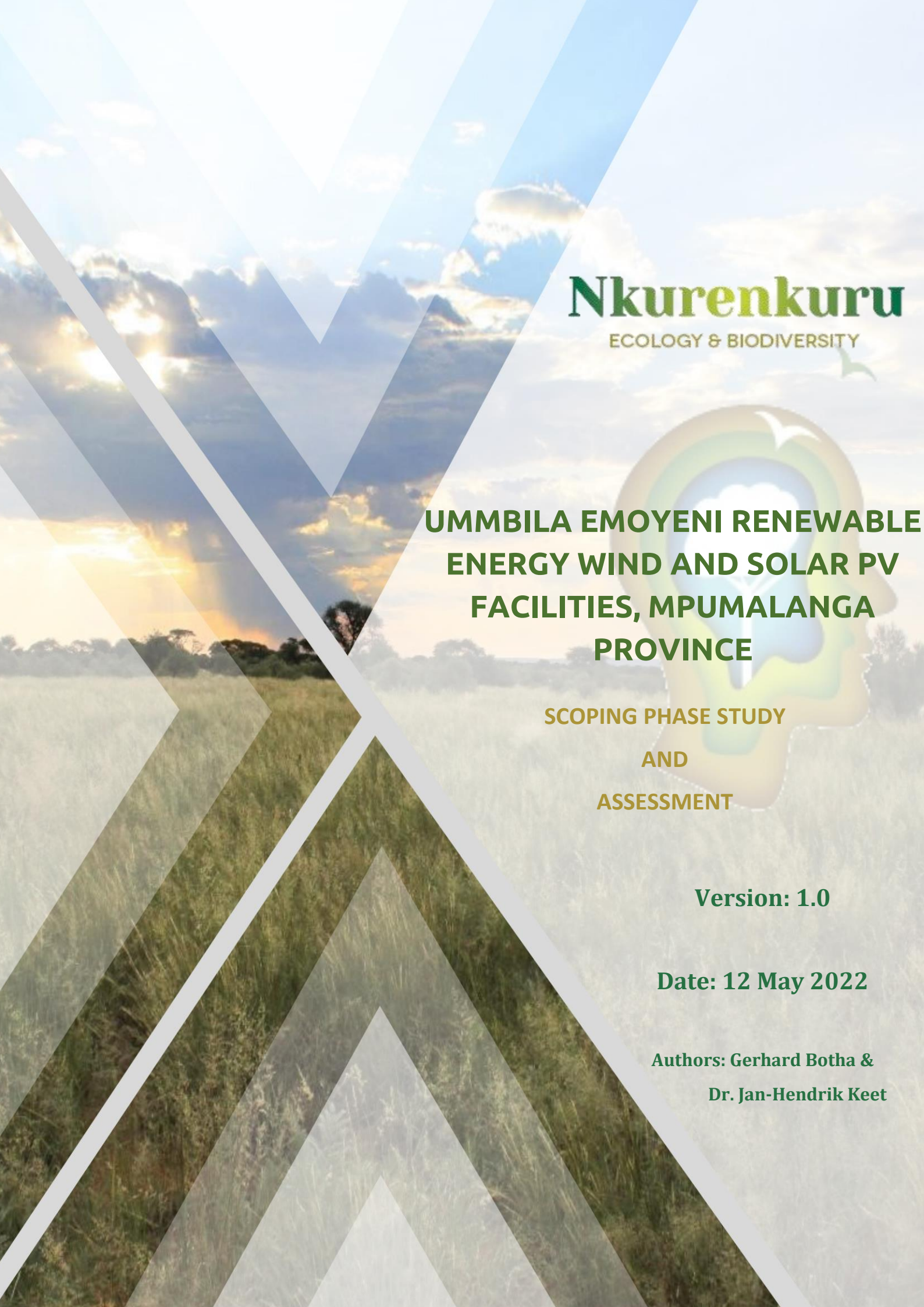

Nkurenkuru
ECOLOGY & BIODIVERSITY

UMMBILA EMOYENI RENEWABLE ENERGY WIND AND SOLAR PV FACILITIES, MPUMALANGA PROVINCE

SCOPING PHASE STUDY

AND

ASSESSMENT

Version: 1.0

Date: 12 May 2022

Authors: Gerhard Botha &

Dr. Jan-Hendrik Keet

UMMBILA EMOYENI RENEWABLE ENERGY WIND AND SOLAR PV FACILITIES, MUPMALANGA PROVINCE.

Report Title: Terrestrial and Aquatic Ecological Scoping Phase Assessment

Authors: Mr. Gerhard Botha and Dr. Jan-Hendrik Keet

Project Name: Ummbila Emoyeni Renewable Energy Wind and Solar PV Facilities, Mpumalanaga Province

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I. DECLARATION OF CONSULTANT INDEPENDENCE

The consultants hereby declare that they:

- act/ed as the independent specialists in this application;
- regard the information contained in this report as it relates to specialist input/study to be true and correct at the time of publication;
- do not, and will not, have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA Environmental Impact Assessment Regulations, 2014, and any specific environmental management Act;
- do not, and will not, have any vested interest(s) in the proceedings of the proposed activities;
- have disclosed, to the applicant, EAP, and competent authority(-ies), any information that have, or may have, the potential to influence the decision of the competent authority(-ies) or the objectivity of any report, plan, or document required in terms of the NEMA Environmental Impact Assessment Regulations 2014, and any specific environmental management Act;
- are fully aware of, and meet, the responsibilities in terms of the NEMA Environmental Impact Assessment Regulations 2014 (specifically in terms of regulation 13 of GN No. R. 326), and any specific environmental management Act, and that failure to comply with these requirements may result in disqualification;
- have provided the competent authority(-ies) with access to all necessary information at their disposal at the time of publication regarding the application, whether such information is favourable to the applicant or not; and
- are aware that a false declaration is an offense in terms of regulation 48 of GN No. R. 326.

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May 2022

II. LIST OF ABBREVIATIONS

CARA: Conservation of Agricultural Resources Act (Act 43 of 1983)

CBA: Critical Biodiversity Area

CIS: Conservation Important Species (species listed within IUCN and South African Red Lists, or that are protected within relevant international, national, and provincial legislation)

CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora

CR: Critically Endangered (threat status)

DAFF: Department of Agriculture, Forestry, and Fisheries

DDD: Data Deficient — Insufficient Information (threat status)

DDT: Data Deficient — Taxonomically Problematic (threat status)

DEA: Department of Environmental Affairs

DEADP:WC: Department of Environmental Affairs and Development Planning: Western Cape Province.

EA: Environmental Authorisation

ECO: Environmental Control Officer

EIA: Environmental Impact Assessment: EIA regulations promulgated under section 24(5) of NEMA and published in Government Notice R. 543 in Government Gazette 33306 of 18 June 2010

EMPr: Environmental Management Programme

EN: Endangered (threat status)

ESA: Ecological Support Area

EW: Extinct in the Wild (threat status)

EX: Extinct (threat status)

FEPA: Freshwater Ecosystem Priority Area

IAPs: Invasive Alien Plant species

LC: Least Concern (threat status)

MAP: Mean Annual Precipitation

MAT: Mean Annual Temperature

NE: Not Evaluated (threat status)

NEM:BA National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

NEMA: National Environmental Management Act (Act 107 of 1998)

NFA: National Forest Act 1998 (No. 84 of 1998)

NFEPA: National Freshwater Ecosystem Priority Areas, identified to meet national freshwater conservation targets (CSIR, 2011)

NT: Near Threatened (threat status)

PES: Present Ecological State, referring to the current state or condition of an environmental resource in terms of its characteristics, and reflecting a change from its reference condition

RE: Regionally Extinct (threat status)

SANBI: South African National Biodiversity Institute

TOPS: Threatened and Protected Species; in terms of section 56 of the National Environment: Biodiversity Act (NEM:BA) of 2004 (Species list as published within Gazette No. 30568, 14 December 2007)

VU: Vulnerable (threat status)

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1.1. Applicant

Emoyeni Renewable Energy Farm (Pty) Ltd

1.2. Project

The project will be known as Ummbila Emoyeni Renewable Energy Facility, and the entire study area with its collection of sites will generally be referred to either as the "study area" or the "study site".

1.3. Proposed Activity

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of renewable energy facilities, consisting of a commercial wind farm, solar PV facility, and associated grid infrastructure, including a battery energy storage system, located approximately 6km southeast of Bethal in the Mpumalanga Province of South Africa.

A preferred project focus area with an extent of 27 819ha been identified by Emoyeni Renewable Energy Farm (Pty) Ltd as a technically suitable area for the development of the Ummbilla Emoyeni Renewable Energy Farm with a contracted capacity of up to 666MW of wind energy and 150MW of solar energy. This layout, and project capacity, will reduce as the EIA and scoping process identifies environmental constraints that exclude areas for development.

The project site comprises the following farm portions:

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6, 8, 9, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12, 22 ,25, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0, 1, 2, 4, 5, 6, 10, 11, 12, 13 14, 15, 17, 19, 20, 22, 23, 2425
Farm 452 – Brakfontein	5
Farm 454 – Oshoek	4, 13, 18
Farm 455 – Ebenhaezer	0, 1, 2, 3
Farm 456 – Vaalbank	1, 2, 3, 4, 7, 8, 13, 15, 16, 17, 18, 19
Farm 457 – Roodekrans	0, 1, 4, 7, 22, 23, 23
Farm 458 – Goedgedacht	0, 2, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 37, 39
Farm 467 – Twee Fontein	0, 1, 4, 5, 6, 7, 8, 10
Farm 469 – Klipkraal	5, 6, 7, 8
Farm 548 – Durabel	0

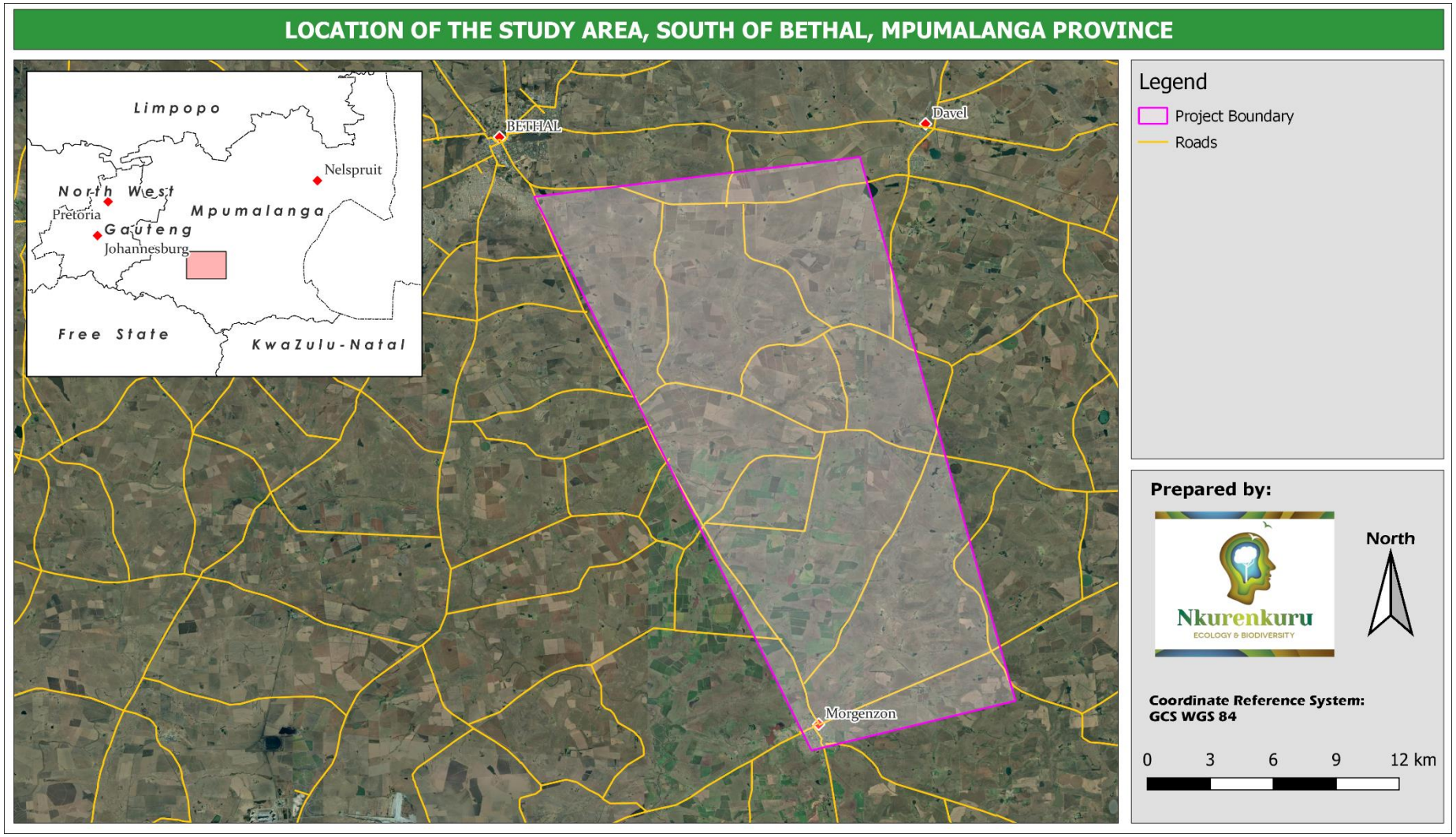

Figure 1: Locality of the project site, south of the town Bethal in the Mpumalanga Province. The inset map shows the main map extent (red square) within Mpumalanga, as well as the broader context of South Africa.

1.4. Terms of Reference (ToR)

To conduct a detailed site terrestrial and aquatic biodiversity sensitivity assessment, including the following:

- Desktop terrestrial biodiversity analysis
- On-site fauna and flora screening survey investigation
- Desktop identification and delineation of potential freshwater resource areas potentially affected by the proposed development, or occurring within a 500m radius of the proposed development using available imagery, contour information and spatial datasets in a Geographical Information System (GIS);
- Site-based (detailed in-field) delineation of the outer boundary of wetland/watercourse areas within the project focal area and which were flagged during the desktop screening/risk assessment;
- Detailed compilation of a site screening / sensitivity report which adheres to the following (this list is not exhaustive):

    - An Initial Site Sensitivity Verification report meeting the requirements for environmental themes in terms of section 24(5)(a) and (h) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
    - Identification of any discrepancies with the environmental sensitivity as identified on the national web based environmental screening tool;
    - Refine / confirm the delineation of the CBA;
    - Identification of sensitive areas to be avoided (including corresponding spatial data);
    - Identification of sensitive species that occur on site;
    - Recommendations regarding potential development areas for wind energy within the project site (including acceptable footprint limit); and
    - Recommendations regarding the scope and timeframe for further assessment.

