.

3.1.8.2 REPTILES

The Limpopo Province is home to 234 reptile species (ADU, 2021), 60 of which have a distribution which includes the proposed development site (ADU, 2021; iNaturalist, 2021; IUCN, 2021). Only two of these species, *Crocodylus niloticus* and Sensitive animal species A, are considered SCCs due to their vulnerable status (Table 3.1). All other species are listed as of least concern. A full list of reptile species with a distribution range which includes the proposed development area is provided in Table 10.2.

Table 3.1: Reptilian SCC distributional ranges (pink area) and observations (orange squares – iNaturalist 2021, pink squares – GBIF 2021) in relation to the project area (black star).

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
Crocodylus niloticus (Nile Crocodile)	VU (RSA)	The Nile Crocodile inhabits swamps, lakes, rivers, river mouths and coastal estuaries throughout southern, eastern and northern Africa, from Zinkwazi River south of the Tugela River in KwaZulu-Natal northwards into Swaziland, Mpumalanga, Limpopo, northern Gauteng and adjacent parts of North-West Province (Turner & Marais, 2017). It was regionally listed as Vulnerable in South Africa due to declines in estimated total population size of more than 30% over three generations (Turner & Marais, 2017).	 The site lacks any suitable aquatic habitat for the species and falls outside its known distributional range (iNaturalist, 2021). The likelihood of its occurrence within the project areas is therefore low.

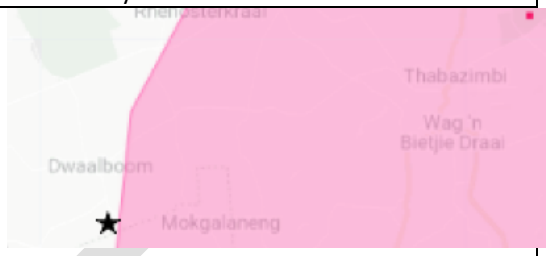
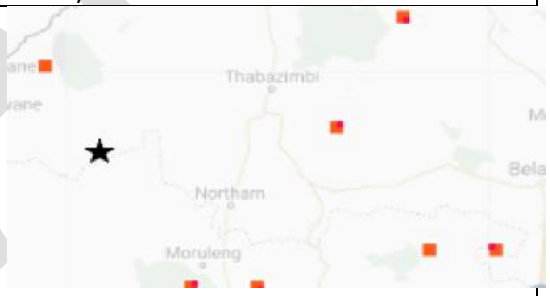
SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
Sensitive animal species A	VU	Sensitive animal species A is near-endemic to South Africa, inhabiting the rocky hillsides of mixed *Acacia* / *Combretum* woodlands, tropical Bushveld and Thornveld, ranging from dense, short shrubland to open tree savanna (Hofmeyr & Boycott, 2017). Its distributional ranges extends from the north-eastern parts of the North West Province, eastwards through northern Gauteng and adjacent parts of Mpumalanga and northwards into Limpopo, south of the Soutpansberg (Broadley & Boycott, 2008; TTWG, 2017).	 The proposed development site falls approximately 10 km from the closest edge of this species' known range. Although the distribution range indicates that it is possible that this species may occur within the project area, the likelihood of its occurrence is moderate due to the absence of rocky outcrops and hillside habitats.

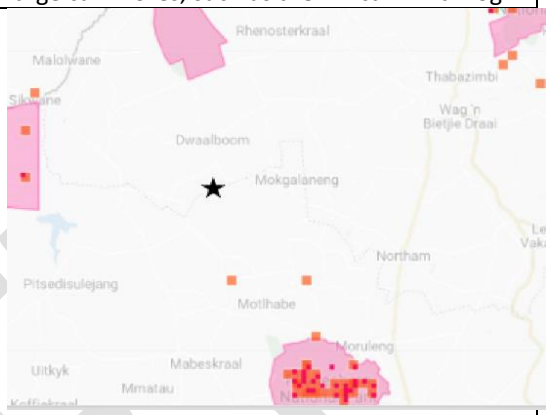
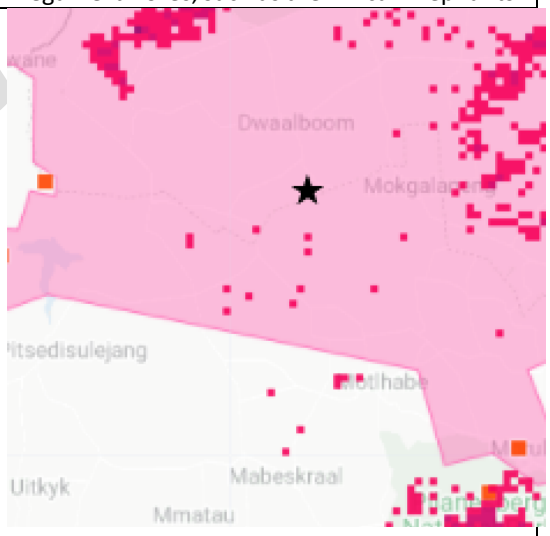
3.1.8.3 MAMMALS

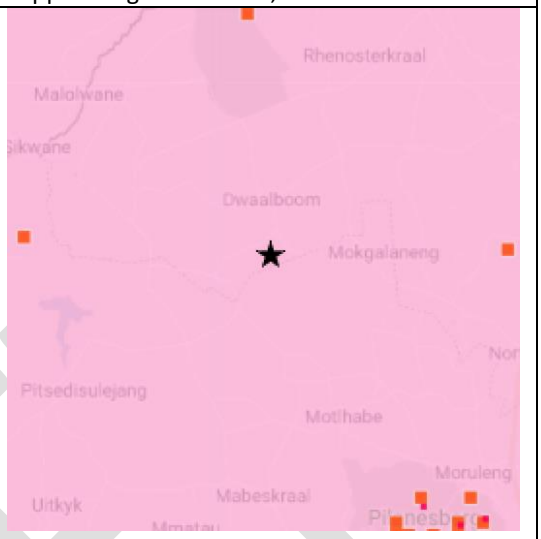
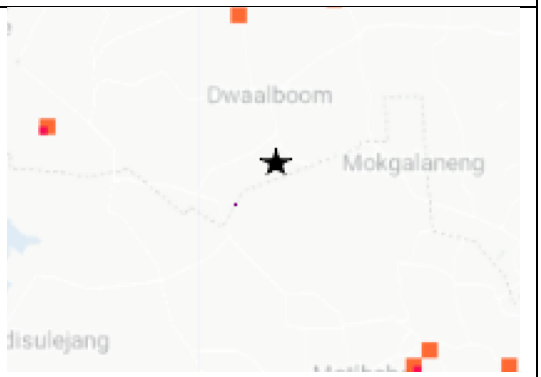
Of the 299 mammal species which occur in the Limpopo Province, 151 have a distribution which includes the proposed development site (ADU, 2021; iNaturalist, 2021; IUCN, 2021). Fifteen mammalian SCCs have distributional ranges which include the site and/or nearby areas. These include two critically endangered, four endangered and nine vulnerable species (Table 3.2). Due to the high density of sickle bush, restricting movement within and through the site, as well as the lack of suitable habitats, it is unlikely that large mammals occur on site. A full list of mammal species with a distribution range which includes the proposed development area is provided in Table 10.3.

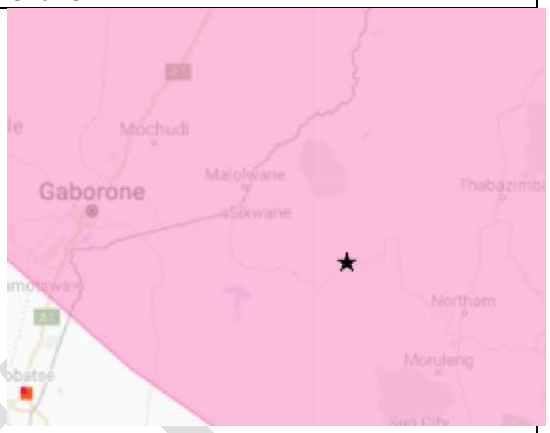
Table 3.2: Mammalian SCC distributional ranges (pink area) and observations (orange squares – iNaturalist 2021, pink squares – GBIF 2021) in relation to the project area (black star).

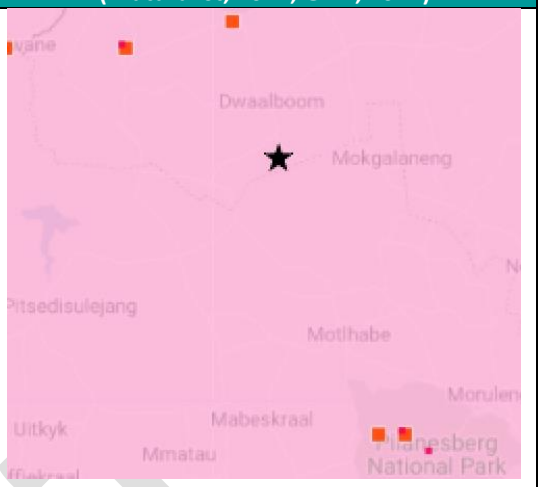
SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
Damaliscus lunatus lunatus (Common Tsessebe)	VU (RSA)	The Common Tsessebe inhabits floodplains and other grasslands in sub-Saharan Africa. In South Africa, it formerly occurred in the bushveld and lowveld. Currently, it occurs mainly on the basalt plains of northern Kruger National Park. Tsessebe do not occur in forests, arid or montane habitats. Nearly exclusively grazers, they can go for months without drinking in	 The distributional range includes the site (iNaturalist, 2021) and the closest verifiable observation of the species occurred >30 km to the north-west. However, the likelihood of *Damaliscus lunatus lunatus* occurring within the

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
		the dry season if they are feeding on growing grass (IUCN SSC Antelope Specialist Group, 2016).	project area is low, because this species does not typically occur outside of protected areas or near developed areas due to increased noise and activity.
Hippotragus equinus and *Hippotragus equinus equinus* (Roan Antelope)	EN (RSA)	The Roan Antelope is a water-dependent browser and grazer, found in the savanna, woodlands, grasslands, bushveld and lowveld of southern Africa (IUCN SSC Antelope Specialist Group, 2017).	 The species is known to occur within the vicinity of the Thabazimbi Local Municipality (iNaturalist, 2021) and the closest verifiable observation of the species occurred approximately 120 km to the north-east of the site. However, the likelihood of *Hippotragus equinus* occurring within the project area is low because, this species also typically does not occur outside of protected areas or near developed areas due to increased noise and activity.
Hippotragus niger niger (Sable Antelope)	VU (RSA)	The Sable Antelope is a savanna woodland browser/grazer species. It frequents the woodland/grassland ecotone, spending the wet season in grassy wooded areas and the dry season in the grasslands in search of green grass and forbs (IUCN SSC Antelope Specialist Group, 2017).	 *Hippotragus niger niger* is a particularly rare species and generally only occurs within protected areas, such as national parks and game reserves. The closest verifiable observation of the species occurred >35 km to the north-west of the site, near the Atherstone Nature Reserve. Its likelihood of occurrence on site is therefore low.
Lycaon pictus pictus (African Wild Dog)	EN	African Wild Dogs are generalist predators, occupying a range of habitats including short-grass plains, semi-desert, bushy savannas and upland forest. It appears that their current distribution is limited primarily by human activities and the availability of prey, rather than by the	 The likelihood of *Lycaon pictus* occurring within the project area is low, as this species is typically

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
		loss of a specific habitat type **Invalid source specified.**.	limited to fenced-off game reserves and protected areas such as the Madikwe Nature Reserve to the west and Pilanesburg National Park to the south. Additionally, the site falls adjacent to current and historical land use activities and lacks sufficient prey to support large carnivores, such as the African Wild Dog.
Loxodonta africana (African Savanna Elephant)	VU	African Savanna Elephants occupy a variety of habitats ranging from montane forest, miombo and mopane woodland, thicket, savanna and grasslands to arid deserts and a wide altitudinal range from mountain slopes to oceanic beaches (Gobush, et al., 2021).	 Most mega-herbivores in South Africa are confined to fenced-off parks and reserves (e.g. Atherstone, Madikwe and Pilanesburg). As such, the likelihood of *Loxodonta africana* occurring within the project area is therefore low. Additionally, the site lacks a sufficiently large habitat and carrying capacity to support mega-herbivores, such as the African Elephants.
Acinonyx jubatus and *Acinonyx jubatus jubatus* (Cheetah)	VU	Cheetahs are found in a wide range of habitats and ecoregions, ranging from dry forest and thick scrub through to grassland and hyper-arid deserts. They are only absent from tropical and montane forest. Cheetah appear to show relatively low habitat selectivity compared with other carnivores**Invalid source specified.**.	 The distribution range includes the site (iNaturalist, 2021) and the closest verifiable observation of the species occurred approximately 10 km to the south-west. However, the likelihood of *Acinonyx jubatus* occurring within the project area is low, as this species is typically limited to fenced-off game

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
			reserves and protected areas. Additionally, the site falls adjacent to current and historical land use activities and lacks sufficient prey to support large carnivores, such as the Cheetah.
Panthera pardus and *Panthera pardus pardus* (Leopard)	VU	Leopards have a wide habitat tolerance and highly varied diet. Their habitats include woodland, grassland savanna and mountain habitats but they also occur widely in coastal scrub, shrubland and semi-desert **Invalid source specified.**.	 *Panthera pardus* may occur on site because PPC staff have reportedly observed a Leopard in the surrounding area. Its distribution range includes the site (iNaturalist, 2021) and the closest verifiable observation of the species occurred approximately 30 km to the north, near Atherstone Nature Reserve. It is unlikely that the species is using the project area as a breeding ground. It is likely using the site as a corridor and possibly as a hunting ground for small mammals. The likelihood of a Leopard occurring within the project area is therefore moderate.
Giraffa camelopardalis giraffe (South African Giraffe)	VU	Giraffes are most often found in savanna/ woodland habitats, but range widely throughout Africa. They are browsers that subsist on a variable diet that includes leaves, stems, flowers, and fruits. They do not need to drink on a daily basis. Acacia is fed on in high proportions wherever Giraffes are found, but during the dry season, the preferred plant species varies by location. Faidherbia, Boscia, Grewia, and Kigelia have all been identified as the most common plant species in the diet of giraffes in the dry	 Most mega-herbivores in South Africa are confined to fenced-off parks and reserves (e.g. Atherstone, Madikwe and Pilanesburg). As such, the likelihood of *Giraffa camelopardalis giraffe* occurring within the project area is therefore low. Additionally, the site lacks a

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
		season in different locations **Invalid source specified.**.	sufficiently large habitat and carrying capacity to support mega-herbivores, such as the Giraffe.
Cloeotis percivali (Percival's Trident Bat)	EN (RSA)	Percival's Trident Bat occurs in savanna areas where there is sufficient cover in the form of caves and mine tunnels for day roosting (Taylor, 2000). It feeds exclusively on moths, and appears to be very sensitive to disturbance (Monadjem, et al., 2017).	 *Cloeotis percivali's* distribution range includes the site (iNaturalist, 2021). Despite the lack of suitable habitats on site with sufficient cover for roosting (such as caves and mine tunnels), the site is possibly used as a feeding ground. The likelihood of the species occurring within the project area is therefore moderate to high.
Sensitive animal species B	VU	This is a predominantly solitary, terrestrial species that inhabits mainly savannas and woodlands in low-lying regions with moderate to dense scrub. It also occurs in floodplain grassland, rocky slopes and sandveld. It occurs widely on well-managed livestock farms where it is afforded protection from human persecution, but is absent from croplands and human settlements **Invalid source specified.**. The most important habitat requirements are believed to be a sufficient population of the various ant and termite prey species and the availability of dens or above-ground debris in which to shelter **Invalid source specified.**.	 The likelihood of Sensitive animal species B occurring within the project area is high because, although the closest verifiable observation was recorded north of Thabazimbi, its distributional range includes the site and there is sufficient suitable habitat for the species on site. It is recommended that a search and rescue team be sent ahead of vegetation clearance and construction teams to ensure that no individuals are found on site. This team should focus on checking termite mounds, burrows and dens in particular.