1.5. Conditions of this Report

All findings, recommendations, and conclusions provided in this report are based on the authors best scientific and professional knowledge at the time of compilation, as well as information available at the time of compilation. This report, or any part of form thereof, may not be amended or extended in any way without the prior written consent of the authors. Any recommendations, statements, or conclusions drawn from, or based on, this report must clearly cite or make reference to this report. Whenever such recommendations, statements, or conclusions form part of another report, whether main or other, relating to the current investigation, this report must be included in its entirety.

1.6. Relevant Legislation: Terrestrial Biodiversity

The following legislation was taken into account whilst compiling this report:

1.6.1. Provincial

The Mpumalanga Nature Conservation Act (Act 10 of 1998), in its entirety, with special reference to:

- Schedule 1: Specially Protected Game
- Schedule 2: Protected Game
- Schedule 4: Protected Wild Animals
- Schedule 7: Invertebrates
- Schedule 11: Protected Plants
- Schedule 12: Specially Protected Plants
- Schedule 13: Invader Weeds and Plants

The above-mentioned Nature Conservation Act accompanied by all amendments is regarded by the Mpumalanga Province as the legal binding, provincial documents, providing regulations, guidelines and procedures with the aim of protecting game and fish, the conservation of flora and fauna, and the destruction of problematic (vermin and invasive) species.

1.6.2. National

- National Environmental Management Act / NEMA (Act No 107 of 1998), and all amendments and supplementary listings and/or regulations.
- Environment Conservation Act (ECA) (No 73 of 1989) and amendments.
- National Environmental Management Act: Biodiversity Act / NEMA:BA (Act No. 10 of 2004) and amendments.
- National Forest Act 1998 / NFA (No 84 of 1998).
- National Veld and Forest Fire Act (Act No. 101 of 1998).
- Conservation of Agricultural Resources Act / CARA (Act No. 43 of 1983) and amendments.

1.6.3. International

- Convention on International Trade in Endangered Species of Fauna and Flora (CITES; https://cites.org/eng).
- The Convention on Biological Diversity (CBD; https://www.cbd.int/).
- The Convention on the Conservation of Migratory Species of Wild Animals (CMS; https://www.cms.int/).

1.7. Relevant Legislation: Aquatic Biodiversity

The link between ecological integrity of freshwater resources and their continued provision of valuable ecosystem goods and services to burgeoning populations is well-recognised, both globally and nationally (Rivers-Moore et al., 2007). In response to the importance

of freshwater aquatic resources, protection of wetlands and rivers has been campaigned at national and international levels. A strong legislative framework which backs up South Africa's obligations to numerous international conservation agreements creates the necessary enabling legal framework for the protection of freshwater resources in the country. Relevant environmental legislation pertaining to the protection and use of aquatic ecosystems (i.e. wetlands and rivers) in South Africa has been summarized below.

1.7.1. South African Constitution 108 of 1996

Section 24 of Chapter 2 of the Bill of Rights No. 108 of 1996 states that everyone has the right to:

(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.

1.7.2. National Environmental Management Act 107 of 1998

Wetlands and other watercourses defined in the NWA are also protected in the National Environmental Management Act (Act 107 of 1998), (NEMA). The act lists several activities that require authorisation before they can be implemented. NEMA lists various activities that require authorisation when located within 32 m or less from the edge of a wetland or other watercourse type.

1.7.3. National Water Act (Act No. 36 of 1998)

According to the National Water Act (Act No. 36 of 1998), a water resource is defined as: "a watercourse, surface water, estuary, or aquifer. A watercourse in turn refers to

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. Reference to a watercourse includes, where relevant, its bed and banks."

A wetland is defined as: "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances support or would support vegetation typically adapted to life in saturated soil."

Chapter 4 of the Act deals with the regulation of the use of water and the requirements for controlled activities, general authorisations, and licenses. In general, a water use must be licensed unless: it is listed in Schedule 1 of the Act as an existing lawful water use, or is permissible under a general authorisation, or if a responsible authority waives the need for a license.

According to the Department of Water and Sanitation (DWS), any activity that falls within the temporary zone of a wetland or the 1:100 year floodline (whichever is greater) qualifies as a Section 21 water use activity (depending on the use) and will thus require either a general authorization or Water Use License (WUL). According to the NWA, an application for a WUL should be submitted to the DWS if any of the above activities are to be undertaken.

Section 21 of the National Water Act (NWA Act No. 36 of 1998) covers the following activities, which might be applicable to the proposed project. According to Section 21 of the NWA and in relation to the river ecosystem, the following activity is considered a use, and therefore requires a water use license:

- 21 (c) impeding or diverting the flow of water in a watercourse;
- 21 (i) altering the bed, banks, course or characteristics of a watercourse;

In terms of Section 22 (1), a person may only undertake the abovementioned water uses if it is appropriately authorised:

22(1) A person may only use water

(a) without a licence
  (i) if that water use is permissible under Schedule 1;
  (ii) if that water use is permissible as a continuation of an existing lawful use; or
  (iii) if that water use is permissible in terms of a general authorisation issued under section 39;
(b) if the water use is authorised by a licence under this Act; or
(c) if the responsible authority has dispensed with a licence requirement under subsection (3).

1.7.4. Other Relevant Legislation

- The National Forests Act No. 84 of 1998;
- The Natural Heritage Resources Act No. 25 of 1999;
- The National Environmental Management: Protected Areas Act No. 57 of 2003;
- Minerals and Petroleum Resources Development Act No. 28 of 2002;

2. METHODOLOGY

2.1. Assessment Approach and Philosophy

2.1.1. Terrestrial Biodiversity

The assessment will be conducted according to the 2014 EIA Regulations, as amended 7 April 2017, as well as within the best-practice guidelines and principles for biodiversity assessment (Brownlie et al., 2006; de Villiers et al., 2005).

This includes adherence to the following broad principles:

- That a precautionary and risk-averse approach be adopted towards projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning in threatened ecosystems or designated sensitive areas: i.e., Critical Biodiversity Areas (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans), and Freshwater Ecosystem Priority Areas.
- Demonstrate how the proponent intends on complying with the principles contained in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA), which, amongst other things, indicates that environmental management should, in order of priority aim to:
    - Avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity;
    - Avoid degradation of the environment;
    - Avoid jeopardising ecosystem integrity;
    - Pursue the best practicable environmental option by means of integrated environmental management;
    - Protect the environment as the people's common heritage;
    - Control and minimise environmental damage; and
    - Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic, or stressed ecosystems.

These principles serve as guidelines for all decision-making concerning matters that may affect the environment. As such, it is incumbent upon the proponent to show how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by NEMA.

In order to adhere to the above principles and best-practice guidelines, the basis for the study approach and assessment philosophy included baseline data collection, desktop studies, and site walkovers/field surveys of the property, describing:

- The broad botanical characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size,

relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of pattern, the following was studied:

Community and ecosystem level:

» The main vegetation types and plant communities (Dayaram et al., 2018; Mucina and Rutherford, 2006), their aerial extents, and interaction with neighbouring types, soils, or topography.
» Threatened or Vulnerable ecosystems (cf. new South African vegetation map/National Spatial Biodiversity Assessment1, fine-scale systematic conservation plans, etc) (South African National Biodiversity Institute, 2019).

Species-level:

» Species of Conservation Concern (SoCC: Red List and protected species), giving GPS location, if possible (Raimondo et al., 2009).
» Estimated population sizes and viabilities of SoCC present on site (including the degree of confidence in prediction based on availability of information and specialist knowledge; i.e., High = 70 – 100% confident, Medium = 40 – 70% confident, Low = 0 – 40% confident).
» Probability of other SoCC occurring in the region of the site (include degree of confidence).

Other pattern issues:

» Any significant landscape features, or rare or important vegetation associations, such as seasonal wetlands, alluvium, seeps, sandstone outcroppings, steep southern aspects, drainage lines etc. in the vicinity.
» The extent of alien plant cover within the site, and whether any infestations are the result of prior soil disturbance, such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than an infestation of undisturbed sites).
» The condition of the site in terms of current or previous land uses.

In terms of process, the following was studied:

» The key ecological "drivers" of ecosystems on the site and in the vicinity.
» Any mapped spatial components of ecological processes that may occur on site or in the vicinity (i.e., corridors such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and vegetation boundaries such as edaphic interfaces, upland-lowland interfaces, or biome boundaries).

» Any possible changes in key processes e.g., increased fire frequency or drainage/artificial recharge of aquatic systems.

Any further studies that may be required during or after the EIA process will be outlined, together with all relevant legislation, permits, and standards that would apply to the development.

The opportunities and constraints for development is described and shown graphically on an aerial photograph, satellite image, or map delineated at an appropriate level of spatial accuracy.

2.1.2. Aquatic Biodiversity

The delineation and classification of freshwater resources were conducted using the standards and guidelines produced by the DWS (DWAF, 2005 & 2007) and the South African National Biodiversity Institute (SANBI, 2009).

In addition to these guidelines, the general approach to freshwater habitat assessment was furthermore based on the proposed framework for wetland assessment as proposed within the Water Research Commission's (WRC) report titled: "Development of a decision-support framework for wetland assessment in South Africa and a Decision-Support Protocol for the rapid assessment of wetland ecological condition" (Ollis et. al., 2014). A schematic illustration of the proposed decision-support framework for wetland assessment in South Africa is provided in Figure 2 below.

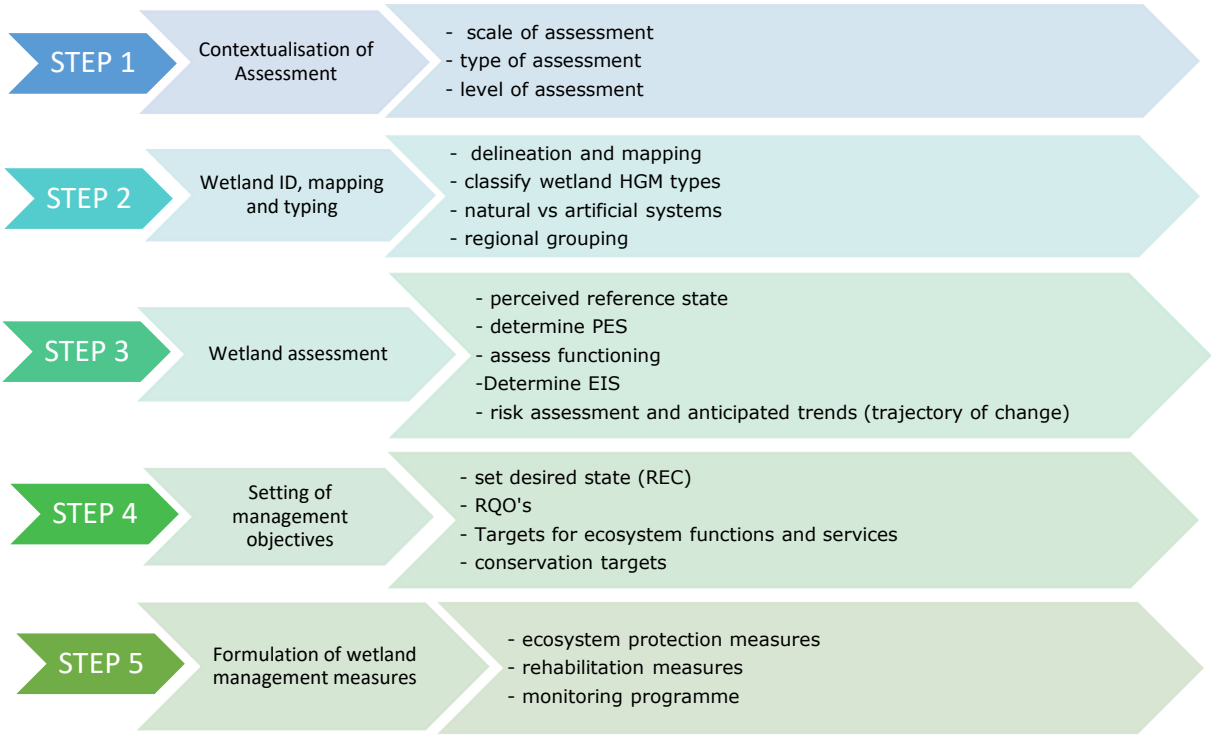

Figure 2: Proposed decision support framework for wetland assessment in South Africa (after Ollis et al., 2014).

2.2. Data Exploration and Review

Data sources from the literature and GIS spatial information were consulted and used where necessary in the study, and include the following (see Figure 3 for the area used to compile a plant species list, and Table 1 for a summary):

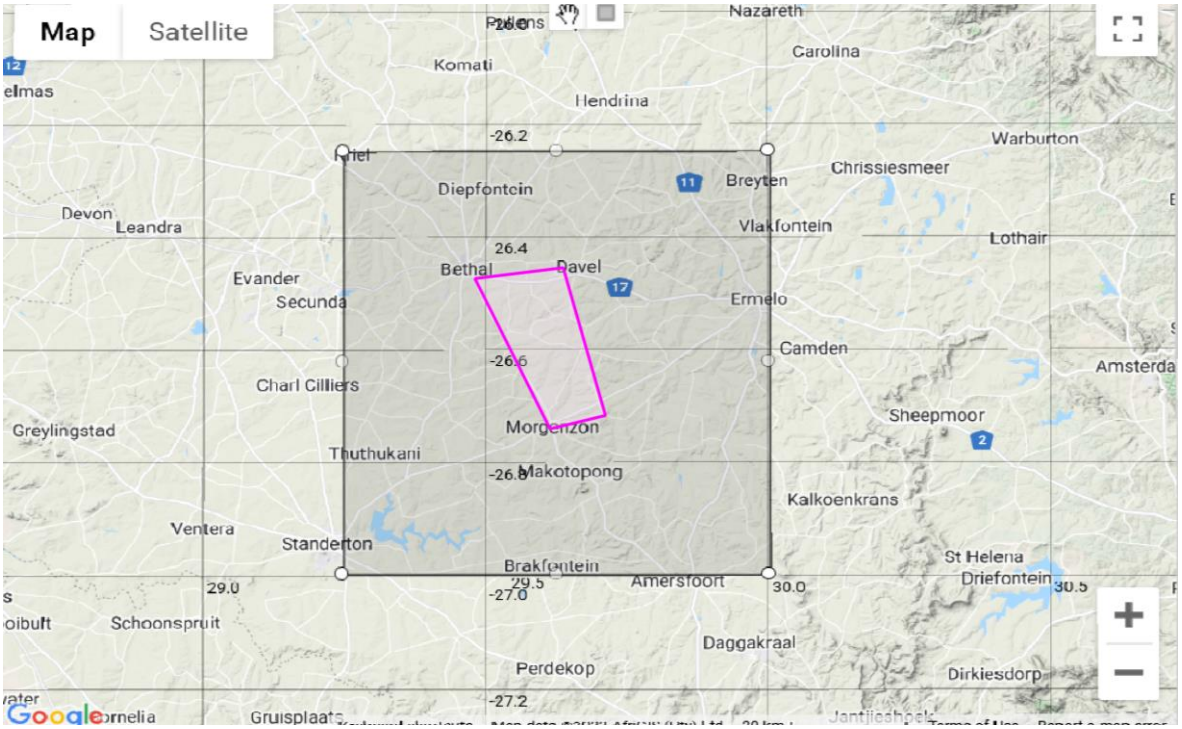

Figure 3: Extent of the study area, as well as the area used to extract data from POSA. Extracted data was used to compile a list of plant species that may potentially occur within the study area, as well as the surrounding area, and provide an indication of potential Species of Conservation Concern that may be found within this area.