SPECIES	THREAT STATUS	HABITAT	DISTRIBUTION AND OBSERVATIONS (iNaturalist, 2021; GBIF, 2021)
Diceros bicornis and *Diceros bicornis bicornis* (Black Rhino)	CR	Black Rhino occur in a wide variety of habitats from desert areas in Namibia to wetter wooded areas. The highest densities of rhinos are found in savannas on nutrient-rich soils and in succulent Valley Bushveld areas. Black Rhino are browsers and favour small acacia's and other palatable woody species (Grewia's, Euphorbiaceae species, etc.) as well as palatable herbs and succulents. Apart from plant species composition and size structure, Black Rhino carrying capacity is related to rainfall, soil nutrient status, fire histories, levels of grass interference, extent of frost and densities of other large browsers **Invalid source specified.**.	 Due to its critically endangered status, the Black Rhino is primarily confined to fenced-off reserves in South Africa. Its likelihood of occurrence within the site is low. Furthermore, although its distribution range includes the site (iNaturalist, 2021), the closest verifiable observation of the species occurred >100 km to the north-east, near the Pilanesberg National Park. Additionally, the site falls adjacent to current and historical land use activities and lacks a sufficiently large habitat and carrying capacity to support mega-herbivores, such as the Black Rhino.

3.1.9 TERRESTRIAL BIODIVERSITY INDICATORS

3.1.9.1 CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

The purpose of the Limpopo Conservation Plan (LCP, 2013) was to develop a map of Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), the spatial component to provincial bioregional plan. In alignment with the principles of NEMA and NEMBA, the LCP (v2) was designed to support integrated development planning and sustainable development by identifying an efficient set of CBAs that are required to meet national and provincial biodiversity objectives, in a configuration that is least conflicting with other land uses and activities. In general, CBAs are described as natural or near-natural areas that are important for preserving both biodiversity pattern and ecological process, whereas ESAs are semi-natural or transformed areas that at least retain some ecological function. Almost three-quarters of the province is covered by CBAs (40%), ESAs (23%) and Protected Areas (11%) collectively, with the remainder comprised of Other Natural Areas (ONA) (20%) and areas with No Natural Remaining (NNR) habitat (6%).

The assessment footprint falls across an ESA 1 and an ONA in terms of the LCP (Figure 3.12). Although approximately half of the assessment falls within the ESA 1 zone, only about 4.9 ha of the proposed development footprint falls within the ESA, with the remainder falling within the ONA. The

management objective of ESA 1 areas is to "*maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern*" (Desmet, et al., 2013, p. 53). No management objectives are prescribed for ONAs, however, it is recommended that areas with NNR habitat are favoured for more intensive developments (Desmet, et al., 2013). A Terrestrial CBA 2 zone is located approximately 600 m to the south-east of the assessment footprint. Here, the management objective is to maintain the area in a natural state and limit the loss of biodiversity (Desmet, et al., 2013).

The Waterberg District Bioregional Plan (WDBP, 2016) was compiled by the Limpopo Department of Economic Development, Environment and Tourism (LEDET), the South African National Biodiversity Institute (SANBI) and the various stakeholders within the district in 2014/2015 as a district-level revision to the Limpopo Conservation Plan. The WDBP includes both a terrestrial and an aquatic CBA map, which update and supersede the LCP CBA Map for the Waterberg District. More than half of the district is covered by CBAs (51%), with the remainder comprised of ESAs (14.8%), Protected Areas (4.2%) and Conservation Areas (7.6%). The Terrestrial Waterberg CBA map differs somewhat from the LCP CBA map, with the majority of the assessment footprint falling within an ESA 1 (Figure 3.13). According to the WDBP, the management objective of ESA 1 zones is to "*maintain in at least a fair ecological condition as ecologically functional landscapes that retain basic natural attributes*" (Desmet, et al., 2016, p. 42). The proposed development footprint does not fall within an aquatic CBA, ESA, protected or conservation area in terms of the WDBP.

3.1.9.2 ECOSYSTEM THREAT STATUS

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. According to the NEMBA List of threatened ecosystems, the proposed solar PV site does not occur within or near to a threatened ecosystem. These findings are supported by the NBA (2018) Terrestrial ecosystem threat status assessment which confirmed that the ecosystems within and surrounding the project area are classified as Least Concern. The nearest threatened ecosystem identified by the NBA (2018) is the Marikana Thornveld (Endangered) which is located over 80 km south south-east of the project area.

3.1.9.3 PROTECTED AND PRIORITY AREAS

The National Protected Areas Expansion Strategy (NPAES, 2008) was developed to "*achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change*." The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and critical ecological process. The NPAES sets targets for expanding South Africa's protected area network, placing emphasis on those ecosystems that are least protected. The site is not located within an NPAES Focus Area, formal/informal protected area or conservation area (Figure 3.14). The nearest NPAES Focus Area (Limpopo Central Bushveld NPAES Focus Area) is located approximately 27 km north of the study site. The nearest nature reserve is located 15 km to the north and the nearest protected area, as identified by the South African Protected Areas Database (SAPAD, 2020), is located approximately 25 km to the north of the project area (Figure 3.14).

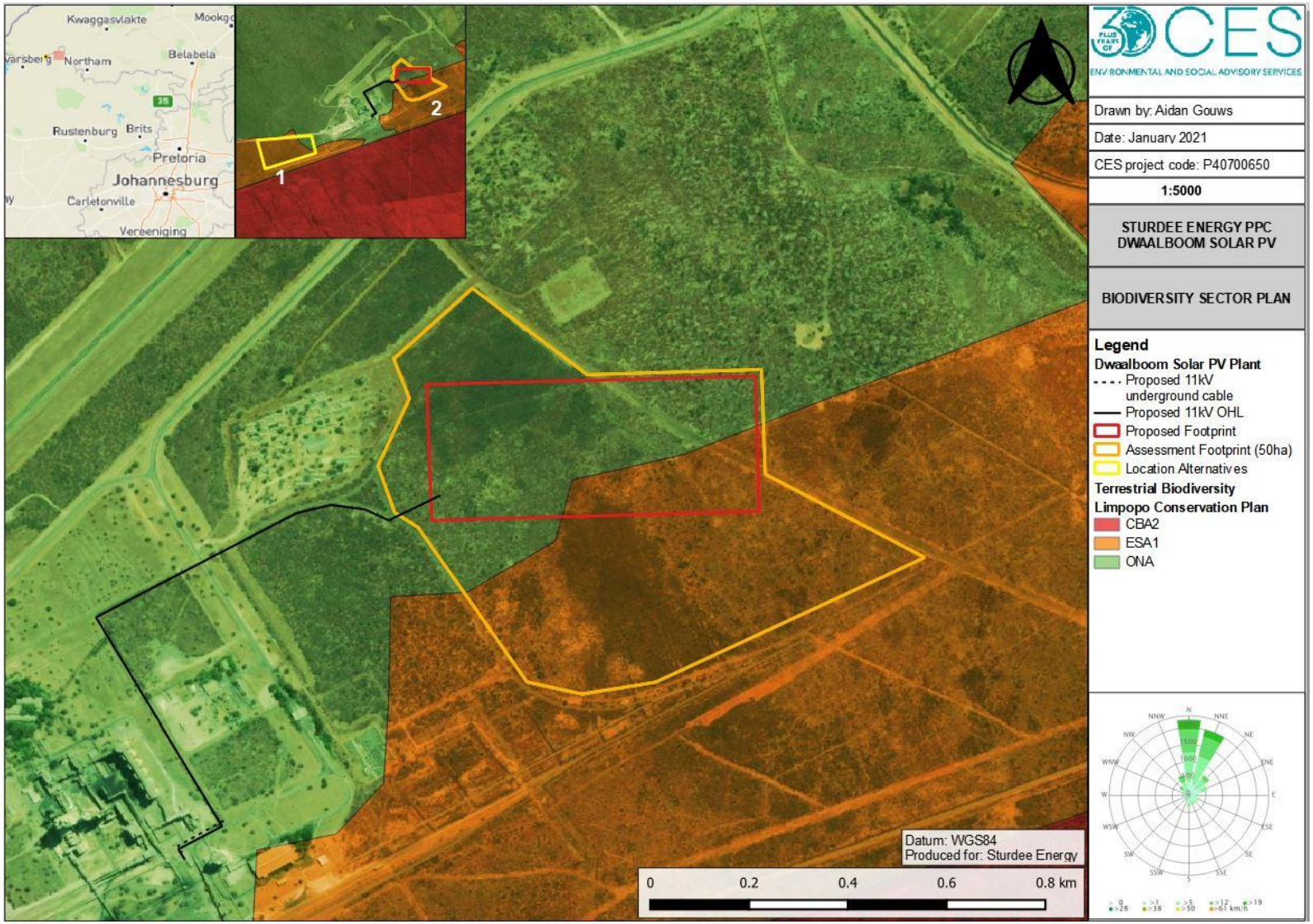


Figure 3.12: Limpopo Conservation Plan (2013) Terrestrial CBAs map of the proposed Solar PV facility.

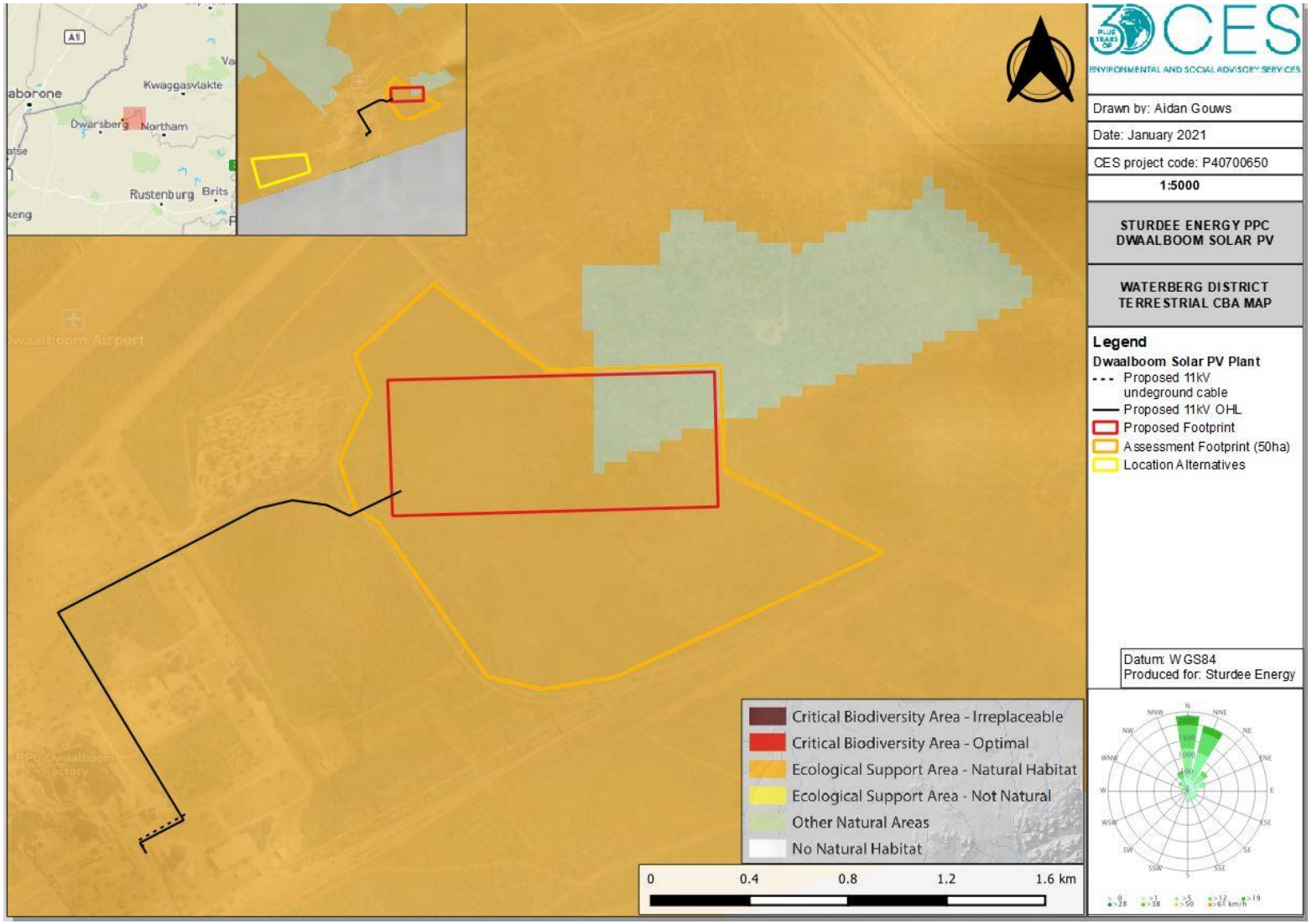


Figure 3.13: Waterberg District Bioregional Plan (2016) Terrestrial CBAs map of the proposed Solar PV facility.

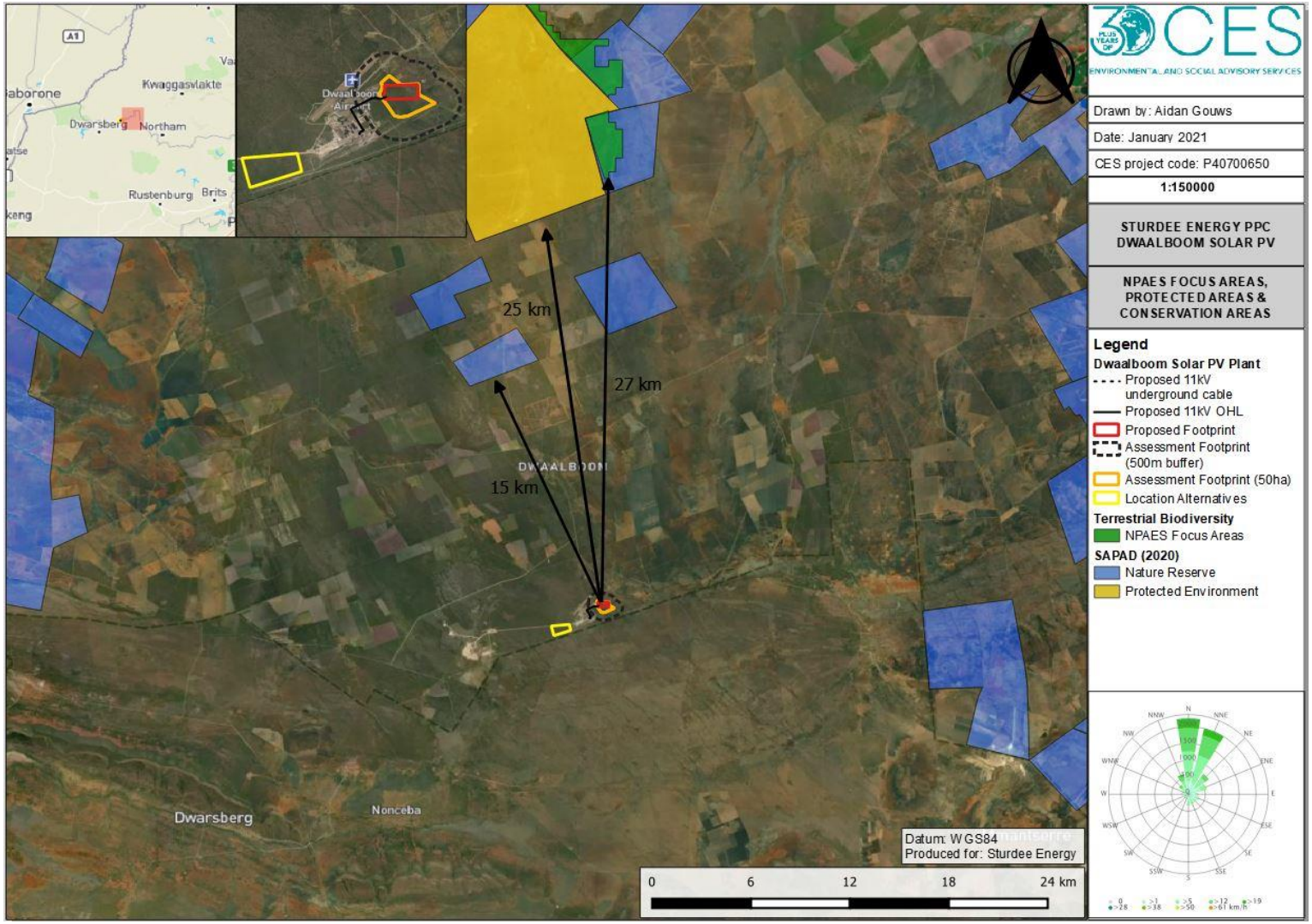


Figure 3.14: NPAES Focus Areas, Protected Areas and Conservation Areas. The site is 15 km from the nearest Nature Reserve, 25 km from the nearest protected area and 27 km from the nearest NPAES

3.2 SITE ASSESSMENT

On completion of the desktop assessment a site visit was conducted on 14 and 15 December 2020, and 22 February 2021. The site visit served to inform potential impacts of the proposed project and to describe the significance of these impacts on the surrounding terrestrial biodiversity and ecology. The vegetation and habitat composition were assessed at 17 sample points within the broader assessment footprint.