Vegetation:

- » South African National Vegetation Map (Mucina and Rutherford, 2006) and National List of Threatened Ecosystems (2011): vegetation types and their respective conservation statuses. The latest version of the National Vegetation Map was also consulted to check for any updates of the respective regions (Dayaram et al., 2018; South African National Biodiversity Institute, 2018).
- » Botanical Database of Southern Africa (BODATSA), hosted by the South African National Biodiversity Institute (SANBI; https://posa.sanbi.org; also referred as POSA: Plants of Southern Africa): information on plant species recorded for the Quarter Degree Squares 2629AD, 2629BC, 2629BD, 2629CB, 2629D, 2629DB, 2629CD, 2629DC, and 2629DD. This is a much larger area than required and is a conservative approach that ensures all species possibly occurring within the study area have been represented. It also accounts for the fact that the study area itself might not be well represented in national databases.
- » Threatened Species Programme, Red List of South African Plants (Version 2017.1; http://redlist.sanbi.org/): The IUCN conservation statuses of all listed species were extracted from this database.

Ecosystem:

- » Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment (NFEPA; Nel et al., 2011). This includes rivers, wetlands, and catchments defined in the study area.
- » Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES; Government of South Africa, 2008).
- » Critical Biodiversity Areas for the site and surroundings (CBA Map for Northern Cape; obtained from SANBI Biodiversity GIS (BGIS), specifically http://bgis.sanbi.org/Projects/Detail/203.

Fauna:

The list of mammal and herpetofauna species predicted to occur in the region and their respective likelihood of occurrence within the study area was generated based on known distributions and habitat suitability, based on online and literature sources such as MammalMap, ReptileMap, FrogMap and the ReptileAtlas as well as field guides such as, Skinner & Chimimba (2005), Apps (ed. 2012), Stuart & Stuart (1998), Bates *et al* (2014), Minter *et al*. (2004), Branch (2009) and Du Preez and Carruthers (2009). The literature study focussed on querying the online database to generate species lists for the relevant Quarter Degree Squares (QDS).

The predicted list is typically heavily influenced by factors other than just distribution or biome type. Factors such as habitat suitability, current land use, current levels of disturbance and structural integrity of the habitats all influence the potential for predicted species to occur in the vicinity of the study area. There is a high likelihood that not all mammal species known to occur within the region will be located within the study area and surrounding areas. Therefore, a 'Likelihood of Occurrence' (LOO) and a 'Species of Conservation Concern' review will be applied to any potential omissions in the data set. For the LOO analysis, a full summary of Red List faunal species (IUCN, 2021); (SANBI, 2021), as well as other SCC will be tabulated, with a LOO applied.

Likelihood of Occurrences will be based upon available spatial imagery and will be based on:

- » Habitat suitability;
- » Overlap with known distributions;
- » Rarity of the species; and
- » Current Impacts.

Mammal distribution data were obtained from the following sources:

- » The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- » The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (www.ewt.org.za) (EWT, 2016);

- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2017) (mammalmap.adu.org.za);
- Stuarts' Field Guide to Mammals of Southern Africa – Including Angola, Zambia & Malawi (Suart & Stuart, 2015)
- A Field Guide to the Tracks and Signs of Southern, Central and East African Wildlife (Stuart & Stuart, 2013).
- Smither's Mammals of Southern Africa (Apps, ed. 2012)

Herpetofauna distribution and species data were obtained from the following sources:

- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates et al.,
- 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- Animal Demography Unit (ADU) - FrogMAP (frogmap.adu.org.za);
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner et
- al., 2004); and
- Ensuring a future for South Africa's frogs (Measey, 2011).

Aquatic Resources:

The assessment was initiated with a survey of the pertinent literature, past reports and the various conservation plans that exist for the study region. The desktop delineation of all freshwater resources (rivers / streams and wetlands) within 500m (DWS regulated area) of the proposed project site was undertaken by analysing available 10m contour lines and colour aerial photography supplemented by Google EarthTM imagery where more up to date imagery was needed. Digitization and mapping were undertaken using ArcGis software. All of the mapped freshwater resources were then broadly subdivided into distinct resource units (i.e. classified as either riverine or wetland systems / habitat). This was undertaken based on aerial photographic analysis and professional experience in working in the region.

Following the desktop identification and mapping exercise, freshwater resource features where confirmed and their boundaries refined in-field

Table 1: Information and data coverages used to inform the ecological assessment.

	Data/Coverage Type	Relevance	Source
Biophysical Context	**Colour Aerial Photography**	Desktop mapping of habitat/ecological features	National Geo-Spatial Information (NGI)
	Latest Google Earth™ imagery	To supplement available aerial photography	Google Earth™ On-line
	1:50 000 River Line (GIS Coverage)	Highlight potential on-site and local rivers and wetlands and map local drainage network.	CSIR (2011)
	National Land-Cover	Shows the land-use and disturbances/transformations within and around the impacted zone.	DEA (2015)
	South African Vegetation Map (GIS Coverage)	Classify vegetation types and determination of reference primary vegetation	Mucina & Rutherford (2012; 2018); Dayaram et al., 2018
	NFEPA: river and wetland inventories (GIS Coverage)	Highlight potential on-site and local rivers and wetlands	CSIR (2011)
Conservation and Distribution Context	**National Biodiversity Assessment – Threatened Ecosystems** (GIS Coverage)	Determination of national threat status of local vegetation types	SANBI (2011)
	Mpumalanga Biodiversity Sector Plan: Critical Biodiversity Areas (GIS Coverage)	Determination of provincial terrestrial/freshwater conservation priorities and biodiversity buffers	SANBI (2016)
	SANBI's PRECIS (National Herbarium Pretoria Computerized Information System) electronic database	Determination of plant species composition within the region as well as potential conservation important plants.	http://posa.sanbi.org
	Red Data Books (Red Data Lists of Plants)	Determination of endangered and threatened plants,	Red List of South African Plants (2011); http://redlist.sanbi.org/

2.3. Criteria used to Assess the Site Sensitivity during the Scoping Phase

The broad-scale scoping phase ecological sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in the literature and various spatial databases (e.g. SIBIS, BGIS). The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

Table 2: Explanation of sensitivity rating

Sensitivity	Factors contributing to sensitivity	Examples of qualifying features
VERY HIGH	Indigenous natural areas that are highly positive for any of the following: ▪ Critical habitat for range restricted species of conservation concern that have a distribution range of less than 10 km^2 ▪ Presence of species of conservation concern listed on the IUCN Red List of Threatened	▪ CBA 1 areas ▪ Remaining areas of vegetation type listed in Draft Ecosystem List of NEM:BA as Critically Endangered,

Sensitivity	Factors contributing to sensitivity	Examples of qualifying features
	Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare ▪ Habitats/Vegetation types with high conservation status (low proportion remaining intact, highly fragmented, habitat for species that are at risk). ▪ Protected habitats (areas protected according to national/provincial legislation, e.g. National Forests Act, Draft Ecosystem List of NEM:BA, Integrated Coastal Zone Management Act, Mountain Catchment Areas, Lake Areas Development Act). These areas/habitats are irreplaceable in terms of species of conservation concern May also be positive for the following: ▪ High intrinsic biodiversity value (high species richness and/or turnover, unique ecosystems) ▪ High value ecological goods and services (e.g. water supply, erosion control, soil formation, carbon storage, pollination, refugia, food production, raw materials, genetic resources, cultural value) ▪ Low ability to respond to disturbance (low resilience, dominant species very old).	Endangered, or Vulnerable. ▪ Protected forest patches. ▪ Confirmed presence of populations of species of conservation concern (Critically Endangered, Endangered, Vulnerable & Rare)
HIGH	Indigenous natural areas that are positive for any of the following: ▪ High intrinsic biodiversity value (moderate/high species richness and/or turnover). ▪ Confirmed habitat highly suitable for species of conservation concern (Those species listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria). ▪ Moderate ability to respond to disturbance (moderate resilience, dominant species of intermediate age). ▪ Moderate conservation status (moderate proportion remaining intact, moderately fragmented, habitat for species that are at risk). ▪ Moderate to high value ecological goods & services (e.g. water supply, erosion control, soil formation, carbon storage, pollination,	▪ CBA 2 "critical biodiversity areas". ▪ Confirmed habitat where species of conservation concern could potentially occur (habitat is suitable, but no confirmed records). ▪ Habitat containing individuals of extreme age. ▪ Habitat with low ability to recover from disturbance. ▪ Habitat with exceptionally high diversity (richness or turnover). ▪ Habitat with unique species composition and narrow distribution.

Sensitivity	Factors contributing to sensitivity	Examples of qualifying features
	refugia, food production, raw materials, genetic resources, cultural value). These areas/habitats are unsuitable for development due to a very likely impact on species of conservation concern May also be positive for the following: ▪ Protected habitats (areas protected according to national/provincial legislation, e.g. National Forests Act, Draft Coastal Zone Management Act, Mountain Catchment Areas Act, Lake Areas Development Act)	▪ Ecosystem providing high value ecosystem goods and services.
Medium	Indigenous natural areas that are positive for: ▪ Suspected habitat for species of conservation concern based either on there being records for this species collected I the past prior to 2002 or being a natural area included in a habitat suitability model (Those species listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria). Indigenous natural areas that are positive for one or two of the factors listed below, ▪ Moderate intrinsic biodiversity value (moderate species richness and/or turnover). ▪ Moderate to moderate low ability to respond to disturbance (moderate resilience, dominant species of intermediate age). ▪ Moderate conservation status (moderate proportion remaining intact, moderately fragmented, habitat for species that are at risk). ▪ Moderate value ecological goods & services (e.g. water supply, erosion control, soil formation, carbon storage, pollination, refugia, food production, raw materials, genetic resources, cultural value).	▪ CBA 2 "corridor areas", ESA 1 and ESA2. ▪ Habitat with moderate diversity (richness or turnover). ▪ Suspected habitat for species of conservation concern.
Low	Degraded or disturbed indigenous natural vegetation No Natural habitat remaining	

*** Please note that this is only a preliminary ecological sensitivity map, and the sensitivity assessment and mapping will be finalised during the EIA phase.**

2.4. Scoping Phase Impact Assessment

The Scoping Phase Impact Assessment will include:

- » a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project;
- » a description and evaluation of environmental issues and potential impacts (including direct, indirect, cumulative impacts and residual risks) that have been identified
- » Direct, indirect, cumulative impacts and residual risks of the identified issues must be evaluated within the Scoping Report in terms of the following criteria:
    - o the nature, which shall include a description of what causes the effect, what will be affected and how it will be affected, for each impact anticipated;
    - o the extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. See Table on the next page.
- » a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- » a comparative evaluation of the identified feasible alternatives, and **nomination of a preferred alternative** for consideration in the EIA phase
- » Identification of potentially significant impacts **to be assessed** within the EIA phase and details of the methodology to be adopted in assessing these impacts. This should be detailed enough to include within the **Plan of Study for EIA** and must include a **description of the proposed method** of assessing the potential environmental impacts associated with the project. This must also include any gaps in knowledge at this point of the study and further recommendations for the EIA Phase. Consideration of areas that would constitute "acceptable and defendable loss" should be included in this discussion.

Example of Impact table summarising the evaluation of Potential Impacts Associated with the Construction of the Facility at the Scoping phase

Impacts Description of the expected impacts. Areas anticipated to be affected. **Desktop Sensitivity Analysis of the Site:** Sensitivity analysis in terms of the impacts expected. Discuss areas of high concern.			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
i.e. Disturbance to and loss of indigenous natural vegetation	Discussion of the consequences of the construction of the facility to the issue/impact considered in column 1.	i.e. Local/Regional/ National	No-Go areas would include the larger drainage lines, and Duneveld.
Gaps in knowledge & recommendations for further study »			

2.5. Assumptions and Limitations

This report deals exclusively with a specifically defined area, and the impacts upon plant biodiversity and natural ecosystems in that area. As such:

» All relevant project information provided by the applicant and/or Environmental Impact Assessment practitioner(s) to the biodiversity specialist(s) was assumed to be correct and valid at the time that it was provided.

Furthermore, information used to inform the assessment was limited to desktop data and GIS coverage's available for the province and district municipality at the time of the assessment as well as available existing specialist studies undertaken within the region.

3. THE IMPORTANCE OF BIODIVERSITY AND CONSERVATION

The term "biodiversity" is used to describe the wide variety (richness and abundance) of plant and animal species occurring in their natural environment or "habitat". Biodiversity not only encompasses all living things but also the series of interactions that sustain them, which are termed "ecological processes".

South Africa's biodiversity provides an important basis for economic growth and development; keeping biodiversity intact is thus vital for ensuring the on-going provision of ecosystem services, for example the production of clean water through comprehensive catchment management practices. The role of biodiversity in combating climate change is also well recognised and further emphasises the key role that biodiversity management plays on a global scale (South African National Biodiversity Institute, 2019).

Typical pressures that natural ecosystems face from human activities include the loss and degradation of natural habitat, invasive alien species, pollution and waste, and climate change (South African National Biodiversity Institute, 2019). High levels of infrastructural and agricultural development typically restrict the connectivity of natural ecosystems, and maintaining connectivity is considered critical for the long-term persistence of both ecosystems and species, in the face of human development and global climate change.

Biodiversity loss places aspects of South Africa's economy and quality of life at risk, and reduces socioeconomic options for future generations. In essence, then, sustainable development is not possible without a healthy biodiversity.

4. CONSERVATION AND FUNCTIONAL IMPORTANCE OF AQUATIC ECOSYSTEMS

Water affects every activity and aspiration of human society and sustains all ecosystems. "Freshwater ecosystems" refer to all inland water bodies whether fresh or saline, including rivers, lakes, wetlands, sub-surface waters, and estuaries (Driver et al., 2011). South Africa's freshwater ecosystems are diverse, ranging from sub-tropical in the north-eastern part of the country, to semi-arid and arid in the interior, to the cool and temperate rivers of the fynbos. Wetlands and rivers form a fascinating and essential part of our natural heritage and are often referred to as the "kidneys" and "arteries" of our living landscapes and this is particularly true in semi-arid countries such as South Africa (Nel et al., 2013). Rivers and their associated riparian zones are vital for supplying freshwater (South Africa's most scarce natural resource) and are important in providing additional biophysical, social, cultural, economic, and aesthetic services (Nel et al., 2013). The health of our rivers and wetlands is measured by the diversity and health of the species we share these resources with. Healthy river ecosystems can increase resilience to the impacts of climate change, by allowing ecosystems and species to adapt as naturally as possible to the changes and by buffering human settlements and activities from the impacts of extreme weather events (Nel et al., 2013). Freshwater ecosystems are likely to be particularly hard hit by rising temperatures and shifting rainfall patterns, and yet healthy, intact freshwater ecosystems are vital for maintaining resilience to climate change and mitigating its impact on human wellbeing by helping to maintain a consistent supply of water and for reducing flood risk and mitigating the impact of flash floods. We, therefore, need to be mindful of the fact that without the integrity of our natural river systems, there will be no sustained long-term economic growth or life (DEA et al., 2013).

Freshwater ecosystems, including rivers and wetlands, are also particularly vulnerable to anthropogenic or human activities, which can often lead to irreversible damage or longer-term, gradual/cumulative changes to freshwater resources and associated aquatic ecosystems. Since channelled systems such as rivers, streams, and drainage lines are generally located at the lowest point in the landscape; they are often the "receivers" of wastes, sediment, and pollutants transported via surface water runoff as well as subsurface water movement (Driver et al., 2011). This combined with the strong connectivity of freshwater ecosystems means that they are highly susceptible to upstream, downstream, and upland impacts, including changes to water quality and quantity as well as changes to aquatic habitat & biota (Driver et al., 2011). South Africa's freshwater ecosystems have been mapped and classified into National Freshwater Ecosystem Priority Areas (NFEPAs). This work shows that 60% of our river ecosystems are threatened and 23% are critically endangered. The situation for wetlands is even worse: 65% of our wetland types are threatened, and 48% are critically endangered (Driver et al., 2011). Recent studies reveal that less than one-third of South Africa's main rivers are considered to be in an ecologically 'natural' state, with the principal threat to freshwater systems being human activities, including river regulation, followed by catchment transformation (Rivers-Moore & Goodman, 2009). South Africa's freshwater fauna also display high levels of threat: at least one-third of freshwater fish indigenous to South Africa are reported as threatened, and a recent southern African study on the conservation status of major

freshwater-dependent taxonomic groups (fishes, molluscs, dragonflies, crabs, and vascular plants) reported far higher levels of threat in South Africa than in the rest of the region (Darwall et al., 2009). Clearly, urgent attention is required to ensure that representative natural examples of the different ecosystems that make up the natural heritage of this country for current and future generations to come. The degradation of South African rivers and wetlands is a concern now recognized by Government as requiring urgent action and the protection of freshwater resources, including rivers and wetlands, is considered fundamental to the sustainable management of South Africa's water resources in the context of the reconstruction and development of the country.

5. DESKTOP ANALYSIS

5.1. Land Use

Land use within the project site is mostly for farming. The study area consists of a mosaic of buildings/structures, active farmland ("agriculture"), fallow land (abandoned farmlands which consist of secondary vegetation; "fallow"), natural grasslands, and freshwater resource features or drainage areas (which is comprised of small streams, wetlands, shallow pans and depressions, and artificial dams).

Farming practices consist a mixture of cultivation (mainly maize with some soya bean cultivation), livestock farming (predominantly cattle on natural to near-natural grasslands and planted pastures), and to lesser extent game farming.

5.2. Conservation Planning / Context

Understanding the conservation context and importance of the study area and surroundings is important to inform decision making regarding the management of the aquatic resources in the area. In this regard, available national, provincial, and regional conservation planning information was used to obtain an overview of the study site (

Table 3: Information and data coverages used to inform the ecological assessment.

Conservation Planning Dataset			Relevant Conservation Feature	Location in Relationship to Project Site	Conservation Planning Status
NATIONAL LEVEL CONSERVATION PLANNING	Terrestrial Features	**National Protected Areas Expansion Strategy**	Focus Area	» Outside of Focus Area: ± 41.6 km north-west of the nearest Focus Area (Moist Escarpment Grassland Focus Area)	Not Classified
		Protected Areas and Conservation Areas (PACA) Database	South African Conservation Area (SACA) and South African Protected Area (SAPA)	Well outside of any SACA and SAPA: » Nearest SACA (Seekoeivlei Nature Reserve) located approximately 88 km to the south. » Nearest SAPA (Rietvlei Private Nature Reserve) located approximately 16 km to the east.	Not Classified
		Vegetation Types	Soweto Highveld Grassland	Vegetation of Study Area	Vulnerable
		Threatened Ecosystems	Soweto Highveld Grassland	Ecosystem of Study Area	Vulnerable
	Freshwater Resource Features	**Strategic Water Source Areas for groundwater and surface water.**	Areas with high groundwater availability and of national importance	Top portion of the study site as well as a portion to the south-west.	Upper Vaal (SWSA_sw)
		National Freshwater Ecosystem Priority Area	River FEPAs (priority sub quaternary catchment areas)	One FEPA1 Priority Sub-Quaternary Catchment (SQC). » This FEPA1 SQC is associate with the Osspruit River. » Approximately 44% of the surface area of this SQC is located within the study area, however the SQC itself covers only approximately 25% of the project site.	One FEPA 1 Priority SQC
				» The bulk (65%) of the study area is located within Upstream Sub-Quaternary Catchments (five SQCs), of which most are associated with the Kwaggalaagte River.	7X Upstream FEPA Catchments
			Kwaggalaagte River (FEPA ID: 1609) – Upstream FEPA River	» The Kwaggalaagte River flows in a southern to south-western direction across the northern half of the project area.	Upstream FEPA River FEPA 1 Priority River

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Table 3: Information and data coverages used to inform the ecological assessment.

Conservation Planning Dataset			Relevant Conservation Feature	Location in Relationship to Project Site	Conservation Planning Status
NATIONAL LEVEL CONSERVATION PLANNING	Terrestrial Features	**National Protected Areas Expansion Strategy**	Focus Area	» Outside of Focus Area: ± 41.6 km north-west of the nearest Focus Area (Moist Escarpment Grassland Focus Area)	Not Classified
		Protected Areas and Conservation Areas (PACA) Database	South African Conservation Area (SACA) and South African Protected Area (SAPA)	Well outside of any SACA and SAPA: » Nearest SACA (Seekoeivlei Nature Reserve) located approximately 88 km to the south. » Nearest SAPA (Rietvlei Private Nature Reserve) located approximately 16 km to the east.	Not Classified
		Vegetation Types	Soweto Highveld Grassland	Vegetation of Study Area	Vulnerable
		Threatened Ecosystems	Soweto Highveld Grassland	Ecosystem of Study Area	Vulnerable
	Freshwater Resource Features	**Strategic Water Source Areas for groundwater and surface water.**	Areas with high groundwater availability and of national importance	Top portion of the study site as well as a portion to the south-west.	Upper Vaal (SWSA_sw)
		National Freshwater Ecosystem Priority Area	River FEPAs (priority sub quaternary catchment areas)	One FEPA1 Priority Sub-Quaternary Catchment (SQC). » This FEPA1 SQC is associate with the Osspruit River. » Approximately 44% of the surface area of this SQC is located within the study area, however the SQC itself covers only approximately 25% of the project site.	One FEPA 1 Priority SQC
				» The bulk (65%) of the study area is located within Upstream Sub-Quaternary Catchments (five SQCs), of which most are associated with the Kwaggalaagte River.	7X Upstream FEPA Catchments
			Kwaggalaagte River (FEPA ID: 1609) – Upstream FEPA River	» The Kwaggalaagte River flows in a southern to south-western direction across the northern half of the project area.	Upstream FEPA River FEPA 1 Priority River

NATIONAL LEVEL CONSERVATION PLANNING	Freshwater Resource Features	**Strategic Water Source Areas for groundwater and surface water. National Freshwater Ecosystem Priority Area**	Un-named River (FEPA ID: 1633) – Upstream FEPA River	» Tributary of the Kwaggalaagte River. » Flows in a south-western direction across the north-eastern portion of the project site to terminate into the Kwaggalaagte River (within the project site)	
			Blesbokspruit River (FEPA ID: 1570) – Upstream FEPA River	» Upper reach of the Blesbokspruit River traverse only a small portion of the north-western corner of the project site. » The river flows in a north-western direction within the project site.	
			Osspruit River (FEPA ID: 1704) – FEPA1 Priority River	» The Osspruit River flows in a south-western direction across the southern half of the project area.	FEPA 1 Priority River
			NFEPA Wetlands	» Approximately 20 wetlands within the project site is classified as FEPA priority wetlands. » The remaining 144 natural wetlands within the project site is not regarded as FEPA priority wetlands. » Approximately 188 artificial wetlands (dams) occur within the project site	20 FEPA Priority Wetlands
CONSERVATION AND DISTRIBUTION CONTEXT	Terrestrial Features	**MPBSP: Terrestrial Critical Biodiversity Areas**	Ecological Support Areas (ESA)	» Local Corridors: ± 1110.1 ha (3.8%) of project site; » Landscape Corridors: ± 754.3 ha (2.6%) of project site	Terrestrial ESA
			Critical Biodiversity Areas (CBA)	» Optimal Areas: ± 6327.8 ha (21.9%) of project site; » Irreplaceable Areas: ± 2419.9 ha (8.4%) of project site	Terrestrial CBA
	Freshwater Resource Features	**MPBSP: Freshwater Critical Biodiversity Areas**	Ecological Support Areas (ESA)	» Wetland Clusters: ± 457.6 ha (1.6%) of project site; » Wetlands: ± 395.1 ha (1.4%) of project site; » Important Sub-catchments: ± 4860.9ha (16.8%) of project site.	Freshwater ESA
			Critical Biodiversity Areas (CBA)	» Rivers: ± 261.7 ha (0.9%) of project site; » Wetlands: ± 395 ha (0.1%) of project site	Freshwater CBA

5.2.1. National Protected Areas Expansion Strategy, Protected Areas and Conservation Areas

Land-based protected area expansion targets include large, intact, and unfragmented areas of high importance for biodiversity representation and ecological persistence, which are suitable for the creation or expansion of large protected areas. Such areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy 2008 (NPAES). They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES, and were designed with a strong emphasis on climate change resilience and requirements for protecting terrestrial and freshwater ecosystems (FEPA: Freshwater Ecosystem Priority Areas). These areas should not be seen as future boundaries of protected areas, since in many cases only a portion of a particular focus area would be required to meet the protected area targets set in NPAES. They are also not a replacement for fine-scale planning, which may identify a range of different priority sites based on local requirements, constraints, and opportunities.

The site is **not** located within any NPAES Areas or any Formal-/Informal Protected Areas (Figure 6). The nearest NPAES Area is located approximately 41.6 km north-west from the nearest focus area (Moist Escarpment Grassland focus area), while the nearest Formal Protected Area is located approximately 88 km south of the site (Seekoeivlei Nature Reserve) and the nearest Informal Protected Area approximately 16 km to the east (Rietvlei Private Nature Reserve).

The proposed development will won't have an impact on national ecosystem-specific protected area targets.

5.2.2. Strategic Water Source Areas (SWSAs)

Strategic Water Source Areas (SWSAs) are defined as areas of land that either:

- supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important;
- have high groundwater recharge and where the groundwater forms a nationally important resource;
- areas that meet both criteria mentioned above.

They include transboundary Water Source Areas that extend into Lesotho and Swaziland.

The project site is located outside of any SWSA for groundwater water but is located within a SWSA for surface water; namely the Upper Vaal SWSA-sw (Figure 4).

Due to the nature of wind energy developments as well as the associated grid infrastructure development, (limited footprint, use of chemicals, hazardous and toxic materials as well as the fact the only likely direct impact on freshwater resources will be

road crossings), there is a low probability that such developments will have a significant impact on important freshwater resource features. The most likely/significant impact will be a local change in runoff and infiltration patterns within the affected catchments, due to a local modification of roughage (vegetation cover) and natural geomorphology within and around the construction and infrastructure areas.

These impacts associated with the WEF and grid infrastructure development can however, be successfully mitigated through careful planning and with effective mitigation measures in place.

In terms of Solar PV developments, the most likely impact associated with such a development will be similar to that of WEF developments, where the most significant impact will be on a local change in runoff and infiltration patterns within the affected catchments. However, the significance of these impacts is typically a bit higher than for WEF developments, as larger contiguous areas are impacted, lowering the buffering capacity of these areas. The significance of these impacts is however also largely influence by various local characteristics, such as slope, soil erodibility, soil texture, current roughage (vegetation cover), distance from freshwater resource features as well as the size of the catchment being impacted. The ability of the downslope, freshwater resource features, to buffer itself against these changes in their catchments is also dependent on various factors such as the size of the wetland relative to the catchment, the type of vegetation coverage and the current ecological condition.

With meticulous planning, especially in terms of the layout design and location of the PV solar facility, as well as the implementation of effective mitigation measures, the significance of these impacts can be significantly reduced to acceptable levels.

5.2.3. National Freshwater Ecosystem Priority Areas (2011) Database

The National Freshwater Ecosystems Priority Areas (NFEPA) (2011) database provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports the sustainable use of water resources. The spatial priority areas are known as Freshwater Ecosystem Priority Areas (FEPAs).

FEPAs were identified based on:

- Representation of ecosystem types and flagship free-flowing rivers.
- Maintenance of water supply areas in areas with high water yield.
- Identification of connected ecosystems.
- Preferential identification of FEPAs that overlapped with"
    - Any free-flowing river
    - Priority estuaries identified in the National Biodiversity Assessment 2011.
    - Existing protected areas and focus areas for protected area expansion identified in the National Protected Area Expansion Strategy.

FEPA maps show various different categories, each with different management implications. The categories include river FEPAs and associated sub-quaternary catchments, wetland FEPAs, wetland clusters, Fish Support Areas (FSAs) and associated sub-quaternary catchments, fish sanctuaries, phase 2 FEPAs and associated sub-quaternary catchments, and Upstream Management Areas (UMAs).

5.2.3.1. NFEPA: River and Sub-Quaternary Catchments

A review of the NFEPA coverage for the study area (Figure 4) revealed that one FEPA1 priority sub-quaternary catchment will potentially be impacted by the proposed development. Such FEPA1 priority sub-quaternary catchments are drained by FEPA Rivers that meet biodiversity targets for river ecosystems and threatened fish species, and are currently in a good condition (A or B ecological category). Although FEPA status applies to the actual river reach within such a sub-quaternary catchment. The mapping of the whole sub-quaternary catchment indicates that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition (A or B ecological category) of the river reach (Nel, et al., 2011).

Approximately 44% of the FEPA sub-quaternary catchment is located within the project site. However, this priority sub-quaternary catchment only covers about 25% of the total project site. The river associated with this sub-quaternary catchment is the Osspruit River (FEPA1 Priority River) which flows across the project site (within the southern half) (Nel, *et al*., 2011).