3.2.1 VEGETATION TYPES AND LAND USES OBSERVED ON SITE

The vegetation within the assessment footprint was then mapped using a combination of data from the field assessment, the Mucina and Rutherford (2018) vegetation map and aerial imagery from Google Earth (Figure 3.15). The vegetation recorded within the assessment unit exhibited some characteristics of Western Sandy Bushveld (WSB), despite evidence of current and historical disturbance and transformation. Three vegetation subtypes were identified on site, namely the encroached WSB; the disturbed and transformed WSB; and the open, semi-natural WSB. Most of the site is comprised of the encroached WSB, characterised by dense sickle bush (*Dichrostachys cinerea*) thornveld. This is fringed by the disturbed WSB, starting at the entrance to the site in the north and following the access road in a south-easterly and south-westerly direction. The transformed areas include the PPC residential area to the west, and the PPC railway siding and Eskom powerline to the south. The open, semi-natural WSB component falls mainly on the north-eastern side of the access road, with some occurring to along the south-eastern edge of the encroached area. These are further

described in

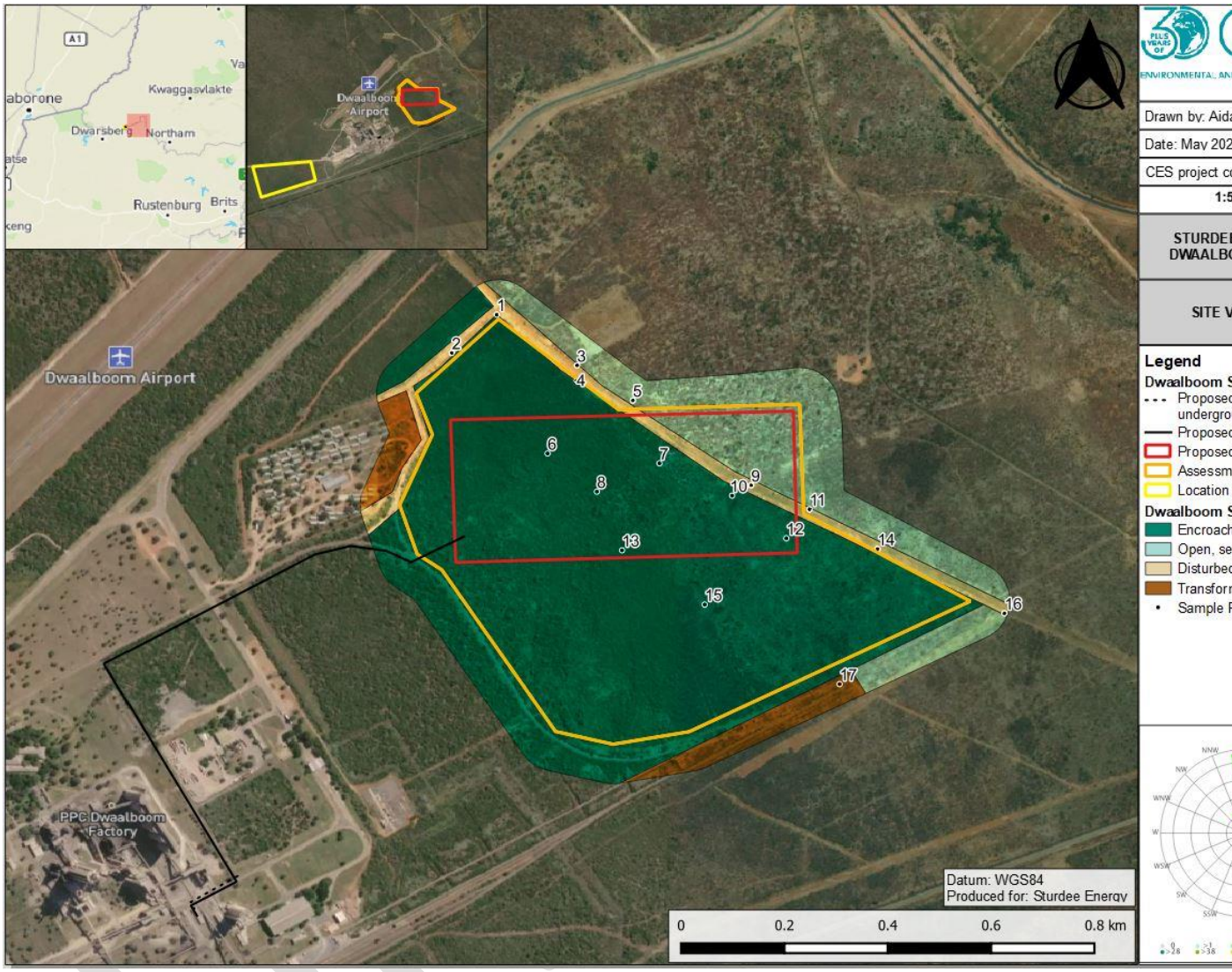


Figure 3.15: Site vegetation map of the proposed Solar PV facility at Dwaalboom, Limpopo (WSB – Western Sandy Bushveld).

Table 3.3 below, along with photographic examples of the species, land uses and general site conditions.

3.2.2 PLANT SPECIES IDENTIFIED ON SITE

A total of 29 plants were identified during the site visit, none of which were Species of Conservation Concern (SCC), with all categorised as "Least Concern". Two species, *Sclerocarya birrea* and *Vachellia erioloba*, are recognised as protected trees under the National Forest Act (NFA), 1998 (Act No. 84 of 1998). In terms of Section 15(1) of the NFA "*no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister of Agriculture, Forestry and Fisheries*." Two species were categorised as AIS, namely *Lantana camara* and *Solanum elaeagnifolium*, both of which are Category 1b. A full list of plant species recorded within the assessment footprint is provided in Table 9.2.

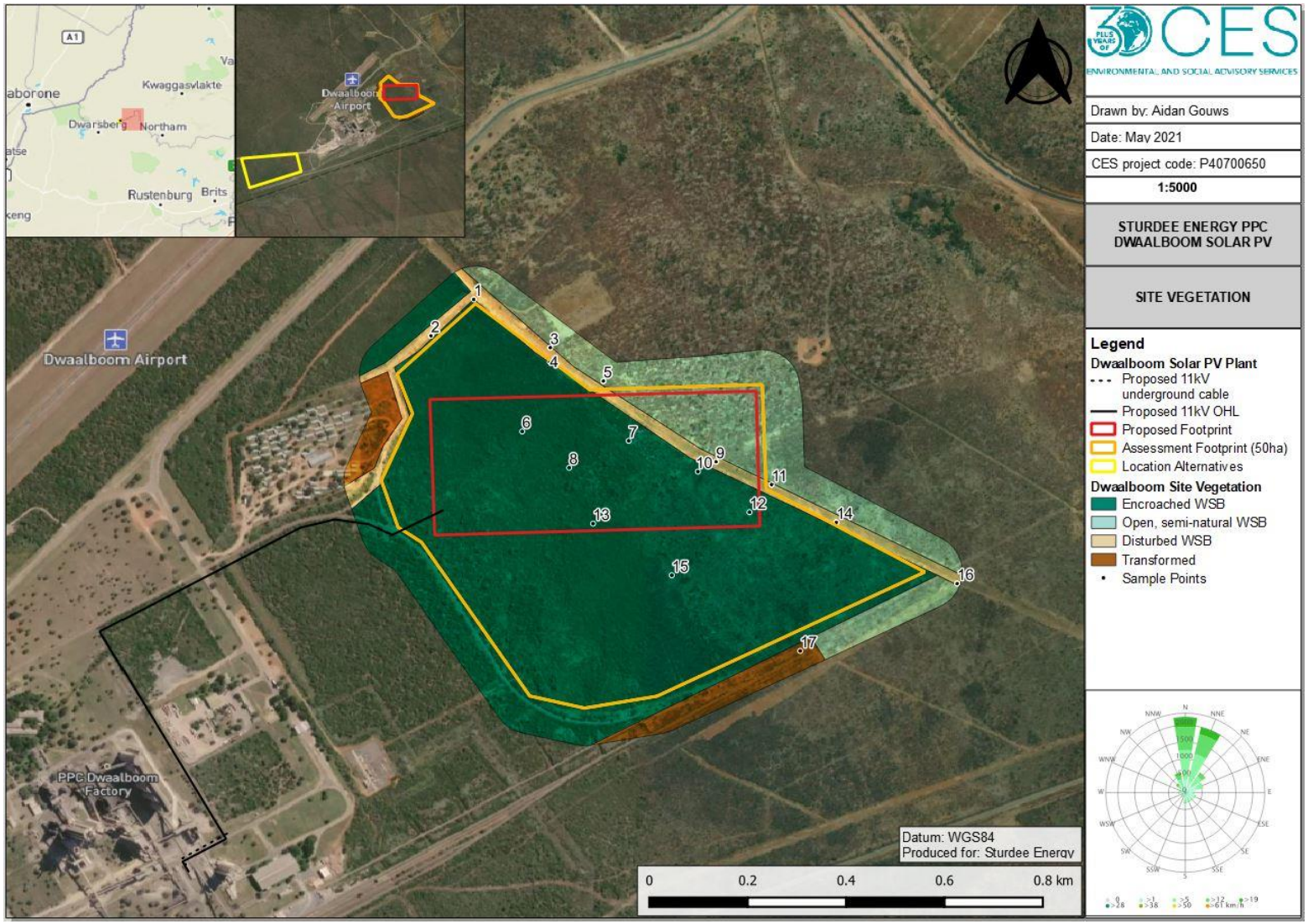


Figure 3.15: Site vegetation map of the proposed Solar PV facility at Dwaalboom, Limpopo (WSB – Western Sandy Bushveld).

Table 3.3: Vegetation survey within the assessment unit of the proposed Dwaalboom Solar PV plant.

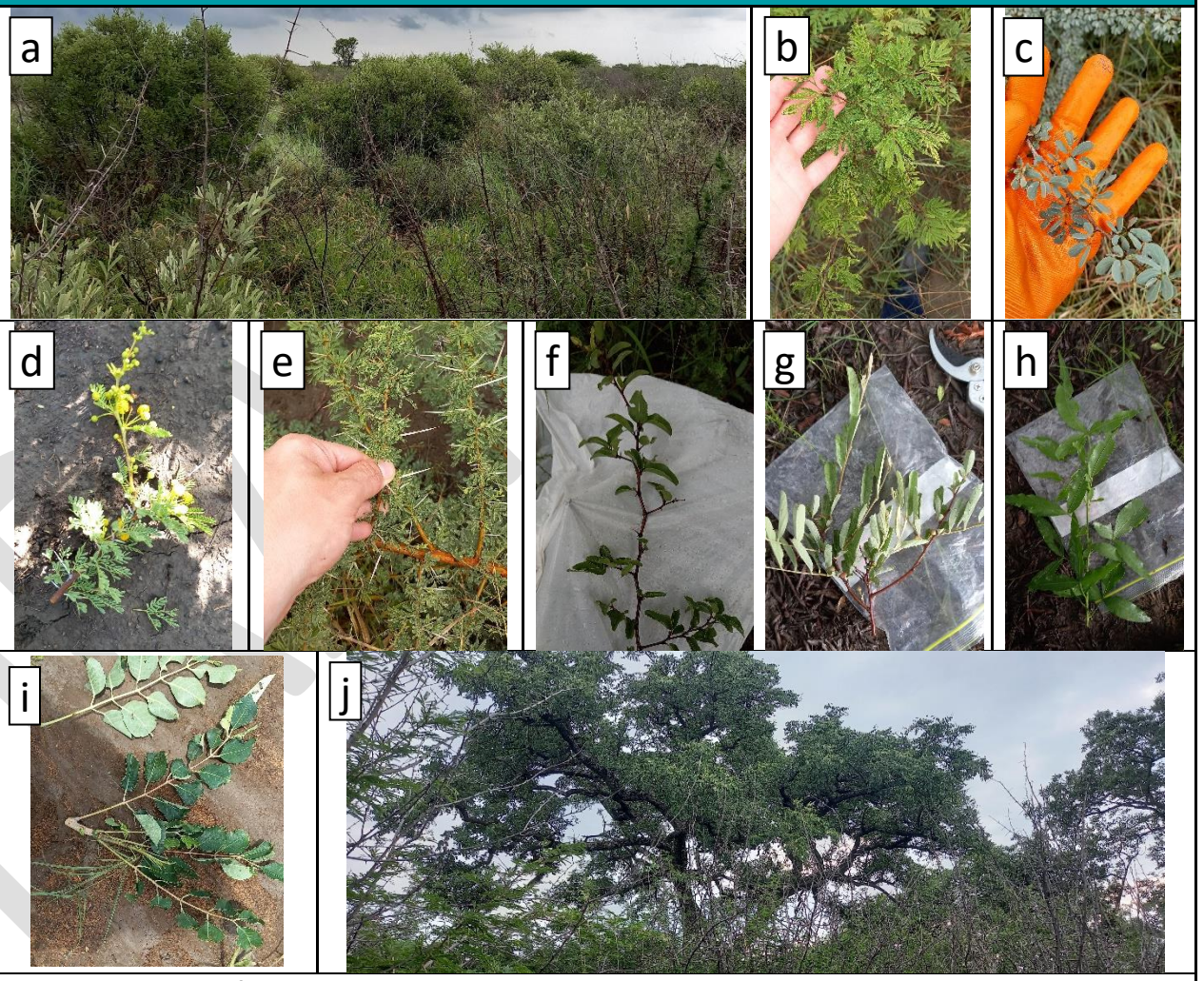
VEG.	VEGETATION DESCRIPTION	PHOTOGRAPHS
Encroached Western Sandy Bushveld	The encroached WSB has a canopy of 2–3 m and is dominated by dense *Dichrostachys cinerea* thornveld (a & b). The understorey is 0.8–1.5 m and is dominated by thorny woody shrubs such as *Senegalia mellifera* (c), *Vachellia erioloba* (d), *Vachellia karroo* (e) and *Ziziphus mucronata* (f), as well as a few scattered non-thorny woody species, such as *Grewia flava* (g), *Searsia leptodictya* (h). Below this, at a height of <0.8 m, the thornveld floor is sparsely vegetated by saplings, weedy herbs (e.g. *Hibiscus trionum* and *Solanum elaegnifolium*) and grasses such as *Panicum repens* and *Setaria sphacelata*. Emergents are approximately 5 m tall and are predominantly *Sclerocarya birrea* (i & j).	

Plate 3.1: Examples of vegetation cover and land-use within the encroached WSB.

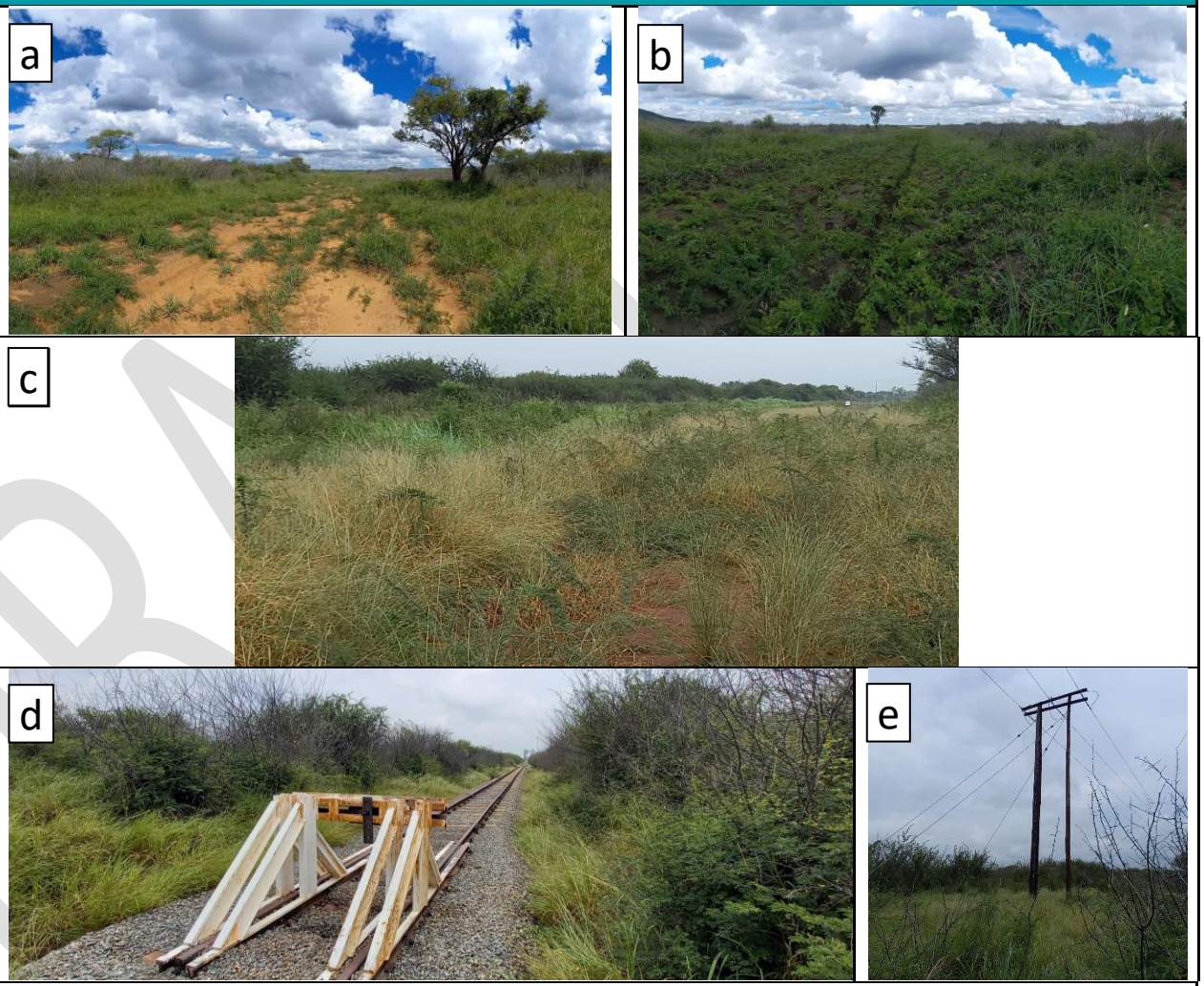
VEG.	VEGETATION DESCRIPTION	PHOTOGRAPHS
Disturbed Western Sandy Bushveld and Transformed Areas	The disturbed WSB areas mainly follow along the access road and immediately adjacent areas. These areas are sparsely- to densely-vegetated by short (<1 m) *Dichrostachys cinerea,* with *Vachellia karroo, Hibiscus trionum* and *Cymbopogon* sp. Photographs a & b were taken during the 14-15 December 2020 site visit and photograph c was taken during the 22 February 2021 site visit, illustrating rapid overgrowth occurring within and along the access road. The transformed areas include the PPC residential area to the west, and the railway line (d) and powerline (e) to the south.	