The Osspruit River is a fairly short (34 km) perennial watercourse, flowing in a largely south-western direction, feeding into the Blesbokspruit River. This river along with its smaller drainage networks, drains most of the southern portion of the project site. Furthermore, this river is classified as a Lower Foothill River (according to geomorphological zonation) with a mostly V4 (confined valley floodplain) and in some portions a V2 (flood plain confined to one side) valley form (Nel, et al., 2011). According to DWAFs 1999 Present Ecological State for mainstream rivers this watercourse was classified as Moderately Modified (Class C) (Kleynhans, 2000).

Furthermore, five Upstream sub-quaternary catchments are located within the project site (covering the remaining 75% of the project site). Most of these sub-quaternary catchments are fairly small to moderate in size, apart from the sub-quaternary catchment covering most of the central portion of the project site. Three of these sub-quaternary catchments are drained by the Kwaggaslaagte River and its associated tributaries, whilst the other two sub-quaternary catchments are drained by the Blesbokspruit River.

These UMAs represent sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas but do not include management areas for wetland FEPAs, which need to be determined at a finer scale (Nel, *et al*., 2011).

The Kwaggaslaagte River as well its associated smaller drainage networks/tributaries, drain most of the northern half of the project site. This river as well as the larger tributaries are perennial in nature and predominantly flow in a western to south-western direction, across the northern portion of the project site. The Kwaggaslaagte River is regarded as an important tributary of the upper reaches of the Blesbok River. The higher lying portion of the Kwaggaslaagte River as well as the higher lying tributaries are classified as Upper Foothill reaches whilst the lower lying portion of the Kwaggaslaagter River and associated tributaries are classified as Lower Foothill reaches (according to geomorphological zonation). The valley form of the Kwaggaslaagte River and associated tributaries are predominantly V4 (confined valley floodplain), and to a lesser extent, V2 (flood plain confined to one side) (Nel, et al., 2011). The Present Ecological State (DWAF, 1999) of the Kwaggaslaagte River and its associated tributaries are classified as Moderately Modified (Class C) (Kleynhans, 2000).

A very small portion to the north (far northern corner) as well as most of the central portion of the project site is drained by the perennial Blesbokspruit River. The headwater source is located within the northern most part of the project site, from where the river flow over a fairly short distance in a north-western direction away from the project site. The river gradually changes direction to eventually flow in a southern direction towards the Vaal River. The higher lying reach of the river is classified as Upper Foothill reach whilst the lower lying reach is classified as a Lower Foothill reach (according to geomorphological zonation). The valley form of the upper and middle reach, of the Blesbokspruit River, are predominantly V4 (confined valley floodplain), and to a lesser extent, V2 (flood plain confined to one side) (Nel, et al., 2011). The Present Ecological State (DWAF, 1999) of the Blesbokspruit River and its associated tributaries are classified as Moderately Modified (Class C) (Kleynhans, 2000).

Refer to Section 5.2.2, for a description of the potential impacts, associated with WEF, SEF and grid developments, on freshwater resource features and their associated catchments.

With meticulous planning, especially in terms of the layout design and location of infrastructure, as well as the implementation of effective mitigation measures, the significance of these impacts can be significantly reduced to acceptable levels. It is furthermore recommended that where watercourses are to be crossed by the access routes, existing crossings should be used/upgraded.

5.2.3.2. NFEPA: Wetlands

A review of the NFEPA coverage for the study area (Figure 4) revealed that a large amount of wetland features occur within the project site (332 wetland features) (Nel, et al., 2011). Of these wetland features, most (188 features) are classified as Non-FEPA, artificial wetland features, and represent the numerous dams/reservoirs (mainly instream), that characterize the project site. Most of these artificial dam features are fairly small in size (average size of dam features; 0.85 ha).

Of the 144 natural wetlands, only 20 wetlands have been listed as FEPA priority wetland features (Nel, et al., 2011). A summary of the natural wetlands, occurring within the project site, as mapped within the NFEPA spatial coverage map, are provided below in Table 4.

Table 4: Summary of NFEPA Wetlands mapped within the project site.

Hydrogeomorphic Unit	Number of Wetlands	Average Size (ha)	Largest Feature (ha)	FEPA Priority Wetlands (amount)	Average Size of FEPA Priority Wetlands (ha)	Largest FEPA Priority Wetland (ha)	WETLAND CONDITION				
							AB: Natural or Good	C: Moderately Modified	Heavily to Critically Modified		
									Z1[1]	Z2[2]	Z3[3]
Channelled valley-bottom	59	3.4	167	9	0.8	6	11	17	5		26
Unchannelled valley-bottom	14	0.2	0.5	9	0.1	0.3	11	2	1		
Depression	8	2.7	15	1	N/A	1.2	4	3	1		
Flat	8	0.2	1	0	N/A	N/A	2	2			4
Seep	53	5.3	197	1	N/A	61	11	2	1		39
Valleyhead Seep	2	0.1	0.2	0	N/A	N/A	1				1
TOTAL	**144**	**3.6**	**167**	**20**	**3.6**	**61**	**40**	**26**	**8**	**0**	**70**

The above table indicates that almost half (48.6%) of all the wetland features have been significantly modified (less than 25% of natural land cover remain). Approximately 27.8% of all wetlands found within the project area can be regarded is largely natural or in a good condition. Of these forty intact wetlands, twenty are regarded as FEPA priority wetlands. Most of these FEPA priority wetlands are fairly small in size (>4 ha), apart from single seepage wetland that is fairly significant in terms of size (61 ha) (refer to Figure 4). The bulk of the wetlands that occur within the project site is closely associated with the watercourse/river features (channelled valley bottom wetlands, unchanneled valley bottom wetlands and most of the seepages) (refer to Figure 4).

Based on more recent, available wetland spatial data sets such as the National Wetland Map 5 (SANBI, 2018) and Mpumalanga Highveld Wetlands Map (SANBI, 2014) it is clear the wetland features within the area have been under-mapped (Refer to Sections 5.2.5.2 and 5.4.2 1 as well as Figure 13, Figure 14 and Figure 15). This was confirmed during the desktop delineation of all wetland features within the project site, which are largely in line with the National Wetland Map 5.

[1] Wetlands that overlap with a 1:50,000 "artificial" inland waterbody from the Department of Land Affairs: Chief Directorate of Surveys and Mapping (2005-2007).
[2] Majority of the wetland unit is classified as "artificial" in the wetland delineation GIS layer.
[3] Percentage natural land cover <25%.

Refer to Section 5.2.2, for a description of the potential impacts, associated with WEF, SEF and grid developments, on freshwater resource features and their associated catchments.

With meticulous planning, especially in terms of the layout design and location of infrastructure, as well as the implementation of effective mitigation measures, the significance of these impacts can be significantly reduced to acceptable levels. It is furthermore recommended that the crossing of wetland features should be avoided as far as possible and where crossing of wetland features are unavoidable, only existing crossings may be used or be upgraded.

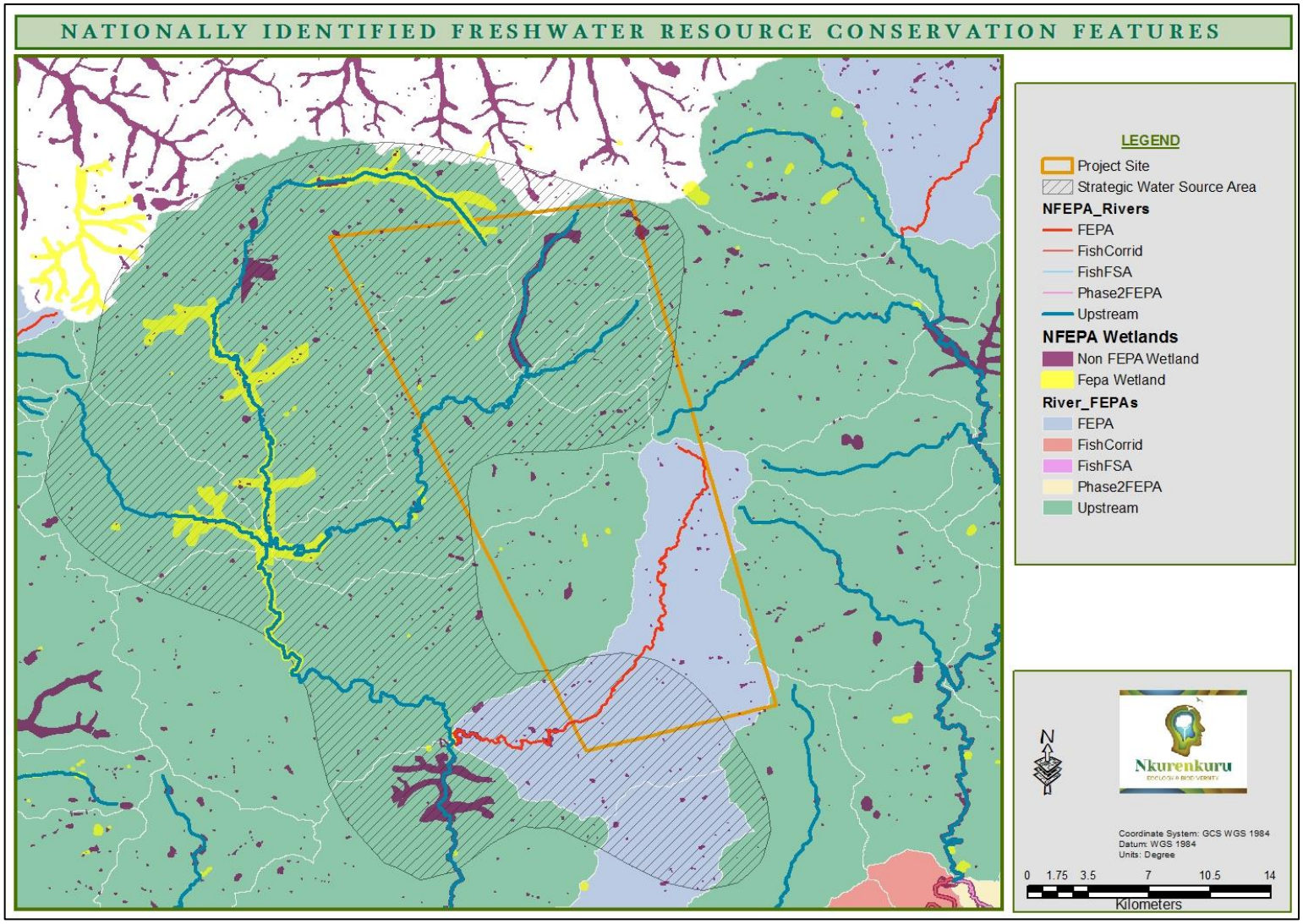

Figure 4: Nationally identified aquatic resource conservation priority areas found within the greater surroundings of the proposed project site..

5.2.4. National Level of Conservation Priorities (Threatened Ecosystems)

South Africa's vegetation types have been assigned a conservation status according to their respective degrees of transformation and rates of conservation. The conservation status of a habitat or vegetation type is based on the amount of its original area that currently remains intact relative to various thresholds. On a national scale, these thresholds are arranged from Least Threatened to Critically Endangered (**Error! Reference source not found.**), as determined by the best available scientific approaches (Driver et al., 2005; South African National Biodiversity Institute, 2019). The level at which an ecosystem becomes Critically Endangered depends on biodiversity targets, and therefore differs from one ecosystem to another, varying from 16% to 36%.

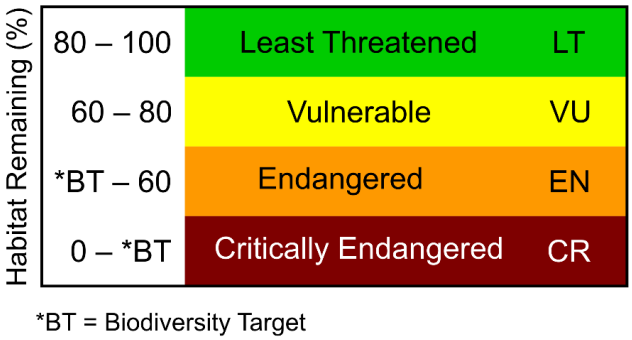

Figure 5: Ecosystem threat status categories (Driver et al., 2005). The biodiversity target represents the minimum conservation requirement.

Nationally, threatened ecosystems that are currently under threat of being transformed by other land uses have been identified and listed. The first national list of threatened terrestrial ecosystems for South Africa was gazetted on 9 December 2011 (NEM:BA National list of ecosystems that are threatened and in need of protection, G 34809, GoN 1002, 9 December 2011). The primary purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function, and composition of threatened ecosystems (SANBI, 2011). NEM:BA lists threatened or protected ecosystems in one of five categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or protected; Least Threatened ecosystems are not listed. There are four main implications of listing ecosystems:

- Planning related implications which are linked to the requirement in the Biodiversity Act (Act 10 of 2004) for listed ecosystems to be taken into account in municipal IDPs and SDFs;
- Environmental authorisation implications in terms of NEMA and the EIA regulations;
- Proactive management implications in terms of the National Biodiversity Act;
- Monitoring and reporting implications in terms of the Biodiversity Act.

The entire study area is mapped as Soweto Highveld Grassland (Gm 8), as currently mapped by the National Vegetation Map 2018 (see section 5.3.1 as well as Figure 6, Figure 11 and Figure 12).

Soweto Highveld Grassland is listed as Vulnerable (Figure 6), within the National Vegetation Map (SANBI, 2018) as well as within the National Threatened Ecosystems Map (NEM:BA, 2011) (Figure 6) and thus no listed ecosystems occur on site.

Soweto Highveld Grassland: The unit is classified as Vulnerable with a target of protection of 24% (Table 5. Only a few patches are statutorily conserved (0.2% of vegetation type) in the Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, and Rolfe's Pan Nature Reserves, or privately conserved in the Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas, and Avalon Nature Reserves, as well as the Heidelberg Natural Heritage Site. Almost half of the area are already transformed (47.3%) by cultivation, urban sprawl, mining, and road infrastructure. Some areas have been flooded by dams, notably the Grootdraai, Leeukuil, Trichardtsfontein, Vaal, and Willem Brummer dams. Erosion is generally very low; only about 93%.

Table 5: Conservation status of the vegetation type occurring in the project site, as well as other vegetation types located within close proximity to the project site.

Vegetation Type	Target (%)	Transformed (%)	Conserved (Statutorily & other reserves)	Conservation Status	
				National Vegetation Map (SAMBI, 2018)	National Ecosystem List (NEMA:BA. 2011)
Soweto Highveld Grassland	24%	47.3%	0.2%	Vulnerable	Vulnerable
Amersfoort Highveld Clay Grassland	27%	24.5%	0%	Least Threatened	Not Listed
Eastern Highveld Grassland	24%	44%	0.3%	Vulnerable	Vulnerable
Wakkerstroom Montane Grassland	27%	6.6%	5.6%	Least Threatened	Endangered

Due to the nature of WEF and grid developments and their associated infrastructure (fairly limited footprint, use of chemicals, hazardous and toxic materials and access routes), there is a low-moderate probability that such a developments will have a significant impact on the status and conservation target set out for the affected vegetation/ecosystem type.