Plate 3.2: Examples of vegetation cover and land-use within disturbed WSB and transformed areas.

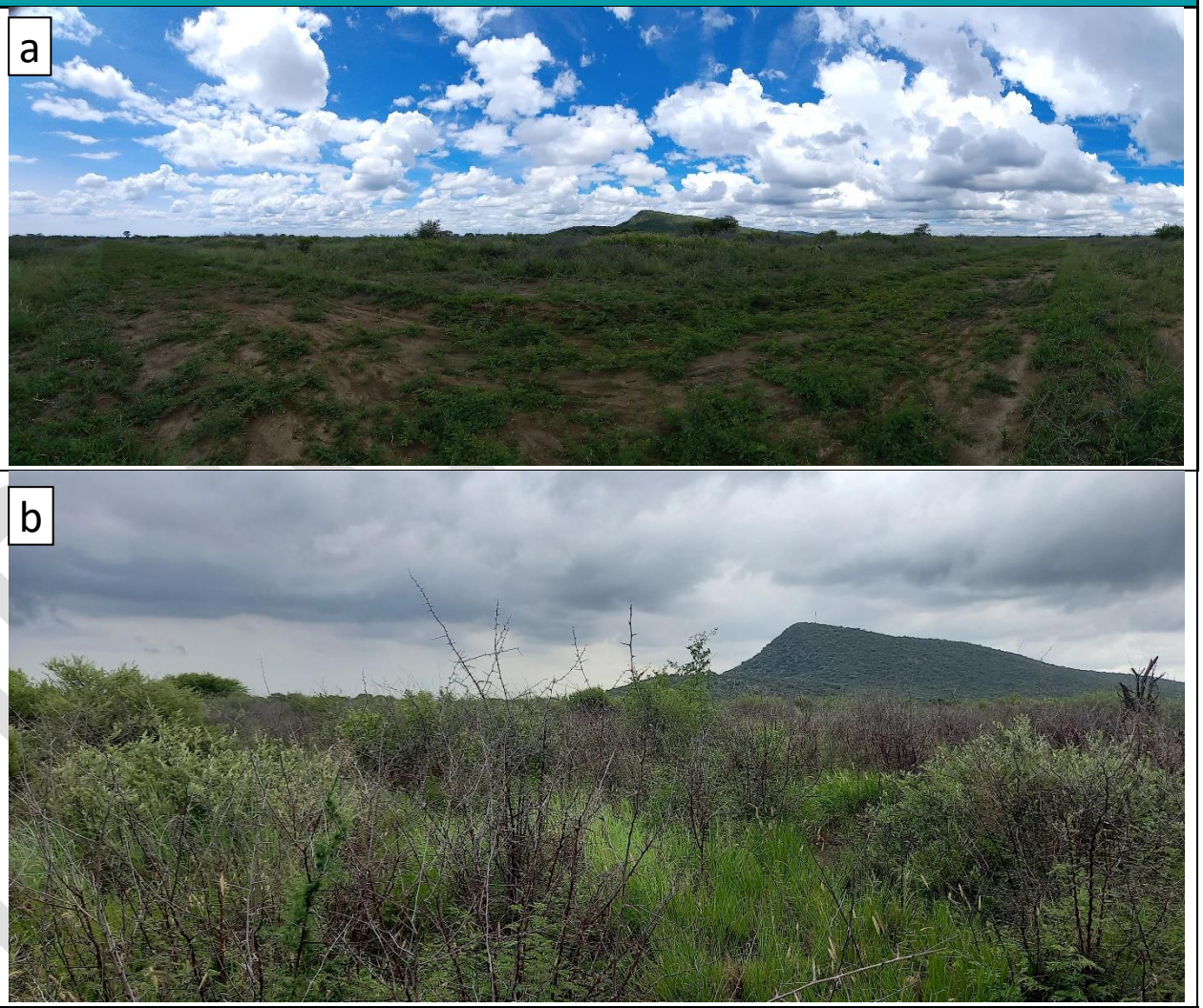
VEG.	VEGETATION DESCRIPTION	PHOTOGRAPHS
Open, semi-natural Western Sandy Bushveld	The open, semi-natural WSB component falls mainly on the north-eastern side of the access road, with some occurring to along the south-eastern edge of the encroached area. These areas were comprised of a similar species composition as the encroached WSB, with a lower canopy height of <2 m and lower density of *Dichrostachys cinerea*, allowing for a greater diversity and coverage of grasses, including *Eragrostis lehmanniana, Fingerhuthia africana, Heteropogon contortus* and *Setaria sphacelata.*	

Plate 3.3: Examples of vegetation cover and land-use within the open, semi-natural WSB.

4 SITE SENSITIVITY

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:

3.1.6. A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant); and

3.1.13. A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate.

The method used to assess site sensitivity has been described in Section 2.3 above. Table 4.1 provides a summary of how each vegetation type was assessed. The encroached WSB was found to be of low sensitivity, due to its low conservation importance, despite the occurrence of two protected tree species within this area (Table 4.1). The open, semi-natural WSB vegetation type has been determined to be of medium sensitivity due to its medium conservation importance, functional integrity and receptor resilience (Table 4.1). Disturbed WSB and transformed areas have been determined to be of low and very low sensitivities, respectively (Table 4.1).

Table 4.1: Evaluation of Site Ecological Importance (SEI) of habitat and SCC

HABITAT/ SPECIES	CONSERVATION IMPORTANCE (CI)	FUNCTIONAL INTEGRITY (FI)	RECEPTOR RESILIENCE (RR)	SEI
Encroached Western Sandy Bushveld	**LOW**	**MEDIUM**	**MEDIUM**	**LOW**
	No confirmed or highly likely populations of SCC or range-restricted species. Some (<50%) remaining natural habitat, but limited potential to support SCC. However, two protected tree species, *Sclerocarya birrea* and *Vachellia erioloba,* are confirmed to occur on site. The removal of these species may not occur without removal permits.	Large (~60 ha) semi-intact, semi-natural area of least concern conservation status, with only narrow corridors of good habitat connectivity or larger areas of poor habitat due to the high density of *Dichrostachys cinerea*. Mostly minor current negative ecological impacts with some major impacts, including the ongoing encroachment and densification of woody species, and a few signs of minor past disturbance. Moderate rehabilitation potential.	A select few species, such as *D. cinerea, S. melifera* and *Vachellia* spp., are anticipated to recover relatively quickly once the impact has been removed. These species are known to encroach into recently disturbed areas and can rapidly regenerate through coppicing (Mucina & Rutherford, 2018). Similar to the spread of alien invasive species, the encroachment of indigenous woody species impacts upon biodiversity, limiting the richness of species restored to the	
Open, semi-natural Western Sandy Bushveld	**MEDIUM**	**MEDIUM**		**MEDIUM**
	Panthera pardus may occur on site because PPC staff have reportedly observed a Leopard in the surrounding area. This species is more likely to occur in the open, semi-natural WSB compared to the densely-encroached WSB. It is likely using the site	Medium (~11 ha) semi-intact, semi-natural area of least concern conservation status. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity.		

HABITAT/ SPECIES	CONSERVATION IMPORTANCE (CI)	FUNCTIONAL INTEGRITY (FI)	RECEPTOR RESILIENCE (RR)	SEI
	as a corridor and possibly as a hunting ground for small mammals. Two protected tree species, *Sclerocarya birrea* and *Vachellia erioloba,* are confirmed to occur on site. The removal of these species may not occur without removal permits. Some natural habitat remains (>50%), but this has limited potential to support SCC.	Minor current negative ecological impacts, with some major impacts, namely woody encroachment, and some signs of minor past disturbance. Moderate rehabilitation potential.	area (Mucina & Rutherford, 2018). It is therefore anticipated that the area will recover relatively slowly in terms of restoring most of the original species composition and ecosystem functionality.	
Disturbed Western Sandy Bushveld	**LOW**	**LOW**		**LOW**
	No confirmed or highly likely populations of SCC or range-restricted species. Some natural habitat remains (<50%), but this has limited potential to support SCC.	Medium (>5 ha) disturbed to transformed area of least concern conservation status, with limited habitat connectivity. Migrations may still be possible along some modified or degraded natural habitat. Several minor and major current negative ecological impacts, including the ongoing encroachment and densification of woody species and use of the access road and railway line. Low rehabilitation potential.		
Transformed Areas	**VERY LOW**	**VERY LOW**		**VERY LOW**
	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.	Small area (~3.6 ha) with no habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.		

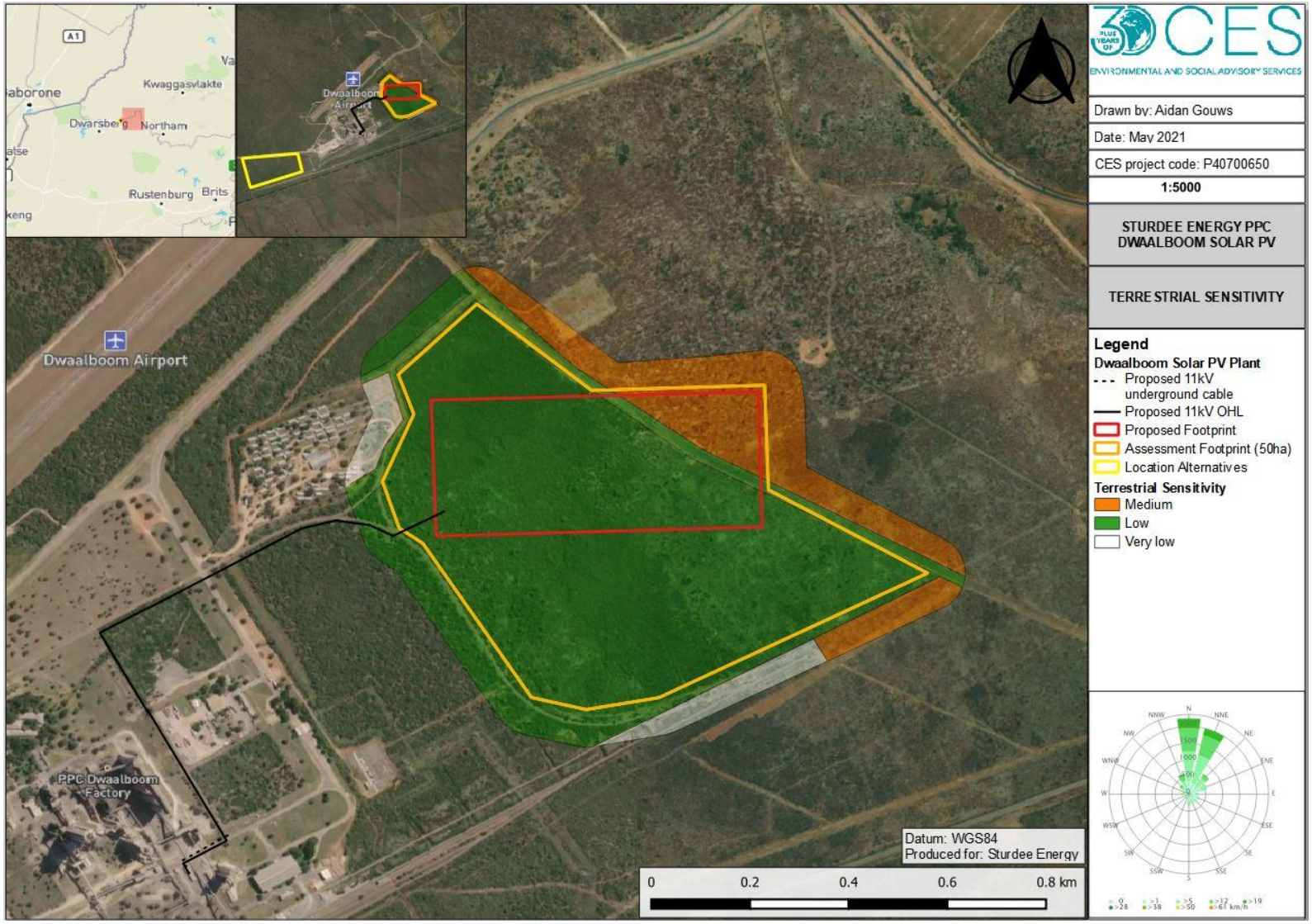


Figure 4.1: Terrestrial biodiversity sensitivity map of the proposed Solar PV facility at PPC Dwaalboom, Limpopo.

5 IMPACT ASSESSMENT

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:

3.1.7. Additional environmental impacts expected from the proposed development;
3.1.8. Any direct, indirect and cumulative impacts of the proposed development;
3.1.9. The degree to which the impacts and risks can be mitigated;
3.1.10. The degree to which the impacts and risks can be reversed;
3.1.11. The degree to which the impacts and risks can cause loss of irreplaceable resources;
3.1.12. Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr).

Impacts that could be a direct or indirect result of the proposed activity were identified for the Planning and Design, Construction, Operation and Decommissioning Phase. These included the consideration of direct, indirect and cumulative impacts that may occur, and also considers the no-go or existing impacts. Table 5.1 below provides a technical scope and summary of the potential issues identified and their applicability to each phase of the proposed development.

An impact assessment was conducted, using the methodology outlined in Section 2.4 and the data collected during the desktop and site assessments, for the planning, construction, operation and decommissioning phases of the proposed development, as well as for the no-go alternative. A breakdown of the assessment and mitigation measures is presented in Table 5.2

Table 5.1: Technical scope of the impacts on the terrestrial biodiversity and ecology for all phases of the proposed solar PV plant.

THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	RECEPTORS	PHASE			
				PLANNING AND DESIGN	CONSTRUCTION	OPERATION	DECOMMISSIONING
Terrestrial biodiversity and ecology	Loss of WSB vegetation	• Layout and design. • Siting of construction activities. • Vegetation disturbance and clearance, including construction vehicle traffic, earthworks, excavation and infilling. • Poor rehabilitation, management and monitoring.	• Abundance, diversity and composition of flora and fauna in development footprint. • Ecological connectivity. • Plant and animal SCCs.	X	X		X
	Loss of Protected Plant Species	• Vegetation disturbance and clearance.	• Floral diversity. • CI, FI, RR and SEI.	X	X		
	Impact on faunal species of conservation concern	• Vegetation disturbance and clearance. • Disturbance, fragmentation and loss of habitats.	• Faunal diversity. • CI, FI, RR and SEI.		X		X
	Reduced Faunal Habitat	• Vegetation disturbance and clearance. • Loss of ecological connectivity and edge effects.	• Faunal diversity. • CI, FI, RR and SEI.		X		
	Disruption of Ecosystem Function and Processes	• Vegetation disturbance and clearance. • Loss of ecological connectivity and edge effects. • Disturbance, fragmentation and loss of habitats.	• Ecological connectivity. • Plant and animal SCCs. • Floral and faunal diversity. • CI, FI, RR and SEI.	X	X	X	X

THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	RECEPTORS	PHASE			
				PLANNING AND DESIGN	CONSTRUCTION	OPERATION	DECOMMISSIONING
	Disturbance to faunal species and potential reduction in abundance and mortality of faunal species	• Vegetation disturbance and clearance. • Noise and vibrations of earthworks. • Encounters with construction machinery. • Disturbance, fragmentation and loss of habitats.	• Faunal diversity. • CI, FI, RR and SEI.		X		X
	Bush encroachment and establishment and/or spread of Alien Plant Species	• Vegetation disturbance and clearance. • Poor rehabilitation, management and monitoring.	• Plant and animal SCCs. • Floral and faunal diversity. • CI, FI, RR and SEI.	X	X	X	X

Table 5.2: Impacts and mitigation measures for all phases of the proposed solar PV plant.

POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
PLANNING AND DESIGN PHASE															
Loss of Western Sandy Bushveld Vegetation	Encroached	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will directly result in the destruction and permanent loss of ~20 ha of Western Sandy Bushveld vegetation. The consequence/severity and significance of this impact depends on the degree of the pre-construction encroachment and disturbance of the vegetation. Impacts associated with semi-natural vegetation will be limited to the project footprint and occur within a vegetation type listed as Least Concern with a fairly wide distribution. As such the impact will be of moderate significance. Since the loss of vegetation is difficult to mitigate due to the permanent loss of this vegetation, this impact will remain of moderate significance even after mitigation measures are implemented.	Negative	Direct	Slight	Localised	Permanent	Definite	Reversible	Resource will be partially lost	Difficult	**LOW -**	Minimize/reduce impact: • During the planning and design phase, the development footprint must be designed to minimize the loss of near-natural indigenous vegetation as far as possible. • The development footprint should be clearly demarcated and only vegetation within the approved footprint may be removed. Vegetation outside of these areas may not be cleared. Remediate/rehabilitate impact: • A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO.	**LOW -**
	Open, semi-natural					Moderate	Localised						**MODERATE -**		**MODERATE-**
	Disturbed					Slight	Localised						**LOW -**		**VERY LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Non-compliance with permitting requirements	Preferred Alternative	During the planning and design phase, the inadequate planning for search and rescue operations and permitting for the removal of any protected species may result in non-compliances being issued and the unintended loss of protected species.	Negative	Direct, indirect	Moderate	Study Area	Long-term	May occur	Irreversible	Resource could be partially lost	Achievable	**MODERATE -**	Avoid/prevent impact: • Planning for any search and rescue operations must be conducted prior to the commencement of construction activities. • All necessary permits must be obtained for the removal of any identified SCC and protected species (including *Sclerocarya birrea* and *Vachellia erioloba*) prior to the commencement of construction activities.	**VERY LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disruption of Ecosystem Function and Processes	Preferred Alternative	The planned layout and siting of construction activities and solar PV infrastructure will result in the disruption of ecosystem functions and processes, including the loss of ecological connectivity and edge disturbance impacts.	Negative	Direct, indirect	Moderate	Study Area	Long-term	Probable	Reversible	Resource could be partially lost	Achievable	**MODERATE -**	Minimize/reduce impact: • During the planning and design phase, the development footprint must be designed to minimize edge disturbance impacts. Preferably, the development footprint will lie adjacent to an existing developed/transformed area, so as to reduce the length of the shared edge with the surrounding near-natural and semi-natural areas. Remediate/rehabilitate impact: • A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Bush encroachment and establishment and/or spread of Alien Plant Species	Preferred Alternative	During the planning and design phase, the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation in sensitive areas during the construction and operational phases.	Negative	Indirect	Moderate	Study area	Long-term	Probable	Reversible	Resource will not be lost	Easily Achievable	**MODERATE -**	Minimize/reduce impact: • An Alien Vegetation Management Plan must be developed by the Contractor prior to construction to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. • The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. Remediate/rehabilitate impact: • A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO.	**LOW -**

POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
CONSTRUCTION PHASE															
Loss of Western Sandy Bushveld Vegetation	Encroached	Preferred Alternative	The clearing of land for the construction of the solar PV plant and associated infrastructure will result in the loss of just under 20 ha of Western Sandy Bushveld Vegetation. Again, the consequence / severity and significance of this impact depends on the degree of the pre-construction encroachment and disturbance of the vegetation. Impacts associated with near-natural and semi-natural vegetation will be limited to the project footprint and occur within a vegetation type listed as Least Concern with a fairly wide distribution. As such the impact will be of moderate significance. Since the loss of vegetation is difficult to mitigate due to the permanent loss of vegetation, this impact will remain of moderate significance even after mitigation measures are implemented.	Negative	Direct	Slight	Localised	Permanent	Definite	Reversible	Resource will be partially lost	Achievable	**LOW -**	Avoid/prevent impact: • Implement mitigation measures during planning and design phase. • Areas of high sensitivity must be avoided. Minimize/reduce impact: • Construction activities must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint. • Construction vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' areas or areas outside the project footprint.	**LOW -**
	Open, semi-natural					Moderate	Localised						**MODERATE-**		**MODERATE-**
	Disturbed					Slight	Localised						**VERY LOW -**		**VERY LOW -**

POTENTIAL ISSUE		ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	All categories		Portions of this vegetation type have already been lost due to historical mining activities and current operation of the PPC Plant to the west. However, the footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC Plant. The additional loss of vegetation will therefore have a Low cumulative impact.	Negative	Cumulative	Slight	Study area	Permanent	Definite	Reversible	Resource will be partially lost	Achievable	**LOW -**	Remediate/rehabilitate impact: • Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). • Only indigenous species must be used for rehabilitation. • The alien invasive management plan for the site must be implemented.	**LOW -**
		No-go alternative	Disturbance from the access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	• No mitigation measures are proposed for the no-go alternative.	**N/A**
Loss of SCC or Protected Plant Species		Preferred Alternative	The permanent loss of SCC or protected plant species, such as *Sclerocarya birrea and Vachellia erioloba*, will occur.	Negative	Direct, indirect	Moderate	Regional	Permanent	Definite	Irreversible	Resource may be partially lost	Difficult	**MODERATE -**	Avoid/prevent impact: • A botanical walkthrough of the final layout is recommended to avoid impacting any SCCs and protected species (including *Sclerocarya birrea* and *Vachellia erioloba*) where feasible. Laydown areas, offices and parking lots can	**MODERATE -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		If populations of SCC are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be moderate as some SCC may have already been impacted upon as a consequence of mining that is currently occurring in the region. This impact can be reduced if a thorough botanical walkthrough of the site is undertaken during the optimum flowering season.	Negative	Cumulative	Moderate	Study area	Permanent	May occur	Irreversible	Resource will be lost	Achievable	**MODERATE -**	be repositioned to avoid impacting these trees. This must be done during the flowering season. • All necessary permits must be obtained for the removal of any identified SCCs and protected species (including *Sclerocarya birrea* and *Vachellia erioloba*) prior to the commencement of construction activities. • If restricted range SCC populations are found, the development must be shifted to avoid these populations. • The ECO must monitor for potential additional plant SCCs not found during search and rescue activities. • No plant SCCs may be removed from the development footprint unless the relevant permits have been obtained.	**LOW -**
	No-go alternative	Disturbance from the access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	• No mitigation measures are proposed for the no-go alternative.	**N/A**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Impact on faunal species of conservation concern	Preferred Alternative	The loss of animal species of conservation concern may occur during the construction phase.	Negative	Direct, indirect	Moderate	Localised	Permanent	May occur	Irreversible	Resource may be partially lost	Achievable	**MODERATE -**	Avoid/prevent impact: • All clearing activities must deploy search and rescue teams in-front of clearing machinery to assist in relocating slower moving faunal species e.g. tortoises. The following mitigation measures are recommended specifically for Sensitive animal species A: • Search and rescue deployed ahead of clearance, including diurnal active searches (during spring to early autumn if feasible). • Intact habitat patches where these species are known to occur (rocky outcrops and hillsides) should be buffered from disturbance taking into account connectivity to other similar habitat, or at least habitats that these species will utilise for migration and dispersal purposes. • The minimum buffer requirement is 30 m. However, a 100 m buffer is recommended for high impact activities.	**LOW -**
		If populations of SCC with restricted ranges are present within the site and are impacted by the placement of infrastructure, the cumulative impact will be high as some SCC have already been lost as a consequence of mining that is currently occurring in the region.	Negative	Cumulative	Severe	Study area	Permanent	May occur	Irreversible	Resource will be lost	Achievable	**HIGH -**		**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Disturbance from the access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	• No mitigation measures are proposed for the no-go alternative.	**LOW -**
Reduced Faunal Habitat	Preferred Alternative	During the construction phase, the construction related activities will result in the loss and/or degradation of natural habitats for fauna.	Negative	Indirect, Cumulative	Moderate	Study area	Long-term	Definite	Reversible	Resource will be partially lost	Achievable	**MODERATE -**	Minimize/reduce impact: • The contractor must ensure that vegetation clearance of semi-natural vegetation is restricted to the approved development footprint only. • Construction vehicles and machinery must not be permitted outside of the development footprint, as much as practically possible. • If feasible, clearing of trees should take place in winter months to avoid disturbing birds and bats that nest and rear young in the spring and summer months. • Employees must be prohibited from making open fires during the construction phase. • The ECO must monitor that all construction activities are conducted within the development footprint.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		Portions of habitat have already been lost due to historical land use and ongoing bush encroachment. The footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC facility. The additional loss of habitats will therefore have a Low cumulative impact.	Negative	Cumulative	Slight	Study area	Permanent	Definite	Irreversible	Resource will not be lost	Achievable	**LOW -**	Remediate/rehabilitate impact: • All impacted areas must be rehabilitated as per the Rehabilitation Plan, as soon as construction has been completed within each area.	**LOW -**
	No-go alternative	Disturbance from the dirt access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	• No mitigation measures are proposed for the no-go alternative.	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Disruption of Ecosystem Function and Processes	Preferred Alternative	Construction activities will result in the disruption of ecosystem functions and processes, including the loss of ecological connectivity and edge disturbance impacts. Fragmentation is one of the most important impacts on vegetation as it creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. It also impacts on fauna as it separates habitats and necessitates fauna having to move across exposed areas like roads to get to another section of their habitat or territory. This impact occurs when more and more areas are cleared, resulting in the isolation of functional ecosystems, which results in reduced biodiversity and reduced movement due to the absence of ecological corridors.	Negative	Direct, indirect	Moderate	Study Area	Permanent	Definite	Reversible	Resource could be partially lost	Achievable	**MODERATE-**	Avoid/prevent impact: • Implement mitigation measures during planning and design and construction phases. Minimize/reduce impact: • The contractor must ensure that vegetation clearance of semi-natural vegetation is restricted to the approved development footprint only. • Construction vehicles and machinery must not be permitted outside of the development footprint, as much as practically possible. • Employees must be prohibited from making open fires during the construction phase.	**MODERATE-**
		Portions of ecosystem have already been disrupted due to historical land use and ongoing bush encroachment. The footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC facility. The additional disruption caused by the construction of the solar PV plant will be of moderate significance.	Negative	Cumulative	Moderate	Study area	Permanent	Definite	Irreversible	Resource will not be lost	Achievable	**MODERATE -**	Remediate/rehabilitate impact: • A rehabilitation plan must be implemented during construction and operation phases. • All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and revegetated, where applicable.	**MODERATE -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Under the no go alternative, the disruption of ecosystem function and processes has already occurred and will continue to do so while operational activities take place at the adjacent PPC Plant.	Negative	Direct	Moderate	Study Area	Permanent	Definite	N/A	N/A	N/A	**MODERATE -**	No mitigation measures are proposed for the no-go alternative.	**N/A**
Disturbance to faunal species and potential reduction in abundance and mortality of faunal species	Preferred Alternative	Faunal species will be disturbed during construction due to noise and vibrations of construction machinery. Faunal species that vacate the immediate area may return following completion of construction or new individuals or species may inhabit the area. Construction machinery may cause unintentional mortalities of faunal species. Even with the mitigations applied, the construction will still have an impact on faunal species.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	**MODERATE -**	Minimize/reduce impact: • Vehicles and machinery must meet best practice standards. • Staff and contractors' vehicles must comply with speed limits of 40 km/hr • Project must start and be completed within the minimum timeframe, i.e. may not be started and left incomplete. • Traffic calming measures such as speed restrictions must be implemented. • Staff induction must include information on speed limits and that vehicles must stop when they encounter snakes crossing the road. The vehicle must wait until the snake has moved off the road before continuing on. • ECO to walk ahead of clearing construction machinery and move slow moving species e.g. tortoises out of harm's way and into	**MODERATE -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		Portions of habitat have already been lost due to historical land use and ongoing bush encroachment. The footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC facility. The additional loss of habitats will therefore have a Low cumulative impact.	Negative	Cumulative	Slight	Study area	Permanent	Definite	Irreversible	Resource will not be lost	Achievable	**LOW -**	suitable neighbouring habitat. • Any faunal species that may die as a result of construction must be recorded (photographed, GPS coordinate captured) and if somewhat intact preserved and donated to SANBI. • Any faunal species observed onsite must be recorded (photographed, GPS coordinate captured) and loaded onto iNaturalist. • The HSE officer must check trenches daily for faunal species (including snakes) that may have fallen inside. If faunal species are found, these must be recorded and removed to suitable habitat out of harm's way. • Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.	**LOW -**
	No-go alternative	Disturbance from the dirt access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	No mitigation measures are proposed for the no-go alternative.	**N/A**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Bush encroachment and establishment and/or spread of Alien Plant Species	Preferred Alternative	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of encroaching and undesirable alien plant species. The infestation of alien plant species will result in the displacement of indigenous vegetation and possible local extinctions of species. This pre-mitigation impact is of high significance but can easily be managed through the implementation of an alien invasive management plan.	Negative	Indirect	Severe	Study area	Long-term	Probable	Reversible	Resource will not be lost	Easily Achievable	**HIGH -**	Minimize/reduce impact: • The Contractor must implement the Alien Vegetation Management Plan. The ECO must monitor for the adequate implementation of this plan. • The ECO must monitor the site for the presence of alien invasive plant species and take immediate action when these are recorded. • It is recommended that the ECO prepare a photo guide of all invasive plant species likely to occur on site. This will aid in the identification of undesirable species. Remediate/rehabilitate impact: • All previously infested areas must be rehabilitated as per the Rehabilitation Plan, to the satisfaction of the appointed ECO, as soon as construction has been completed within each area.	**LOW -**
		Existing disturbance from the access road and railway line, illegal dumping and bush encroachment will likely be exacerbated by the additional impacts of the construction of the proposed solar PV plant. This will be of moderate significance.	Negative	Cumulative	Moderate	Study area	Long-term	Probable	Irreversible	Resource will not be lost	Achievable	**MODERATE -**		**LOW -**
	No-go alternative	Disturbance from existing bush encroachment and alien species on site will probably continue should the proposed solar PV project not go ahead. This will have a moderate negative impact on the site.	Negative	Direct	Moderate	Study area	Long term	Probable	N/A	N/A	N/A	**MODERATE -**	No mitigation measures are proposed for the no-go alternative.	**N/A**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
OPERATIONAL PHASE														
Disruption of Ecosystem Function and Processes	Preferred Alternative	Operational activities, such as routine maintenance, may result in the disruption of ecosystem functions and processes, including the disturbance of vegetation and faunal habitats, as well as edge disturbance impacts. Assuming the appropriate mitigation measures are adopted during the planning and design and construction phases, the severity of the operational phase impacts will be relatively low.	Negative	Direct, indirect	Slight	Localised	Medium-term	May occur	Reversible	Resource could be partially lost	Easily achievable	**LOW -**	Avoid/prevent impact: • Implement mitigation measures during planning and design and construction phases. Minimize/reduce impact: • Monitoring and maintenance vehicles must not be permitted outside of the development footprint, as much as practically possible. Remediate/rehabilitate impact: • The rehabilitation plan must be implemented during operation phases.	**VERY LOW -**
		Portions of habitat have already been lost due to historical land use and ongoing bush encroachment. The footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC facility. The additional loss of habitats will therefore have a Low cumulative impact.	Negative	Cumulative	Slight	Study area	Permanent	Definite	Irreversible	Resource will not be lost	Achievable	**LOW -**		**LOW -**
	No-go alternative	Disturbance from the access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	No mitigation measures are proposed for the no-go alternative.	**N/A**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Bush encroachment and establishment and/or spread of Alien Plant Species	Preferred Alternative	During the operation phase, the failure to manage encroaching and alien vegetation could result in widespread bush encroachment and invasion of alien vegetation.	Negative	Direct, indirect	High	Study Area	Long-Term	May occur	Reversible	Resource could be partially lost	Easily achievable	**HIGH-**	Avoid/prevent impact: • Implement mitigation measures during planning and design and construction phases. Minimize/reduce impact: • The Alien Vegetation Management Plan must continue to be implemented. • The site should be monitored on a regular basis to ensure that no alien vegetation establishes on site. Remediate/rehabilitate impact: • Any alien vegetation found during monitoring should be removed as per the Alien Vegetation Management Plan and the area should be appropriately rehabilitated in alignment with the Rehabilitation Plan.	**VERY LOW -**
		Existing disturbance from the dirt access road and railway line, illegal dumping and bush encroachment will likely be exacerbated by the additional impacts of the construction of the proposed solar PV plant. This will be of moderate significance.	Negative	Cumulative	Moderate	Study area	Long-term	Probable	Irreversible	Resource will not be lost	Achievable	**MODERATE -**		**VERY LOW -**
	No-go alternative	Disturbance from existing bush encroachment and alien species on site will probably continue should the proposed solar PV project not go ahead. This will have a moderate negative impact on the site.	Negative	Direct	Moderate	Study area	Long term	Probable	N/A	N/A	N/A	**MODERATE -**	No mitigation measures are proposed for the no-go alternative.	**N/A**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
DECOMMISSIONING PHASE														
Loss of Indigenous Vegetation	Preferred Alternative	The decommissioning of the solar PV plant and removal of panels will require laydown areas and will disrupt vegetation that has re-established around the areas that were disturbed during the construction phase. The loss of vegetation will be similar to the construction phase impacts.	Negative	Direct	Moderate	Localised	Permanent	Probable	Irreversible	Resource will be lost	Achievable	**MODERATE -**	Avoid/prevent impact: • Implement mitigation measures during planning and design phase. Minimize/reduce impact: • Decommissioning activities must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint. • Vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' areas or areas outside the project footprint. • Lay down areas must not be located within any watercourses, drainage lines or sensitive areas. Remediate/rehabilitate impact: • Only indigenous species must be used for rehabilitation. • The alien invasive management plan for the site must be implemented.	**LOW -**
		Portions of this vegetation type have already been lost due to historical mining activities and current operation of the PPC Plant to the west. However, the footprint of the solar PV plant is relatively small compared to the adjacent mine and PPC Plant. The additional loss of vegetation will therefore have a low cumulative impact.	Negative	Cumulative	Slight	Localised	Permanent	Probable	Irreversible	Resource will be lost	Achievable	**LOW -**		**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
	No-go alternative	Disturbance from the dirt access road and railway line, encroaching and alien invasive species will probably continue should the proposed solar PV project not go ahead. This will have a low negative impact on the site, with the vegetation continuing to degrade.	Negative	Direct	Slight	Localised	Long term	Possible	N/A	N/A	N/A	**LOW -**	• No mitigation measures are proposed for the no-go alternative.	**N/A**
Disturbance to faunal species and potential reduction in abundance and mortality of faunal species	Preferred Alternative	Faunal species will be disturbed during decommissioning due to noise and vibrations of machinery. Faunal Species that vacate the immediate area may return following completion of construction or new individuals or species may inhabit the area. Machinery may cause unintentional mortalities of faunal species. Even with the mitigations applied the construction will still have an impact on faunal species.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Reversible	Resource will not be lost	Achievable	**LOW -**	Minimize/reduce impact: • Vehicles and machinery must meet best practice standards. • Staff and contractors' vehicles must comply with speed limits of 40 km/hr • Project must start and be completed within the minimum timeframe, i.e. may not be started and left incomplete. • ECO to walk ahead of machinery and move slow moving species e.g. tortoises	**LOW -**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
		The adjacent PPC plant has already caused an increase in ambient noise in the area. The additional noise generated from the construction of the decommissioning of the solar PV plant will be a short term impact and will be of low significance.	Negative	Cumulative	Slight	Study area	Short term	Definite	Reversible	Resource will not be lost	Achievable	**LOW -**	out of harm's way and into suitable neighbouring habitat. • Any faunal species that may die as a result of decommissioning must be recorded (photographed, GPS coordinate captured) and if somewhat intact preserved and donated to SANBI. • Any faunal species observed onsite must be recorded (photographed, GPS coordinate captured) and loaded onto iNaturalist. • Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.	**LOW -**
	No-go alternative	Under the no-go alternative, some faunal populations at the study site will still be impacted by noise from the adjacent PPC Plant.	Negative	Direct	Slight	Study area	Medium term	Probable	N/A	N/A	N/A	**LOW -**	No mitigation measures are proposed for the no-go alternative.	**N/A**

POTENTIAL ISSUE	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE	EXTENT	DURATION	PROBABILITY	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE WITH MITIGATION
Bush encroachment and establishment and/or spread of Alien Plant Species	Preferred Alternative	During the decommissioning phase, the disturbance of natural vegetation creates open habitats that favour bush encroachment and the establishment of undesirable alien plant species. The infestation of alien plant species will result in the displacement of indigenous vegetation and possible local extinctions of species. This pre-mitigation impact is of high significance but can easily be managed through the implementation of an alien invasive management plan.	Negative	Indirect	Severe	Study area	Long-term	Probable	Reversible	Resource will not be lost	Easily Achievable	**HIGH -**	Remediate/rehabilitate impact: • All previously infested areas must be rehabilitated as per the Rehabilitation Plan, to the satisfaction of the appointed ECO, as soon as construction has been completed within each area.	**LOW -**
		Existing disturbance from the dirt access road and railway line, illegal dumping and bush encroachment will likely be exacerbated by the additional impacts of the construction of the proposed solar PV plant. This will be of moderate significance.	Negative	Cumulative	Moderate	Study area	Long-term	Probable	Reversible	Resource will not be lost	Achievable	**MODERATE -**		**LOW -**
	No-go alternative	Disturbance from existing bush encroachment and alien species on site will probably continue should the proposed solar PV project not go ahead. This will have a moderate negative impact on the site.	Negative	Direct	Moderate	Study area	Long term	Probable	N/A	N/A	N/A	**MODERATE -**	No mitigation measures are proposed for the no-go alternative.	**N/A**

6 IMPACT STATEMENT, CONCLUSION AND RECOMMENDATIONS

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:

3.1.14. *A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and*

3.1.15. *Any conditions to which this statement is subjected.*

6.1 SUMMARY OF IMPACT SIGNIFICANCE

Table 6.1 provides a summary of the negative impacts of the proposed solar PV plant on the terrestrial biodiversity and ecology of the area, pre- and post-mitigation, during the planning and design, construction, operational and decommissioning phases. Prior to mitigation, the proposed development is anticipated to have four impacts of HIGH and 16 of MODERATE significance, with 13 of low significance and one of very low significance. Provided that the proposed mitigation measures are implemented and adhered to, the impacts can be reduced to a significance of moderate to very low.

Table 6.1: Assessment of pre- and post-mitigation impact significance.

PHASE	PRE-MITIGATION				POST-MITIGATION			
	V. LOW	LOW	MOD	HIGH	V. LOW	LOW	MOD	HIGH
Planning and Design		-2	-4		-2	-3	-1	
Construction	-1	-4	-9	-2	-1	-10	-5	
Operational		-2	-1	-1	-3	-1		
Decommissioning		-3	-2	-1		-7		
TOTAL	-1	-13	-16	-4	-6	-21	-6	0

6.2 RECOMMENDATIONS FOR THE PROPOSED ACTIVITY AND CONDITIONS OF EA & EMPR

As per Section 3.2 of the Terrestrial Biodiversity Protocol (2020), *"the findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant."*

It should be noted that if the impacts are suitably planned for and mitigated (i.e. avoided or minimized) during the planning and design phase, the impacts of these will be reduced during the construction phase, even in the absence of active mitigation during construction. Similarly, if the impacts are suitably planned for during the planning and design phase, and mitigated and rehabilitated during the construction phase, the operational phase impacts will also be significantly reduced, even in the absence of active mitigation during the operational phase. That said, it is recommended that all mitigation measures are implemented during all phases.

All the mitigation measures provided below are to be implemented in the Planning and Design, Construction, Operational and Decommissioning Phases of the proposed activity.

6.2.1 PLANNING AND DESIGN

- Avoid/prevent impact:
  - Planning for any search and rescue operations must be conducted prior to the commencement of construction activities.
  - All necessary permits must be obtained for the removal of any identified SCC prior to the commencement of construction activities.

- Minimize/reduce impact:
  - During the planning and design phase, the development footprint must be designed to minimize the loss of near-natural indigenous vegetation as far as possible.
  - The development footprint should be clearly demarcated and only vegetation within the approved footprint may be removed. Vegetation outside of these areas may not be cleared.
  - During the planning and design phase, the development footprint must be designed to minimize edge disturbance impacts. Preferably, the development footprint will lie adjacent to an existing developed/transformed area, so as to reduce the length of the shared edge with the surrounding near-natural and semi-natural areas.

- Remediate/rehabilitate impact:
  - An Alien Vegetation Management Plan must be developed by the Contractor prior to construction to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation.
  - A rehabilitation plan must be developed by the project manager or contractor as part of the method statement and implemented during construction and operation phases. This method statement must be approved by the appointed ECO.

6.2.2 CONSTRUCTION

- Avoid/prevent impact:
  - Implement mitigation measures during planning and design phase.
  - A botanical walkthrough of the development area, by an experienced botanist with knowledge of the SCC identified as possibly occurring within the site, must be undertaken during the flowering season.
  - If restricted range SCC populations are found, the development must be shifted to avoid these populations.
  - The ECO must monitor for potential additional plant SCCs not found during search and rescue activities.
  - No plant SCCs may be removed from the development footprint unless the relevant permits have been obtained.
  - All clearing activities must deploy search and rescue teams in-front of clearing machinery to assist in relocating slower moving faunal species e.g. tortoises.

- Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.

- Minimize/reduce impact:
  - Vegetation clearing must be kept a minimum and only to the site footprint.
  - Construction activities must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint.
  - Construction vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' areas or areas outside the project footprint.
  - Lay down areas must not be located within any watercourses, drainage lines or sensitive areas.
  - The contractor must ensure that vegetation clearance of near-natural and wetland vegetation is restricted to the approved development footprint only.
  - Construction vehicles and machinery must not be permitted outside of the development footprint, as much as practically possible.
  - If feasible, clearing of trees should take place in winter months to avoid disturbing birds and bats that nest and rear young in the spring and summer months.
  - Employees must be prohibited from making open fires during the construction phase.
  - The ECO must monitor that all construction activities are conducted within the development footprint.
  - Vehicles and machinery must meet best practice standards.
  - Staff and contractors' vehicles must comply with speed limits of 40 km/hr.
  - Project must start and be completed within the minimum timeframe, i.e. may not be started and left incomplete.
  - ECO to walk ahead of clearing construction machinery and move slow moving species e.g. tortoises out of harm's way and into suitable neighbouring habitat.
  - Any faunal species that may die as a result of construction must be recorded (photographed, GPS coordinate captured) and if somewhat intact preserved and donated to SANBI.
  - Any faunal species observed onsite must be recorded (photographed, GPS coordinate captured) and loaded onto iNaturalist.

- Remediate/rehabilitate impact:
  - All impacted areas must be rehabilitated as per the Rehabilitation Plan, as soon as construction has been completed within each area.
  - Disturbed areas must be monitored for erosion channels and these must be rehabilitated.
  - All trenches/excavations must be backfilled and all disturbed areas backfilled, compacted and revegetated, where applicable.
  - Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).
  - Only indigenous species must be used for rehabilitation.
  - The alien invasive management plan for the site must be implemented.

6.2.3 OPERATIONAL

- Avoid/prevent impact:
  - Implement mitigation measures during planning and design and construction phases.

- Minimize/reduce impact:
  - The Contractor must implement the Alien Vegetation Management Plan. The ECO must monitor for the adequate implementation of this plan.
  - Monitoring and maintenance vehicles must not be permitted outside of the development footprint.

- Remediate/rehabilitate impact:
  - The rehabilitation plan must be implemented during operation phases.
  - All previously infested areas must be rehabilitated as per the Rehabilitation Plan, to the satisfaction of the appointed ECO, as soon as construction has been completed within each area.

6.2.4 DECOMMISSIONING

- Avoid/prevent impact:
  - Implement mitigation measures during planning and design and construction phases.

- Minimize/reduce impact:
  - Decommissioning activities must remain within the approved demarcated development footprint, and no vegetation clearance is to be permitted outside of the approved development footprint.
  - Vehicles and machinery must not encroach into identified highly-sensitive, 'no-go' areas or areas outside the project footprint.
  - Lay down areas must not be located within any watercourses, drainage lines or sensitive areas.
  - Vehicles and machinery must meet best practice standards.
  - Staff and contractors' vehicles must comply with speed limits of 40 km/hr
  - Project must start and be completed within the minimum timeframe, i.e. may not be started and left incomplete.
  - ECO to walk ahead of machinery and move slow moving species e.g. tortoises out of harm's way and into suitable neighbouring habitat.
  - Any faunal species that may die as a result of decommissioning must be recorded (photographed, GPS coordinate captured) and if somewhat intact preserved and donated to SANBI.
  - Any faunal species observed onsite must be recorded (photographed, GPS coordinate captured) and loaded onto iNaturalist.
  - Staff and contractors are not permitted to capture, collect or eat any faunal species onsite.

- Remediate/rehabilitate impact:
  - Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).
  - Only indigenous species must be used for rehabilitation.
  - The alien invasive management plan for the site must be implemented.
  - All previously infested areas must be rehabilitated as per the Rehabilitation Plan, to the satisfaction of the appointed ECO, as soon as construction has been completed within each area.

6.3 FATAL FLAWS

It is the opinion of the specialist that **NO FATAL FLAWS** exist with the proposed development.

6.4 ENVIRONMENTAL STATEMENT AND OPINION OF THE SPECIALIST

The terrestrial biodiversity and ecological impacts of all aspects for the solar PV plant were assessed and considered to be acceptable, provided that the mitigation measures provided in this report are implemented. All impacts are rated as VERY LOW to HIGH pre-mitigation. Therefore, implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will reduce impacts to VERY LOW to MODERATE significance.

It is recommended that the proposed solar PV plant be authorised provided that all mitigation measures in this report are implemented.

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8 APPENDIX A: CURRICULUM VITAE

AIDAN JOHN GOUWS
Curriculum Vitae

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

CONTACT DETAILS

Name of Company	**CES – Environmental and Social Advisory Services**
Designation	Centurion Branch
Profession	Senior Environmental Consultant
Years with firm	3 Years
E-mail	a.gouws@cesnet.co.za
Office number	+27 (0)10 045 1372
Nationality	South African
Professional Affiliations	• South African Council for Natural Scientific Professions (SACNASP) (*Cand.Sci.Nat* 121901) • International Association of Impact Assessment (IAIAsa)
Key areas of expertise	• Environmental Authorisations • Geographical Information Systems (GIS) • Terrestrial Ecology • Wetland Ecology • Database Management

PROFILE

Mr Aidan Gouws

Aidan obtained his MSc in Environmental Science (*Cum laude*) from Rhodes University, having conducted research on the spatio-temporal dynamics of *Acacia dealbata* invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (*Cum laude*) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. Since joining CES in 2018, he has been involved in several projects, including Basic Assessments (BA), Full Scoping and Environmental Impact Assessments (S&EIA), Environmental Amendment Applications, Environmental Audits and Resettlement Action Plan (RAP) Audits. He works from the Centurion office as a Senior Environmental Consultant. His interests include the general Environmental Impact Assessment (EIA) process, terrestrial and wetland ecology, and database management. Aidan is registered with the South African Council for Natural Scientific Professions (SACNASP) as a Candidate Natural Scientist (*Cand.Sci.Nat*. 121901) and with the International Association for Impact Assessments (IAIA).