The most likely/significant impact will be a local loss of vegetation in and around the wind turbines, crane pads, access roads, laydown areas, and around all other building infrastructure. Especially the total extent of access routes may potentially have a significant impact on local vegetation. Furthermore, these disturbed areas may become prone to invasion by Invasive Alien Plants (IAPs) which may spread and establish within the surrounding natural areas (especially aggressive IAPs such as the Category 1b IAP; *Campuloclinium macrocephalum*, are regarded as a potentially significant threat). Furthermore, these disturbed areas are vulnerable to erosion which may potentially spread downslope into natural areas.

These potential impacts associated with the WEF development can however, be significantly mitigated to acceptable levels, without affecting sensitive, conservation worthy, plant communities (valuable for the overall conservation of the affected vegetation type).

In terms of Solar PV developments, due to the total contiguous land areas required for such developments, and the fact that very little natural vegetation can persist underneath these PV panels, impacts on vegetation is regarded as the most significant impact. Depending on the size of the such a Solar PV development and the extent of natural habitat that will be impacted, such developments can potentially impact local ecological services and functions provided by natural grassland vegetation. There is a low-moderate probability that this proposed PV solar development (as a standalone), will have a significant impact on the status and conservation target set out for the affected vegetation/ecosystem type. However, the cumulative impact of this PV development, along with the proposed WEF and other potential renewable energy projects, will result in further pressure on this vulnerable grassland type and may have a significant impact on the conservation status of this grassland type.

The removal of large tract of natural vegetation will render these areas vulnerable to erosion, and these erosion features may spread into fringing natural areas. Furthermore, these disturbed areas may become prone to invasion by Invasive Alien Plants (IAPs) which may spread and establish within the surrounding natural areas.

Meticulous planning, especially in terms of the location of the PV solar facility, as well as the implementation of effective mitigation measures, is crucial, in order to avoid significant impacts on natural Soweto Highveld Grassland areas (location within current and previously disturbed areas). Effective mitigation measures should significantly reduce the potential threat posed by erosion and IAPs.

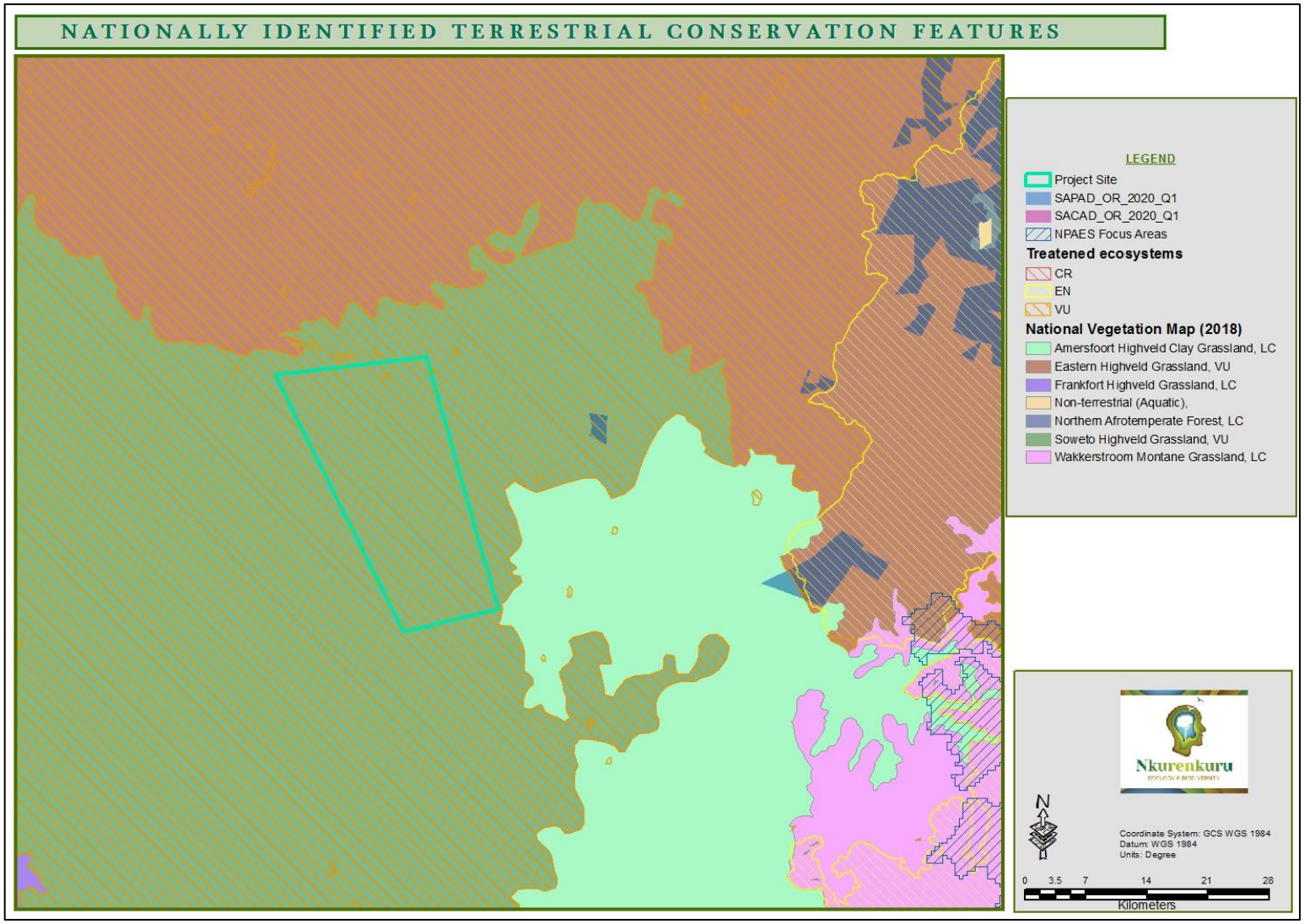

Figure 6: Nationally identified terrestrial conservation priority areas found within the greater surroundings of project site.

5.2.5. Critical Biodiversity Areas and Broad Scale Ecological Processes

The Mpumalanga Biodiversity Conservation Plan (MBCP) is a plan developed conjointly by the Mpumalanga Tourism and Parks Agency (MPTA) and Department of Agriculture and land Administration (DALA) to guide conservation and land-use decisions in the province in order to support sustainable development.

Terrestrial and Freshwater Critical Biodiversity Areas (CBA) have been identified for the entire Mpumalanga Province and are published by SANBI (http://bgis.sanbi.org/). This biodiversity assessment identifies CBAs representing biodiversity priority areas that should be maintained in a natural to near-natural state. CBA maps show the most efficient selection and classification of land portions to be safeguarded so that ecosystem functioning is maintained and national biodiversity objectives are met (see Table 6 for a summary of the different terrestrial and freshwater features underpinning the various CBA maps and also refer to Table 7for a summary of the land-use guidelines recommended for each feature).

5.2.5.1. Terrestrial CBAs

According to Figure 7 and Figure 9, the majority of the project site is located within a CBA: Optimal area (41%), whilst 36% of the project site have been modified to some extent, either through cultivation, ploughing (historical and current) or through infrastructure. Only 6% of the project site is regarded as Irreplaceable CBA. Furthermore, four percent of the project area is regarded as potential important corridor areas. These areas are either associated with ridge/hill systems or are areas that are closely associated with extensive freshwater features.

From a developmental perspective, development within the Heavily and Moderately Modified Areas are regarded as the most suitable/preferable. Development within the Other Natural Areas are also regarded as acceptable, with the implementation of appropriate mitigation measures. In terms of the CBAs and ESAs, development within the Irreplaceable CBAs are regarded as unacceptable and these areas should be regarded as "No-Go" areas for both the WEF and SEF developments. The Optimal CBAs as well as the Local Corridor- and Landscape Corridor ESAs are regarded as unsuitable/unacceptable for the development of the Solar PV facility due to the nature of the development (transformation of large contiguous areas). As for the development of the Wind Energy Facility, some placement of wind turbines, cabling and access roads, within these Optimal Natural Areas, are regarded acceptable. However, construction activities within these areas should be restricted as far as possible, and to a small as possible area. Existing access routes should be used as far as possible. Meticulous planning, especially in terms of the location of wind turbines and any new access routes should be done (in close consultation with the Ecologist).

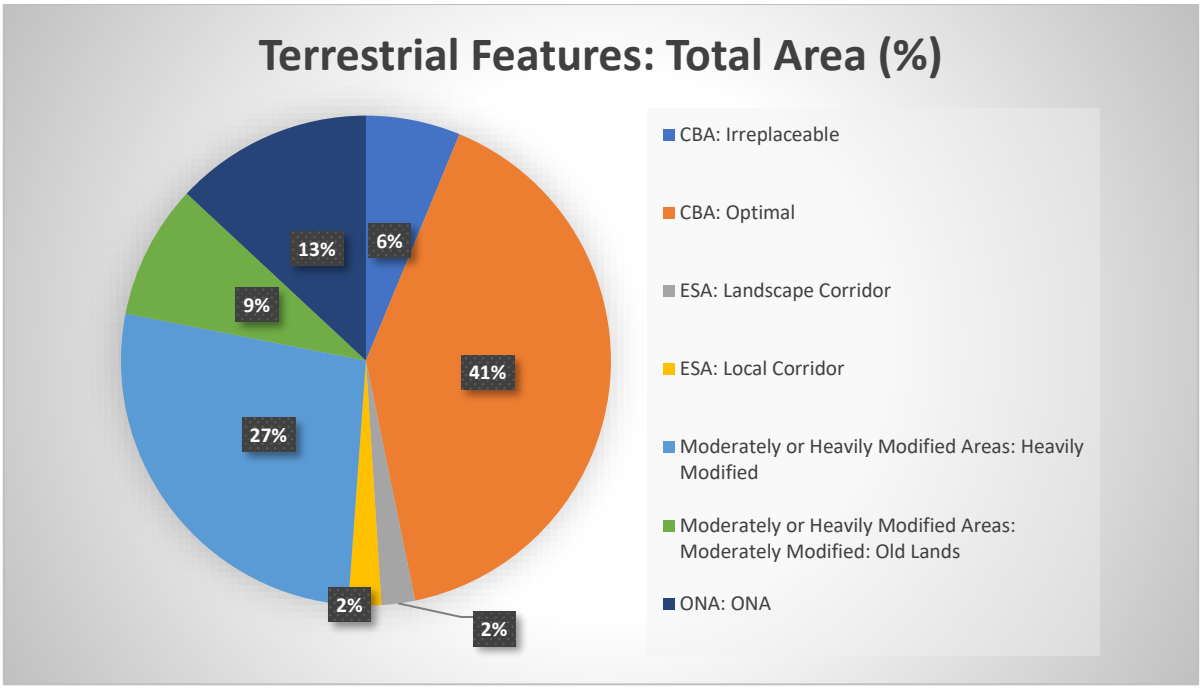

Figure 7: Percentage coverage of Terrestrial CBAs within the project site.

5.2.5.2. Freshwater CBAs

According to Figure 8 and Figure 10 more than half of the project site is located within Other Natural Areas (54.8%), whilst 19% of the project site comprises of Heavily Modified Areas. Only about 1% of the project site comprises Freshwater CBAs (CBA Rivers: 0.7% and CBA Wetlands: 0.3%). In terms of ESAs; approximately 24% of the project is located within an Important Catchment Area, whilst ESA Wetlands and Wetland Cluster, combined, only cover a little more than 1% of the project site.

As already mentioned, (refer to Sections 2, 3 and 5) more recent, available wetland spatial data sets such as the indicate that wetland features have been under-mapped within the NFEPA Wetland coverage (main source used for identifying freshwater CBAs and ESAs). Subsequently, the coverage of ESA Wetlands should be much higher. This was confirmed during the desktop delineation of all wetland features within the project site.

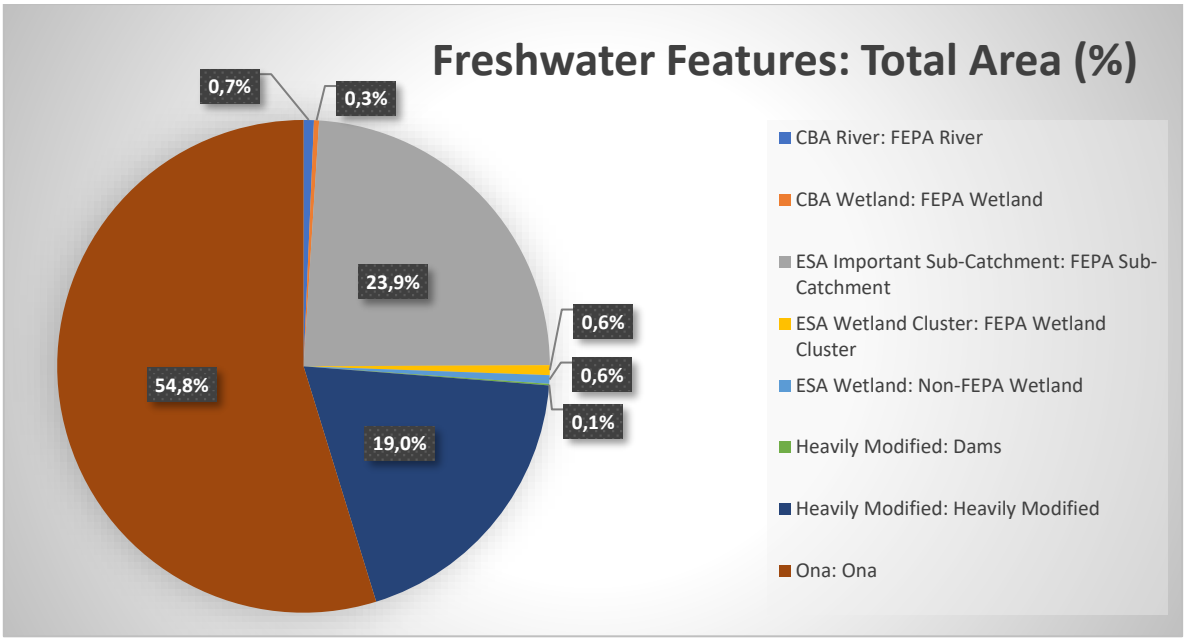

Figure 8: Percentage coverage of Freshwater CBAs within the project site.

From a developmental perspective, the following recommendations and additional requirements are provided:

» The following buffer areas are recommended, and should be for maintaining the freshwater resource features REC (Recommended Ecological Category) allowing the persistence of the current present ecological status as well as their functions and services.
  - All small, endorheic seepages and depressions with a low to moderate Ecological Importance: 50m buffers from the outer edge of the freshwater resource features.
  - All larger outward draining (exoreic), interconnected wetland features with high Ecological Importance: 100m buffers from the outer edge of the freshwater resource features.

» All freshwater features with their buffer areas have been classified as either Very High- or High sensitive and should be regarded as "No-Go" areas apart from the following activities and infrastructure which may be allowed (although restricted to an absolute minimum footprint):
  - only activities relating to the route access and cabling:
    - the use/upgrade of existing roads and watercourse crossings are the preferred options;
    - Where no suitable existing roads and watercourse crossings exist, the construction of new access roads and watercourse crossings can be allowed, however this should be deemed as a last resort.
    - All underground cabling should be laid either within access roads or next to access roads (as close as possible).

» In terms of activities and infrastructure planned within the FEPA1 prioritized Catchment: Careless and uncontrolled activities may lead to indirect negative impacts on the lower lying watercourses. Thus, the following mitigation measures should be considered;
    - During the planning and design phase the following aspects should be considered and addressed:
        - Natural runoff patterns within the catchments: Provide mitigation measures that will manage/simulate these natural runoff patterns and prevent erosion.
        - Natural/normal water inputs, flow patterns and flood peaks associated with the lower lying watercourses: Provide mitigation measures in order to maintain these hydrological characteristics (drivers).
        - Landscape/Ecological Connectivity: Provide mitigation measures that will prevent the fracturing of landscape (maintain connectivity between upland terrestrial habitats and downstream freshwater resource features)
        - Recommended Ecological Categories (RECs) of downstream freshwater resource features: Maintain these RECs.

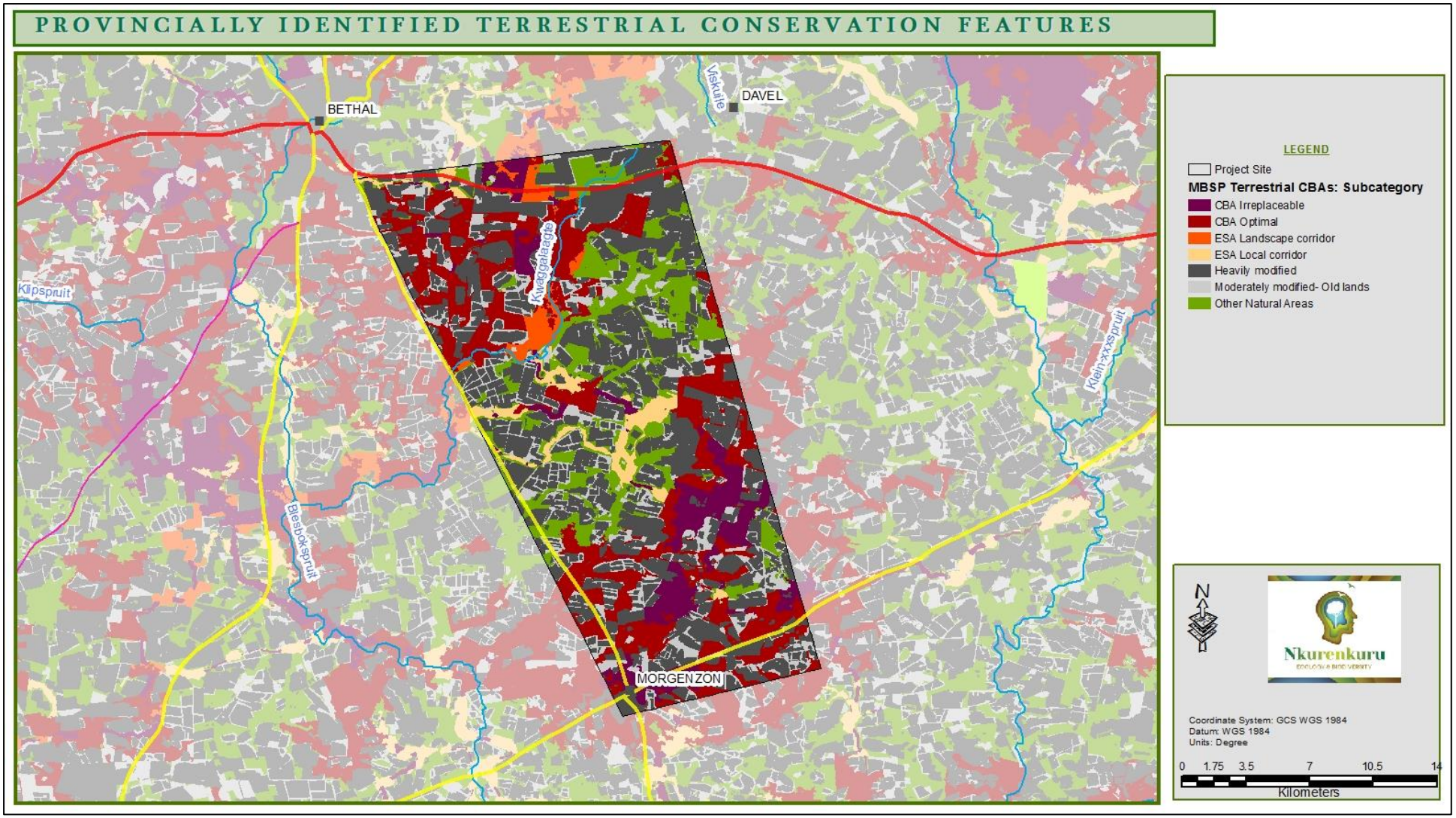

Figure 9: Provincially identified terrestrial conservation priority areas found within the greater surroundings of project site.

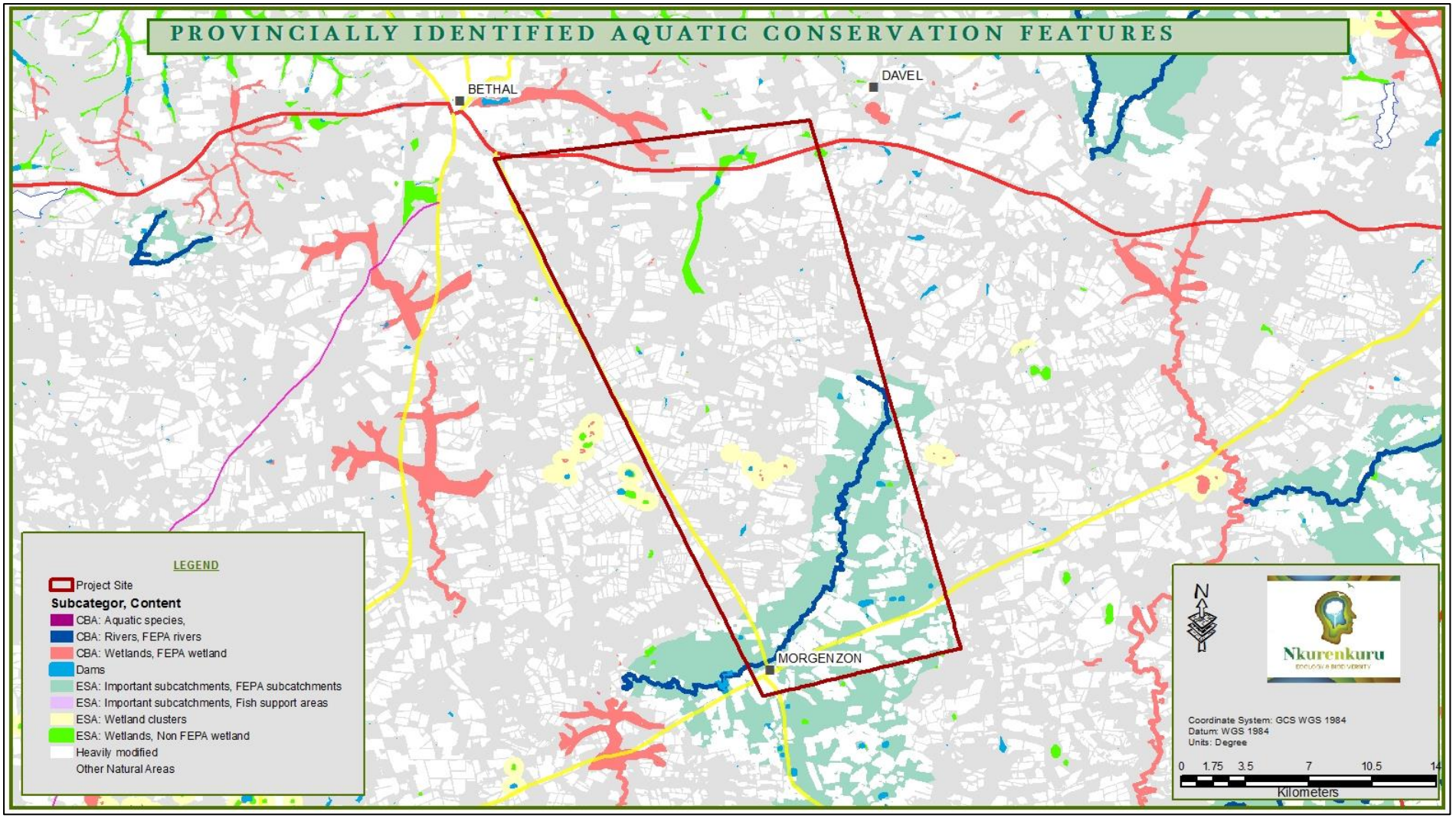

Figure 10: Provincially identified freshwater conservation priority areas found within the greater surroundings of project site.

Table 6: Summary of the different categories occurring within the Mpumalanga Terrestrial and Freshwater CBA maps.

MAP CATEGORY	DESCRIPTION	SUB-CATEGORY	DESCRIPTION
TERRESTRIAL FEATURES			
Protected Areas (PA)	Areas that are formally protected by law and recognized in terms of the Protected Areas Act, including contract protected areas declared through the biodiversity stewardship programme.	National Parks & Nature Reserves	Includes formally proclaimed National Parks, Nature Reserves, Special Nature Reserves, and Forest Nature Reserves.
		Protected Environments: Natural	Includes Protected Environments, declared in terms of Protected Areas Act (Act 57 of 2003, as amended).
		Protected Environments: Modified	Heavily modified areas in formally proclaimed Protected Environments.
Critical Biodiversity Areas (CBAs)	All areas required to meet biodiversity pattern and process targets; Critically Endangered ecosystems, critically linkages (corridor pinch-points) to maintain connectivity; CBAs are areas of high biodiversity value that must be maintained in a natural state.	CBA: Irreplaceable	This category includes: (1) Areas required to meet targets and with irreplaceable values of more than 80%; (2) Critical linkages or pinch-points in the landscape that must remain natural; (3) Critically Endangered Ecosystems.
		CBA: Optimal	The CBA Optimal Areas (previously called 'important and necessary' in the MBCP) are the areas optimally located to meet both the various biodiversity targets and other criteria defined in the analysis. Although these areas are not 'irreplaceable' they are the most efficient land configuration to meet all biodiversity targets and design criteria.
Ecological Support Areas (ESA)	Areas that are not essential for meeting targets, but that play an important role in supporting the functioning of CBAs and that deliver important ecosystem services.	ESA: Landscape Corridor	The best option to support landscape-scale ecological processes, especially allowing for adaptation to the impacts of climate change.
		ESA: Local Corridor	Finer-scale alternative pathways that build resilience into the corridor network by ensuring connectivity between climate change focal areas, reducing reliance on single landscape-scale corridors.
		ESA: Species Specific	Areas required for the persistence of particular species. Although these may be production landscapes, a change in land-use may result in loss of this species from the area. (Only one species-specific ESA was included in the analysis – an over-wintering site for blue cranes).

		ESA: Protected Area Buffers	Areas surrounding protected areas that moderate the impacts of undesirable land-uses that may affect the ecological functioning or tourism potential of Pas. Buffer distances vary according to reserve status: National Parks – 10km; Nature Reserves – 5km and Protected Environments – 1km buffer.
Other Natural Areas (ONA)	Areas that have not been identified as a priority in the current systematic biodiversity plant but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.		
Moderately or Heavily Modified Areas	Areas in which significant or complete loss of natural habitat and ecological function has taken place due to activities such as ploughing, hardening of surfaces, open-cast mining, cultivation and so on.	Heavily Modified	All areas currently modified to such an extent that any valuable biodiversity and ecological functions have been lost.
		Moderately Modified: Old lands	Old cultivated lands that have been allowed to recover (within the last 80 years), and support some natural vegetation. Although biodiversity pattern and ecological functioning may have been compromised, the areas still play a role in supporting biodiversity and providing ecosystem services.
AQUATIC FEATURES			
Critical Biodiversity Areas (CBAs)	All areas required to meet biodiversity pattern and process targets; CBAs are areas of high biodiversity value that should be maintained in a natural or near-natural state.	CBA: Rivers	Rivers, with a 100 m buffer, that need to be maintained in a good ecological condition in order to meet biodiversity targets for freshwater ecosystems. This category includes FEPA rivers and all FEPA free-flowing rivers. The FEPA rivers include those required to meet biodiversity targets for threatened fish species.
		CBA: Wetlands	Wetlands that are important for meeting biodiversity targets for freshwater ecosystems; the ecological condition of these wetlands needs to be maintained or improved, and their loss or deterioration must be avoided. This category includes FEPA wetlands.
		CBA: Aquatic Species	Areas considered critical for meeting the habitat requirements for selected aquatic invertebrate species (dragonflies, damselflies, crabs). These species are known to occur only at one or a few localities and are at high risk of extinction if their habitat is lost. Fish species are included under the CBA River category
	Areas that are not essential for meeting targets, but that play an important role in supporting the	ESA: Wetland Cluster	Clusters of wetlands embedded within a largely natural landscape to allow for the migration of fauna and flora between wetlands.

Ecological Support Areas (ESA)	functioning of CBAs and that deliver important ecosystem services.	ESA: Wetlands	All non-FEPA wetlands. Although not classed as FEPAs, these wetlands support the hydrological functioning of rivers, water tables and freshwater biodiversity, as well as providing a host of ecosystem services through the ecological infrastructure that they provide.
		ESA: Important Sub-catchments	Sub-catchments that either contain river FEPAs and/or Fish Support Areas.
		ESA: Fish Support Area	Sub-catchments that harbour fish populations of conservation concern, based on FEPA data augmented with regional data sets.
		ESA: Strategic Water Source Area	High rainfall areas that produce 50% of Mpumalanga's runoff in only 10% of the surface area, thus supporting biodiversity and underpinning regional water security.
Other Natural Areas (ONA)	Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.		
Moderately or Heavily Modified Areas	Areas in which significant or complete loss of natural habitat and ecological function has taken place due to activities such as ploughing, hardening of surfaces, open-cast mining, cultivation and so on.	Heavily Modified	Heavily Modified: All areas currently modified to such an extent that any valuable biodiversity and ecological function has been lost.
		Moderately Modified: Old lands	Artificial water bodies that have impacted on wetland or river ecosystems. These areas may still have a recharge effect on wetlands, groundwater and river systems and may support river- or water-dependent fauna and flora, such as water birds and wetland vegetation.