AIDAN JOHN GOUWS
Curriculum Vitae

EMPLOYMENT EXPERIENCE	**Senior Environmental Consultant – Coastal and Environmental Services (Centurion)** *August 2020 – Current* • Consulting, project management and conducting assessments in the broad field of Environmental Management, including Basic Assessments, full Scoping and Environmental Impact Assessments, Environmental Management Programmes and Environmental Auditing. • Ecological Impact Assessments • Wetland Impact Assessments • GIS Mapping • Database Management **Environmental Consultant – Coastal and Environmental Services (Centurion)** *July 2018 – July 2020* • Consulting, project management and conducting assessments in the broad field of Environmental Management, including Basic Assessments, full Scoping and Environmental Impact Assessments, Environmental Management Programmes and Environmental Auditing. • Ecological Impact Assessments • GIS Mapping • Database Management **Volunteer – Khulisa Social Solutions (Johannesburg)** *May 2018 – July 2018* **Departmental tutor - Department of Environmental Science, Rhodes University (Grahamstown)** *January 2016 – December 2017* **Demonstrator - Department of Plant Science, University of Pretoria (Pretoria)** *July 2015 – December 2015*
ACADEMIC QUALIFICATIONS	• 2014 - BSc Environmental Science (University of Pretoria) • 2015 - BSc (Hons) Geographical and Environmental Science (University of Pretoria) • 2018 - MSc Environmental Science (Rhodes University)
COURSES	• 2020 - Tools for Wetland Assessment (Rhodes University, in association with GroundTruth, The Water Research Commission and Verdant Environmental) *August 2020*
PUBLICATIONS	• Gouws, A. J., & Shackleton, C. M. (2019). A spatio-temporal, landscape perspective on *Acacia dealbata* invasions and broader land use and cover changes in the northern Eastern Cape, South Africa. Environmental Monitoring and Assessment, 191(2), 74. • Gouws, A. J., & Shackleton, C. M. (2019). Abundance and correlates of the *Acacia dealbata* invasion in the northern Eastern Cape, South Africa. Forest Ecology and Management, 432, 455-466.

AIDAN JOHN GOUWS
Curriculum Vitae

PROFESSIONAL EXPERIENCE	**BASIC ASSESSMENTS**

Ramotshere Moiloa Local Municipality Residential Extensions, Zeerust, North West Province, 2019–2020
Two Basic Assessments for the proposed extension of two residential extensions in Zeerust, North West. Assigned the role of project manager, PPP manager, Terrestrial Ecologist and lead author of the Basic Assessment Report.

SANRAL Koster R52 Road Upgrade, Koster, North West Province, 2018–2021
Basic Assessment for the road upgrade of the R52 route between Koster and the N4 Rustenburg. Assigned the role of project manager, PPP manager, Terrestrial Ecologist, Wetland Ecologist, WULA manager and lead author of the Basic Assessment Report.

Transnet Freight Rail Installation of Telecommunications Masts and Associated Infrastructure at Various Locations in South Africa, 2019–2020
Three Basic Assessments for the installation of telecommunications masts in Gauteng, Mpumalanga and KwaZulu-Natal. Assigned the role of project manager, PPP manager and lead author of the Basic Assessment Report.

PRASA CRES Establishment of Township Leralla Extension 1, Tembisa, Gauteng Province, 2019–2020
Basic Assessment for the proposed township establishment at Leralla Station in Tembisa, Gauteng. Assigned the role of project manager, PPP manager and lead author of the Draft Basic Assessment Report.

FULL SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENTS

SANRAL Zandkraal-Winburg N1 Road Upgrade Quarry S&EIR Authorisation, Winburg, Free State Province, 2018–2021
Full Scoping and Environmental Impact Assessment for the mining of borrow pits and quarries associated with the upgrade of the N1 between Zandkraal and Winburg South. Assigned the role of project manager, PPP manager and lead author of the Scoping Report and Environmental Impact Assessment Report.

SANRAL Masekwaspoort N1 Road Quarry S&EIAR Authorisation, Musina, Limpopo Province, 2018–On hold, to resume 2021
Full Scoping and Environmental Impact Assessment for the mining of borrow pits and quarries associated with the upgrade of the N1 between Louis Trichardt and Musina. Assigned the role of co-author of the Scoping Report. Project on hold due to pending design changes.

ENVIRONMENTAL AMENDMENT APPLICATIONS

SANSA Space Operations Installation of Satellite Antennae on Farm Hartebeesthoek 502JQ, Gauteng Province, 2019–2021
Amendment of Environmental Authorisation for the installation of satellite antennae at the South African National Space Agency (SANSA) Space Operations facility. Assigned the role client liaison, Terrestrial Ecologist, Assistant Wetland Ecologist and lead author of the Amendment Report.

AIDAN JOHN GOUWS
Curriculum Vitae

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

ENVIRONMENTAL AUDITING

SANRAL Hendrina N11 Road Upgrade ECO Audits, Hendrina, Mpumalanga Province, 2018–2019
Environmental Auditing for the construction of the road and mining of borrow pits associated with the upgrade of the N11 route between Hendrina and Hendrina Power Station. Assigned the role of Environmental Control Officer (ECO), author of ECO audit reports and author of the borrow pit closure report.

South African National Biodiversity Institute (SANBI) Office Complex Development, Pretoria, Gauteng Province, 2018
Environmental Auditing for the construction of the Office Complex at the Pretoria National Botanical Gardens. Assigned the role of interim ECO and co-author of ECO audit reports.

RISK ASSESSMENTS

PRASA CRES Inhlanzane Risk Assessment, Jabulani (Soweto), Gauteng, 2019
Social and Environmental Risk Assessment of the Illegal Occupation of the Rail Reserve near Inhlanzane Station - Jabulani (Soweto), Gauteng. Assigned the role of project manager and lead author of the Risk Assessment Report.

RESETTLEMENT ACTION PLAN (RAP) AUDITING

Millennium Challenge Account Malawi (MCA-M) RAP Audits, 2018–2019
Completion audits for six Resettlement Action Plans (RAPs) conducted for the Infrastructure Development Project in Malawi. These RAPs documented the physical and economic displacement impacts and compensation for assets of people affected by wayleave corridors along 400kV, 132kV, 66kV and 33kV OHLs, as well as for substations and permanent access roads. Assigned the role of database support, auditor, training assistant and assistant author. Later assigned the role of database manager.

DATABASE MANAGEMENT

Eswatini Electricity Company (EEC) 132kV Powerline ESIA and RAP, 2020-
Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for the proposed 132kV powerline in the Shiselweni Region of Swaziland. Assigned the role of data analyst and database co-manager.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Aidan John Gouws Date: February 2021

9 APPENDIX B: LIST OF PLANT SPECIES

9.1 LIST OF PLANT SPECIES THAT MAY WITHIN THE STUDY AREA

The following list of plant species may occur within the study area of the proposed Dwaalboom Solar PV development (Source: http://posa.sanbi.org/searchspp.php).

Table 9.1 List of plant species that may occur within the proposed development area.

FAMILY	GENUS	SPECIES	ECOLOGY	STATUS
Acanthaceae	*Blepharis*	*subvolubilis*	Indigenous	- LC
Acanthaceae	*Hypoestes*	*forskaolii*	Indigenous	- LC
Acanthaceae	*Justicia*	*betonica*	Indigenous	- LC
Acanthaceae	*Justicia*	*debilis*	Indigenous	- LC
Acanthaceae	*Ruellia*	*cordata*	Indigenous	- LC
Amaryllidaceae	*Crinum*	*buphanoides*	Indigenous	- LC
Anacardiaceae	*Ozoroa*	*paniculosa*	Indigenous	- LC
Asteraceae	*Geigeria*	*burkei*	Indigenous	- Not Evaluated
Asteraceae	*Philyrophyllum*	*schinzii*	Indigenous	- LC
Boraginaceae	*Heliotropium*	*nelsonii*	Indigenous	- LC
Combretaceae	*Combretum*	*zeyheri*	Indigenous	- LC
Combretaceae	*Terminalia*	*sericea*	Indigenous	- LC
Commelinaceae	*Commelina*	*eckloniana*	Indigenous	- LC
Convolvulaceae	*Seddera*	*suffruticosa*	Indigenous	- LC
Cucurbitaceae	*Coccinia*	*rehmannii*	Indigenous	- LC
Cucurbitaceae	*Coccinia*	*sessilifolia*	Indigenous	- LC
Cucurbitaceae	*Cucumis*	*hirsutus*	Indigenous	- LC
Cucurbitaceae	*Trochomeria*	*macrocarpa*	Indigenous	- LC
Cyperaceae	*Bulbostylis*	*burchellii*	Indigenous	- LC
Fabaceae	*Alistilus*	*bechuanicus*	Indigenous	- LC
Fabaceae	*Bauhinia*	*galpinii*	Indigenous	- LC
Fabaceae	*Crotalaria*	*obscura*	Indigenous; Endemic	- LC
Fabaceae	*Indigofera*	*adenoides*	Indigenous	- LC
Fabaceae	*Senegalia*	*mellifera*	Indigenous	- LC
Fabaceae	*Tylosema*	*esculentum*	Indigenous	- LC
Fabaceae	*Vachellia*	*grandicornuta*	Indigenous	- LC
Fabaceae	*Vachellia*	*permixta*	Indigenous	- LC
Hyacinthaceae	*Ledebouria*	*luteola*	Indigenous	- LC
Lamiaceae	*Clerodendrum*	*ternatum*	Indigenous	- LC
Lamiaceae	*Salvia*	*runcinata*	Indigenous	- LC
Malvaceae	*Abutilon*	*ramosum*	Indigenous	- LC
Malvaceae	*Grewia*	*flava*	Indigenous	- LC
Malvaceae	*Hibiscus*	*calyphyllus*	Indigenous	- LC
Malvaceae	*Pavonia*	*burchellii*	Indigenous	- LC

FAMILY	GENUS	SPECIES	ECOLOGY	STATUS
Olacaceae	*Ximenia*	*caffra*	Indigenous	- LC
Poaceae	*Aristida*	*rhiniochloa*	Indigenous	- LC
Poaceae	*Brachiaria*	*eruciformis*	Indigenous	- LC
Poaceae	*Dichanthium*	*aristatum*	Not indigenous; Naturalised	- Not Evaluated
Poaceae	*Dinebra*	*retroflexa*	Indigenous	- LC
Poaceae	*Echinochloa*	*holubii*	Indigenous	- LC
Poaceae	*Heteropogon*	*contortus*	Indigenous	- LC
Poaceae	*Ischaemum*	*afrum*	Indigenous	- LC
Poaceae	*Panicum*	*coloratum*	Indigenous	- LC
Poaceae	*Setaria*	*incrassata*	Indigenous	- LC
Poaceae	*Urochloa*	*mosambicensis*	Indigenous	- LC
Ranunculaceae	*Clematis*	*brachiata*	Indigenous	- LC
Ricciaceae	*Riccia*	*okahandjana*	Indigenous	- DD
Rubiaceae	*Empogona*	*lanceolata*	Indigenous	- LC
Ruscaceae	*Sansevieria*	*aethiopica*	Indigenous	- LC
Sapindaceae	*Erythrophysa*	*transvaalensis*	Indigenous	- LC
Scrophulariaceae	*Aptosimum*	*elongatum*	Indigenous	- LC

9.2 LIST OF PLANT SPECIES RECORDED WITHIN THE ASSESSMENT FOOTPRINT ON SITE

The following list of plant species were recorded within the assessment footprint during the site visit on 14-15 December 2020 and 22 February 2021.

Table 9.2 List of plant species recorded within the assessment footprint.

FAMILY	GENUS	SPECIES	ECOLOGY	STATUS
Anacardiaceae	*Sclerocarya*	*birrea*	Indigenous	- LC - Protected tree
Anacardiaceae	*Searsia*	*leptodictya*	Indigenous	- Not Evaluated
Apocynaceae	*Asclepias*	sp.		
Asparagaceae	*Asparagus*	*laricinus*	Indigenous	- LC
Asparagaceae	*Asparagus*	*setaceus*	Indigenous	- LC
Asteraceae	*Hilliardiella*	*elaeagnoides*	Indigenous	- LC
Commelinacease	*Commelina*	*africana*	Indigenous	- LC
Convolvulaceae	*Seddera*	*capensis*	Indigenous	- LC
Ebenaceae	*Euclea*	*undulata*	Indigenous	- LC
Fabaceae	*Dichrostachys*	*cinerea*	Indigenous	- Not Evaluated
Fabaceae	*Indigofera*	sp.	Indigenous	
Fabaceae	*Senegalia*	*mellifera*	Indigenous	- LC
Fabaceae	*Vachellia*	*erioloba*	Indigenous	- LC - Protected tree
Fabaceae	*Vachellia*	*karroo*	Indigenous	- LC
Lamiaceae	*Vitex*	*pooara*	Indigenous; endemic	LC
Malvaceae	*Grewia*	*bicolor*	Indigenous	- LC
Malvaceae	*Grewia*	*flava*	Indigenous	- LC
Malvaceae	*Hibiscus*	*trionum*	Non-indigenous; naturalised	- DD
Poaceae	*Cymbopogon*	sp.	Indigenous	- LC
Poaceae	*Enneapogon*	*cenchroides*	Indigenous	- LC
Poaceae	*Eragrostis*	*lehmanniana*	Indigenous	- LC
Poaceae	*Fingerhuthia*	*africana*	Indigenous	- LC
Poaceae	*Heteropogon*	*contortus*	Indigenous	- LC
Poaceae	*Panicum*	*repens*	Indigenous	- LC
Poaceae	*Pennisetum*	*clandestinum*	Non-indigenous; naturalised; invasive	- Not Evaluated
Poaceae	*Setaria*	*sphacelata*	Indigenous	- Not Evaluated
Rhamnaceae	*Ziziphus*	*mucronata*	Indigenous	- LC
Solanaceae	*Solanum*	*elaeagnifolium*	Non-indigenous; naturalised; invasive	- Not Evaluated - Cat 1b
Verbenaceae	*Lantana*	*camara*	Non-indigenous; naturalised; invasive	- Not Evaluated - Cat 1b

10 APPENDIX C: LIST OF FAUNAL SPECIES

10.1 LIST OF AMPHIBIAN SPECIES

The following list of amphibian species have distribution ranges which include the study area of the proposed Dwaalboom Solar PV development, based on the following sources:

1. Amphibian Taxon Search for coordinate 24°48'27.22"S, 26°50'31.45"E (IUCN, 2021);
2. The Frog Map, species list search for Quarter Degree Square (QDS) 2426DD (ADU, 2021); and
3. Amphibian Taxon Search for Thabazimbi Municipality (iNaturalist, 2021).

Table 10.1 List of amphibian species with a distribution range which includes the proposed development area.

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
Brevicepitidae	*Breviceps adspersus*	Bushveld Rain Frog	LC	1, 2, 3
Bufonidae	*Poyntonophrynus fenoulheti*	Fenoulhet's Toad	LC	1, 3
	Poyntonophrynus vertebralis	Southern Pygmy Toad	LC	1, 2
	Schismaderma carens	Red Toad	LC	1, 2, 3
	Sclerophrys capensis	Raucous Toad	LC	1
	Sclerophrys garmani	Olive Toad	LC	1, 2
	Sclerophrys gutturalis	Guttural toad	LC	1, 3
	Sclerophrys poweri	Kimberley toad	LC	1, 3
Hemisotidae	*Hemisus marmoratus*	Marbled Snout-Burrower	LC	1
	Hildebrandtia ornata	African Ornate Frog	LC	1
Hyperoliidae	*Hyperolius marmoratus*	Painted Reed Frog	LC	3
	Kassina senegalensis	Bubbling Kassina	LC	1, 2
Microhylidae	*Phrynomantis bifasciatus*	Banded Rubber Frog	LC	1, 2, 3
Phrynobatrachidae	*Phrynobatrachus natalensis*	Natal dwarf puddle frog	LC	1
Pipidae	*Xenopus laevis*	African Clawed Frog	LC	1
Ptychadenidae	*Ptychadena anchietae*	Plain Grass Frog	LC	1, 2, 3
	Ptychadena mossambica	Broadbanded Grass Frog	LC	1, 2
Pyxicephalidae	*Amietia delalandii*	Delalande's river frog	LC	1, 3
	Amietia poyntoni	Poynton's River Frog	LC	1
	Cacosternum boettgeri	Common Caco	LC	1, 2
	Pyxicephalus adspersus	African bullfrog	LC	1
	Pyxicephalus edulis	Lesser Bull-frog	LC	1, 3
	Tomopterna cryptotis	Tremelo Sand Frog	LC	1, 2
	Tomopterna krugerensis	Knocking sand frog	LC	1, 3
	Tomopterna natalensis	Natal sand frog	LC	1, 3
	Tomopterna tandyi	Tandy's sand frog	LC	1, 3
Rhacophoridae	*Chiromantis xerampelina*	Grey foam-nest tree frog	LC	1, 3

10.2 LIST OF REPTILE SPECIES

The following list of reptile species have distribution ranges which include the study area of the proposed Dwaalboom Solar PV development, based on the following sources:

1. Reptile Taxon Search for coordinate 24°48'27.22"S, 26°50'31.45"E (IUCN, 2021);
2. The Reptile Map, species list search for Quarter Degree Square (QDS) 2426DD (ADU, 2021); and
3. Reptilian Taxon Search for Thabazimbi Municipality (iNaturalist, 2021).

Table 10.2 List of reptile species with a distribution range which includes the proposed development area.

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
Sensitive animal species A[2]			**VU**	**1, 3**
CROCODILES				
Crocodylidae	***Crocodylus niloticus***	**Nile Crocodile**	**VU**	**2, 3**
LIZARDS				
Agamidae	*Acanthocercus atricollis*	Southern Tree Agama	LC	1, 3
	Agama aculeata	Ground Agama	LC	3
	Agama aculeata subsp. *distanti*	Eastern Ground Agama	LC	3
	Agama atra	Southern Rock Agama	LC	1
Chamaeleonidae	*Chamaeleo dilepis*	Common African Flap-necked Chameleon	LC	1, 3
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	LC	1, 2
	Platysaurus minor	Waterberg flat lizard	LC	3
	Pseudocordylus transvaalensis	Northern Crag Lizard	LC	3
Gekkonidae	*Chondrodactylus turneri*	Turner's Gecko	LC	2
	Hemidactylus mabouia	Common Tropical House Gecko	LC	1, 2, 3
	Homopholis arnoldi	Arnold's Velvet Gecko	LC	3
	Homopholis wahlbergii	Wahlberg's Velvet Gecko	LC	2
	Lygodactylus capensis	Common Dwarf Gecko	LC	2, 3
	Pachydactylus affinis	Transvaal Gecko	LC	1
	Pachydactylus capensis	Cape Gecko	LC	2, 3
	Ptenopus garrulus	Common Barking Gecko	LC	1
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	LC	3
	Matobosaurus validus	Giant Plated Lizard	LC	3
Lacertidae	*Heliobolus lugubris*	Bushveld Lizard	LC	3
	Pedioplanis lineoocellata subsp. *lineoocellata*		LC	3
Scincidae	*Acontias occidentalis*	Okahandja Legless Skink	LC	3
	Acontias percivali	Percival's Legless Skink	LC	1
	Mochlus sundevallii	Sundevall's Writhing Skink	LC	2, 3
	Trachylepis laevigata	Smooth Variable Skink	DD	3
	Trachylepis margaritifera	Rainbow Skink	LC	3
	Trachylepis punctatissima	Speckled Rock Skink	LC	1, 2, 3

[2] The name has been withheld as the species may be prone to illegal harvesting and must be protected.

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
	Trachylepis sp.	Afro-Malagasy Mabuyas	LC	3
	Trachylepis striata	African Striped Skink	LC	3
	Trachylepis varia	Variable Skink	LC	3
	Trachylepis varia sensu lato	Common Variable Skink Complex	LC	2
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	LC	2, 3
	Varanus niloticus	Nile Monitor	LC	3
	Varanus sp.	Monitor Lizards	LC	3
WORM LIZARDS				
Amphisbaenidae	*Monopeltis capensis*	Cape Worm Lizard	LC	1
	Monopeltis infuscata	Dusky Worm Lizard	LC	1
SNAKES				
Atractaspididae	*Aparallactus capensis*	Black-headed Centipede-eater	LC	1
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	LC	3
	Dispholidus typus	Boomslang	LC	3
	Philothamnus semivariegatus	Spotted Bush Snake	LC	3
	Thelotornis capensis	Southern Twig Snake	LC	1
	Dasypeltis scabra	Rhombic Egg Eater	LC	1
Elapidae	*Dendroaspis polylepis*	Black Mamba	LC	1, 3
	Naja mossambica	Mozambique Spitting Cobra	LC	1, 3
Lamprophiidae	*Psammophis subtaeniatus*	Western Yellow-bellied Sand Snake	LC	2
Leptotyphlopidae	*Leptotyphlops scutifrons*	Peter's Thread Snake	LC	3
Prosymnidae	*Prosymna ambigua*		LC	1
	Prosymna bivittata	Two-striped Shovel-snout	LC	1
Psammophiidae	*Psammophis angolensis*	Dwarf Sand Snake	LC	1, 3
	Psammophis brevirostris	Short-snouted Whip Snake	LC	3
	Psammophylax tritaeniatus	Striped Grass Snake	LC	1
	Pseudaspis cana	Mole Snake	LC	3
Pythonidae	*Python natalensis*	Southern African Python	LC	3
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	LC	1, 3
Viperidae	*Bitis arietans* subsp. *arietans*	Common Puff Adder	LC	3
	Bitis caudalis	Horned Adder	LC	3
TURTLES, TERRAPINS AND TORTOISES				
Pelomedusidae	*Pelomedusa galeata*	Cape Terrapin	LC	3
	Pelomedusa subrufa	Helmeted Turtle	LC	3
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC	3

10.3 LIST OF MAMMAL SPECIES

The following list of mammal species have distribution ranges which include the study area of the proposed Dwaalboom Solar PV development, based on the following sources:

1. Mammal Taxon Search for coordinate 24°48'27.22"S, 26°50'31.45"E (IUCN, 2021);
2. The Mammal Map, species list search for Quarter Degree Square (QDS) 2426DD (ADU, 2021); and
3. Mammalian Taxon Search for Thabazimbi Municipality (iNaturalist, 2021).

Table 10.3 List of mammal species with a distribution range which includes the proposed development area.

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
Bovidae	*Aepyceros melampus*	Impala	LC	1, 2, 3
	Aepyceros melampus subsp. *melampus*	Common Impala	LC	3
	Alcelaphus buselaphus	Hartebeest	LC	1
	Alcelaphus buselaphus subsp. *caama*	Red Hartebeest	LC	3
	Antidorcas marsupialis	Springbok	LC	3
	Connochaetes taurinus	Common Wildebeest	LC	1
	Connochaetes taurinus subsp. *taurinus*	Blue Wildebeest	LC	3
	Damaliscus lunatus	Tsessebe	LC	1, 3
	Damaliscus lunatus* subsp. *lunatus	**Common Tsessebe**	**VU**	**3**
	Damaliscus pygargus subsp. *phillipsi*	Blesbok	LC	3
	Hippotragus equinus	**Roan Antelope**	**EN**	**1**
	Hippotragus equinus* subsp. *equinus	**Southern Roan Antelope**	**EN**	**3**
	Hippotragus niger	Sable Antelope	LC	1
	Hippotragus niger* subsp. *niger	**Southern Sable Antelope**	**VU**	**3**
	Kobus ellipsiprymnus	Waterbuck	LC	1
	Kobus ellipsiprymnus subsp. *ellipsiprymnus*	Common Waterbuck	LC	3
	Oreotragus oreotragus	Klipspringer	LC	1, 2, 3
	Oreotragus oreotragus subsp. *transvaalensis*	Transvaal Klipspringer	LC	3
	Oryx gazella	Gemsbok	LC	1, 3
	Pelea capreolus	Grey Rhebok	NT	1
	Raphicerus campestris	Steenbok	LC	1, 2, 3
	Raphicerus campestris subsp. *campestris*	Southern Steenbuck	LC	3
	Redunca arundinum	Southern Reedbuck	LC	1
	Redunca fulvorufula	Mountain Reedbuck	LC	1, 3
	Redunca fulvorufula subsp. *fulvorufula*	Southern Mountain Reedbuck	LC	3
	Sylvicapra grimmia	Bush Duiker	LC	1, 2, 3

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
	Sylvicapra grimmia subsp. *caffra*	Grey Common Duiker	LC	3
	Syncerus caffer	African Buffalo	LC	1
	Syncerus caffer subsp. *caffer*	Cape Buffalo	LC	3
	Tragelaphus angasii	Nyala	LC	3
	Tragelaphus oryx	Common Eland	LC	1, 3
	Tragelaphus oryx subsp. *oryx*	Cape Eland	LC	3
	Tragelaphus scriptus	Bushbuck	LC	1, 2, 3
	Tragelaphus scriptus subsp. *sylvaticus*	Southern Bushbuck	LC	3
	Tragelaphus strepsiceros	Greater Kudu	LC	1, 2, 3
	Tragelaphus strepsiceros subsp. *strepsiceros*	Southern Greater Kudu	LC	3
Canidae	*Canis mesomelas*	Black-backed Jackal	LC	1, 2
	Lupulella mesomelas subsp. *mesomelas*	Southern Black-backed Jackal	LC	3
	Lycaon pictus* subsp. *pictus	**Cape Wild Dog**	**EN**	**3**
	Otocyon megalotis	Bat-eared Fox	LC	1, 2, 3
	Otocyon megalotis subsp. *megalotis*	Southern Bat-eared Fox	LC	3
	Vulpes chama	Cape Fox	LC	1
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	LC	1, 2, 3
	Chlorocebus pygerythrus subsp. *pygerythrus*	Southern Vervet Monkey	LC	3
	Papio ursinus	Chacma Baboon	LC	2, 3
	Papio ursinus subsp. *griseipes*	Grayfoot Chacma Baboon	LC	3
Elephantidae	***Loxodonta africana***	**Savannah Elephant**	**VU**	**3**
Emballonuridae	*Taphozous mauritianus*	Mauritian Tomb Bat	LC	1, 3
Equidae	*Equus quagga*	Plains Zebra	LC	1, 3
	Equus quagga subsp. *burchellii*	Burchell's Zebra	LC	3
	Equus quagga subsp. *chapmani*	Chapman's Zebra	LC	3
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog	NT	1
Felidae	***Acinonyx jubatus***	**Cheetah**	**VU**	**1**
	Acinonyx jubatus* subsp. *jubatus	**Southern and Eastern African Cheetah**	**VU**	**3**
	Caracal caracal	Caracal	LC	1
	Caracal caracal subsp. *caracal*	Southern and Eastern African Caracal	LC	3
	Felis catus	Domestic Cat		3
	Felis nigripes	Black-footed Cat	LC	1
	Felis silvestris	Wild Cat	LC	1
	Leptailurus serval	Serval	NT	1

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
	Panthera leo	Lion	LC	3
	Panthera leo subsp. *melanochaita*	Southern Lion	LC	3
	Panthera pardus	**Leopard**	**VU**	**1, 2**
	Panthera pardus* subsp. *pardus	**African Leopard**	**VU**	**3**
Galagidae	*Galago moholi*	Southern Lesser Galago	LC	1, 3
Giraffidae	*Giraffa camelopardalis*	Giraffe	LC	1
	Giraffa camelopardalis* subsp. *giraffa	**South African Giraffe**	**VU**	**3**
Gliridae	*Graphiurus microtis*	Small-eared dormouse	LC	1
	Graphiurus platyops	Rock dormouse	LC	1
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	LC	1
	Galerella sanguinea	Slender Mongoose	LC	3
	Helogale parvula	Common Dwarf Mongoose	LC	1
	Herpestes sanguineus	Common Slender Mongoose	LC	1
	Mungos mungo	Banded Mongoose	LC	1, 3
	Mungos mungo subsp. *grisonax*	Banded mongoose	LC	3
	Suricata suricatta subsp. *suricatta*	Southern African Meerkat	LC	3
	Atilax paludinosus	Marsh Mongoose	LC	1
Hippopotamidae	*Hippopotamus amphibius*	Hippopotamus	LC	1, 3
	Hipposideros caffer	Cape Leaf-nosed bat	LC	1
Hipposideridae	***Cloeotis percivali***	**Percival's Trident Bat**	**EN**	**1**
Hyaenidae	*Crocuta crocuta*	Spotted Hyena	NT	1, 3
	Hyaena brunnea	Brown Hyena	NT	2, 3
	Parahyaena brunnea	Brown Hyaena	LC	1
	Proteles cristata	Aardwolf	LC	1, 2, 3
	Proteles cristata subsp. *cristata*	Southern Aardwolf	LC	3
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC	1, 3
	Hystrix africaeaustralis subsp. *africaeaustralis*	Southern Porcupine	LC	3
Leporidae	*Lepus saxatilis* subsp. *saxatilis*	Scrub Hare	LC	3
	Lepus victoriae	African Savanna Hare	LC	1
	Pronolagus randensis	Bushveld Red Rockhare	LC	3
	Pronolagus randensis subsp. *makapani*	Jameson's red rock hare	LC	3
Macroscelididae	*Elephantulus brachyrhynchus*	Short-snouted Sengi	LC	1
	Elephantulus intufi	Bushveld Sengi	LC	1
	Elephantulus myurus	Eastern Rock Sengi	LC	1, 3
Molossidae	*Sauromys petrophilus*	Roberts's Flat-headed Bat	LC	1
	Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	1

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
Muridae	*Acomys selousi*	Selous's Spiny Mouse	LC	1
	Aethomys chrysophilus	Red Rock Rat	LC	1
	Aethomys ineptus	Tete Veld Aethomys	LC	1
	Arvicanthini	African and Indian Bush Rats		3
	Desmodillus auricularis	Gray African Climbing Mouse	LC	1
	Gerbilliscus brantsii	Highveld Gerbil	LC	1
	Gerbilliscus leucogaster	Bushveld Gerbil	LC	1, 3
	Gerbillurus paeba	Hairy-footed Gerbil	LC	1
	Lemniscomys rosalia	Single-striped Grass Mouse	LC	1
	Mastomys coucha	Southern Multimammate Mouse	LC	1
	Micaelamys namaquensis	Namaqua Rock Rat	LC	1
	Mus indutus	Desert Pygmy Mouse	LC	1
	Otomys angoniensis	Angoni Vlei Rat	LC	1
	Rhabdomys dilectus	Mesic Four-striped Grass Rat	LC	1
	Thallomys	Acacia Rats	LC	3
	Thallomys paedulcus	Sundevall's Acacia Rat	LC	1
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT	1
	Ictonyx striatus	Zorilla	LC	1
	Mellivora capensis	Honey Badger	LC	1
	Mellivora capensis subsp. *capensis*	Cape Ratel	LC	3
	Poecilogale albinucha	African Striped Weasel	LC	1
Nesomyidae	*Dendromus melanotis*	Gray African Climbing Mouse	LC	1
	Saccostomus campestris	Southern African Pouched Mouse	LC	1
	Steatomys pratensis	Common Fat Mouse	LC	1
Nycteridae	*Nycteris thebaica*	Egyptian Slit-faced Bat	LC	1, 3
Orycteropodidae	*Orycteropus afer*	Aardvark	LC	1
	Orycteropus afer subsp. *afer*	Southern Aardvark	LC	3
Pedetidae	*Pedetes capensis*	Southern Springhare	LC	1, 3
Procaviidae	*Procavia capensis*	Rock Hyrax	LC	1, 3
	Procavia capensis subsp. *capensis*	Cape Dassie	LC	3
Rhinocerotidae	*Ceratotherium simum*	White Rhino	NT	1
	Ceratotherium simum subsp. *simum*	Southern White Rhinoceros	NT	3
	Diceros bicornis	**Black Rhinoceros**	**CR**	**1, 3**
	Diceros bicornis* subsp. *bicornis	**Southern Black Rhinoceros**	**CR**	**3**
Rhinolophidae	*Rhinolophus*	Horseshoe Bats	LC	3
	Rhinolophus darlingi	Darling's Horseshoe Bat	LC	1
	Rhinolophus simulator	Bushveld Horseshoe Bat	LC	1
Sciuridae	*Paraxerus cepapi*	Smith's Bush Squirrel	LC	1, 3

FAMILY	SCIENTIFIC NAME	COMMON NAME	STATUS	SOURCE
	Paraxerus cepapi subsp. *cepapi*	Smith's bush squirrel	LC	3
	Xerus inauris	South African Ground Squirrel	LC	3
Soricidae	*Crocidura cyanea*	Reddish-gray Musk Shrew	LC	1
	Crocidura fuscomurina	Bicolored Musk Shrew	LC	1
	Crocidura hirta	Lesser Red Musk Shrew	LC	1
	Crocidura silacea	Lesser Gray-brown Musk Shrew	LC	1
Suidae	*Phacochoerus africanus*	Common Warthog	LC	1, 3
	Phacochoerus africanus subsp. *sundevallii*	Southern Warthog	LC	3
Thryonomyidae	*Thryonomys swinderianus*	Greater Cane Rat	LC	1
Vespertilionidae	*Kerivoula lanosa*	Lesser Woolly Bat	LC	1
	Myotis tricolor	Cape hairy bat	LC	3
	Neoromicia capensis	Cape serotine	LC	1, 3
	Scotophilus dinganii	Yellow-bellied House Bat	LC	1
Viverridae	*Civettictis civetta*	African Civet	LC	1, 3
	Genetta genetta	Common Genet	LC	1
	Genetta maculata	Rusty-spotted Genet	LC	3