Table 7: Land-use guidelines for the various terrestrial and aquatic categories.

MAP CATEGORY	DESIRED MANAGEMENT OBJECTIVE	GUIDELINES
TERRESTRIAL FEATURES		
PA	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.	» All operational aspects of managing these areas must be subject to their main purpose, which is to protect and maintain biodiversity and ecological integrity, and should be governed by a formally approved management plan and land-use activities that support the primary function of these areas as primary sites for biodiversity conservation. » The management plan must identify allowable activities, which should be consistent at least with the CBA Irreplaceable category; the location of these allowable activities should be captured in a zonation plan in the management plan. » Activities relating to the construction of roads, administrative or tourism infrastructure and services (such as water reticulation systems, power lines and the likes) that are required to support the primary function of the protected area and its allowable activities, must be subject to at least a basic scoping report, or a full EIA, as specified by NEMA, and the protected area management plan. » In the case of Protected Environments, a variety of agricultural land uses may be allowed, such as livestock grazing, plantation forestry and some cultivation. The location of these land-use activities must be informed by the CBA maps, and should be specified in the zonation plan of the management plan for the protected environment. All areas of natural habitat that are zoned for conservation use, should be subject to implementation of the land-use guidelines for protected areas, CBAs, and ESAs.
CBA: Irreplaceable	Maintain in a natural state with no further loss of natural habitat.	**General Guidelines.** » Biodiversity loss and land-use change in Irreplaceable CBAs should be monitored as a matter of priority, to prevent unauthorised land-use change or degradation by neglect or ignorance. » Where appropriate, these areas should be incorporated into the formal Protected Area system through biodiversity stewardship agreements (contract Nature Reserves or Protected Environments). Ideally, conservation management activities should be the primary land-use in all irreplaceable areas, or they should at least be » managed in ways that have no negative impact on species, ecosystems or ecosystem services. » Extensive (widespread, low-intensity) livestock or game ranching, if well-managed, is compatible with the desired management objectives for these areas. These land-uses are acceptable if they take into account the specific biodiversity features (e.g. rare

		species or vegetation remnants) and vulnerabilities (e.g. infestation by invasive alien plants) at each site, if they comply with recommended stocking rates, if any associated infrastructure (required to support the ranching activities) is kept to low levels. **Specific Guidelines (for meeting minimum requirements).** » In general, Irreplaceable sites must be avoided in terms of the mitigation hierarchy. » A specialist study must be part of the Scoping and EIA process for all land-use applications in these areas, using the services of an experienced and locally knowledgeable biodiversity expert who is approved by the MTPA. » Applications for land use of any kind should be referred to the biodiversity specialists in MTPA and DARDLEA for evaluation. » Degraded areas included in the land parcel, but not the land-use proposal, should be restored to natural ecosystem functioning where possible. » Provision of alternative land as a 'biodiversity offset' in exchange for biodiversity loss in these areas CANNOT be considered except in exceptional circumstances and would need to be considered on a case by case basis. **General Guidelines.** » Acceptable land uses are those that are least harmful to biodiversity, such as conservation management, or extensive livestock or game farming. Large-scale cultivation, mining and urban or industrial development are not appropriate. » Extensive (widespread, low-intensity) livestock and game ranching, if well-managed (see above), is compatible with the desired management objectives for these areas.
CBA: Optimal	Maintain in a natural state with no further loss of natural habitat.	**Specific Guidelines (for meeting minimum requirements).** » If small-scale land-use change is unavoidable, it must be located and designed to be as biodiversity-sensitive as possible. » A specialist study must be part of the scoping and EIA process for all land-use applications in these areas, using the services of an experienced and locally knowledgeable biodiversity expert who is SACNASP registered. » Provision for biodiversity offsets in exchange for biodiversity loss should only be considered as a last resort and at a ratio consistent with national policy.

ESA: Landscape and Local-scale Corridor	Maintain ecological functionality in support of biodiversity connectivity by retaining the existing natural vegetation cover in a healthy ecological state, and restore 'critical-linkages' where necessary.	**General Guidelines.** » A greater range of land uses over wider areas is appropriate, subject to an authorisation process that ensures the underlying biodiversity objectives are not compromised. **Specific Guidelines (for meeting minimum requirements).** » Certain activities covered under Listing Notice 3 trigger the EIA process in ESA corridors. » Restoration of corridors is important, particularly in terms of the Working for Water programs. » The impact of land-use proposals on the functionality of ecological corridors must be assessed by the relevant biodiversity specialist as part of the EIA/Scoping report. » Impenetrable fences that restrict animal movement should be discouraged.
ESA: Species Specific	Maintain the prevailing ecological processes that support the specific species, and manage for no further habitat loss.	**General Guidelines.** » Although these areas may be located in production landscapes, and may be heavily modified in parts, a change in land use to anything other than conservation management should be discouraged as it would most likely result in a loss of the target species from the area. **Specific Guidelines (for meeting minimum requirements).** » The impact of any changes in land use on the population viability of listed species, such as blue cranes, should be assessed by a registered specialist. » Restoration of degraded areas and invasive alien plant control is recommended, particularly clearing the small wattle 'jungles' that large birds avoid.

ESA: Protected Area Buffers	To minimise the impacts of surrounding land-uses on the ecological integrity, character and tourism potential of protected areas.	**General Guidelines.** » When assessing the impacts of proposed land uses in protected area buffers, consideration needs to be given to both direct (e.g. plantation forestry blocking view-sheds and reducing water flows into a Protected Area) and indirect impacts (e.g. light and noise pollution). **Specific Guidelines (for meeting minimum requirements).** » Buffer distances vary according to the nature of the Protected Area, as follows: o National Parks: 10 km buffer as indicated in Listing Notice 3. o Nature Reserves: 5 km buffer as indicated in Listing Notice 3. o Protected Environments: 1 km buffer as these may include production landscapes. » Land-use change applications within the buffer zone may be referred to the protected area manager or ecologist for evaluation. » A viewshed analysis of the potential visual impact of the proposed land-use on adjacent protected areas should be undertaken where necessary.
Other Natural Areas (ONA)	The overall objective should be to ensure ecosystem functionality and minimise loss of natural habitat and species through strategic landscape planning.	» These areas have the greatest flexibility in terms of management objectives and permissible land-uses. » Where possible, avoid modifying any remaining natural habitat by locating land-uses, including cultivation and plantations, in already-modified areas. » Authorisation may be required for high-impact land-uses (such as intensive industry or urban development) and standard application of EIA regulations and other planning procedures is required.

Note: These areas may still contain species of conservation concern but either have not yet been surveyed, or the data were not available for incorporation into the MBSP. The presence or absence of important species should always be established through site visits before proceeding with a land-use change.

Moderately or Heavily Modified Areas	Manage land-use in a biodiversity friendly manner, aiming to maximise ecological functionality. In old lands, stabilise ecosystems and manage them to restore ecological functionality, particularly soil carbon and waterrelated functionality, using indigenous plant cover. Old lands should be burnt and grazed appropriately.	» Areas with no natural habitat remaining are preferred sites for higher-impact land-uses, and new projects should be located in these areas before modifying any remaining natural habitat. » Restoration and re-vegetation should be prioritised where heavily modified areas occur close to land of high biodiversity value, or are located such that they could potentially serve useful ecological connectivity functions (such as in ecological corridors). » For individual parcels of land identified as having specific actual or potential biodiversity values, develop incentives to restore lost biodiversity and connectivity. » When locating land-uses in these modified areas, consider the off-site impacts they may have on neighbouring areas of natural habitat, especially if these are of high biodiversity value. For example, controlling use of pesticides in modified areas, because of the impacts on neighbouring areas of natural habitat. » Encourage landowners and developers to use indigenous plants, especially trees, where aesthetic or functional options exist.
AQUATIC FEATURES		
All Freshwater CBAs	Maintain in a natural state with no loss of ecosystems, functionality or species. Where they are currently degraded, they should be rehabilitated, with no further degradation of ecosystem condition.	**General Guidelines.** » Freshwater CBAs should be maintained in good ecological condition, and those that are degraded should ideally be rehabilitated to a good condition. » Land-use practices or activities that will lead to deterioration in the current condition of a freshwater CBA, or that will make rehabilitation difficult, are not acceptable. » Any proposed land-use change must be subject to an EIA as it is likely to impact on the ecological drivers of the river or wetland ecosystem and can, potentially, alter its functioning or lead to loss of species. » Specialist studies by a freshwater ecologist should be conducted if there is a watercourse that is likely to be affected. **Specific Guidelines (for meeting minimum requirements).** » All questions about land-use change and its impact on water supplies must be referred to the Department of Water Affairs and Sanitation (DWS). » National Water Quality Standards are set by DWS and return flows (of effluent) from any land-use, are subject to these. » The process of determining the 'Ecological Reserve' flow, developed by DWS, is an essential tool in managing water use so that rivers can survive as ecosystems. » All land-use activities should also be subject to the accepted standards set for construction of structures like bridges, culverts and dams.

		» Ideally, effluent should be reflective of Resource Quality Objectives, as determined by a Reserve Determination, or determined on the basis of species sensitivities. » A buffer of 100 m should be used to buffer rivers and wetlands, unless DWS's river / wetland buffer tool has been applied. » Mining should not take place within 1 000 m of a freshwater CBA buffer.
CBA: Rivers	Maintain in a natural state with no loss of ecosystems, functionality or species.	» There is no flexibility in land-use options in this category. » Any activities that may impact on CBA rivers, even upstream or in sub-catchments, need to be avoided, or impacts mitigated if they cannot be avoided. » Any damaging activities within CBA river buffers must be avoided. » A 100 m buffer is the greater of the delineated riparian area or 100m measured from the top of bank.
CBA: Wetlands	Maintain in a natural state with no loss of species or ecosystems.	» If the current ecological condition is good (either natural and unmodified, or largely natural with only small change in habitats and biota), then this condition needs to be maintained. » If the current ecological condition is fair to poor (i.e. moderately to severely degraded with significant loss of natural habitat, biota and ecosystem functions), then this needs to be improved through rehabilitation measures. » Refer to the NFEPA Implementation Manual for specific guidelines (for example, mining should not take place within 1 km of the boundary of the buffer around a wetland). » Note that the generic buffer is 100 m measured from the outside edge of the wetland.
CBA: Aquatic Species	Maintain in a natural state with no loss of species or ecosystems.	» Avoid the use of pollutants such as pesticides and other agricultural toxins. » There are few appropriate land-use options as any loss of habitat could result in extinction of threatened freshwater - dependent invertebrate species.

ESA: Important Sub-catchments and Fish Support Areas	Minimise habitat and species loss through judicious planning and maintain basic ecosystem functionality and ecological condition within the surrounding landscape (sub-catchment).	» Manage the cumulative impacts of land-use activities in the sub-catchment (including land-based activities), ensuring no further deterioration of the ecological state of river or wetland CBAs. » In the case of Fish Support Areas, apply authorisation requirements more stringently. Ensure that aquatic specialist studies are conducted in ESA Fish Support Areas. » Maintain flow rates in streams in agricultural catchments in good condition, by managing land-use practices to mitigate the impacts of stream-flow reduction and ensuring that the extent of agriculture in the catchment does not exceed 30-50% of land surface areas. » Generic buffers of 100 m should be established around streams and wetlands within these catchments. These buffers can be refined based on a site visit and applying DWS's wetland delineation tool. » Land-use practices or activities that are not consistent with keeping natural habitat and biota intact in ESA Important sub-catchments are not acceptable.
ESA: Wetland Clusters	Manage to maximise potential for movements of species between wetlands in the cluster, and maintenance of landscape-scale ecological processes; avoid fragmentation of natural habitat within which the wetlands are embedded.	» Wetland clusters should not be further fragmented, but should be managed as a unit. » Land-uses that disrupt the possibility of migration, or the functioning of other ecological processes, across the cluster should not be allowed and sensitivity to disruption must be assessed in the EIA process. » Delineate all wetlands within 500 m of a land-use activity, and apply for a Water Use Licence if needed. » Conduct a buffer determination assessment around all wetlands, regardless of ecological condition or ecosystem threat status.
ESA: Wetlands	Maintain in a natural, functional state. Limited loss of ecosystems or functionality is acceptable, as long as the present ecological state is not lowered.	» All wetlands are protected under the National Water Act (Act 36 of 1998). » In terms of the National Water Act, freshwater ecosystems (all wetlands included) should not be allowed to degrade to an unacceptably modified condition (E or F ecological category). » Conduct a buffer determination assessment around all wetlands, regardless of ecological condition or ecosystem threat status. » Any further loss of area or ecological condition must be avoided, including if needed, a 100 m generic buffer around the wetland.

ESA: Strategic Water Source Area	Maintain ecological integrity across the entire sub-catchment, paying particular attention to maintaining water quantity, water quality and habitat integrity	» Strategic Water Source Areas tend to be favoured for plantation forestry and the application of best-practice management is encouraged. » Mining places the delivery of good quality water in adequate quantities at risk, and any cumulative impact of mines needs to be assessed and considered when processing mining applications. » The clearing of invasive alien plants from drainage lines and wetlands within these areas must be a provincial priority. » Restoration of wetlands and degraded areas within these catchments is encouraged.

5.3. Broad-Scale Vegetation Patterns

5.3.1. National Vegetation Map of Southern Africa

This section deals with vegetation types as described in the National Vegetation Map of Southern Africa, which will be used interchangeably with the term "VegMap" (Dayaram et al., 2018; Mucina and Rutherford, 2006 and 2018; these references are the rest of this section).

Note that the latest VegMap was used, namely 2018. Although vegetation descriptions are as per VegMap 2006, these units were cross-validated with VegMap 2018 to ensure their extents remained the same.

The entire study area is mapped as Soweto Highveld Grassland (Gm 8), but other vegetation types occur nearby, namely Amersfoort Highveld Clay Grassland (Gm 13) and Eastern Highveld Grassland (Gm 12) (Figure 11 and Figure 12). These other vegetation types indeed have the potential to occur on site, and as such are also described here (see Table 8 for a summary of total area covered by the mapped units as per VegMap).

Table 8: Total area sizes (approximately) for vegetation types occurring within the study area, as mapped by the National Vegetation Map 2018.

Vegetation Type	Total Area (km^2)	Total Area (ha)	Threat Status
Amersfoort Highveld Clay Grassland (Gm 13)	3 927	392 709	Least Threatened
Eastern Highveld Grassland (Gm 12)	12 772	1 277 243	Vulnerable
Soweto Highveld Grassland (Gm 8)	14 574	1 457 366	Vulnerable
Wakkerstroom Montane Grassland (Gm 14)	3 750	375 041	Least Threatened

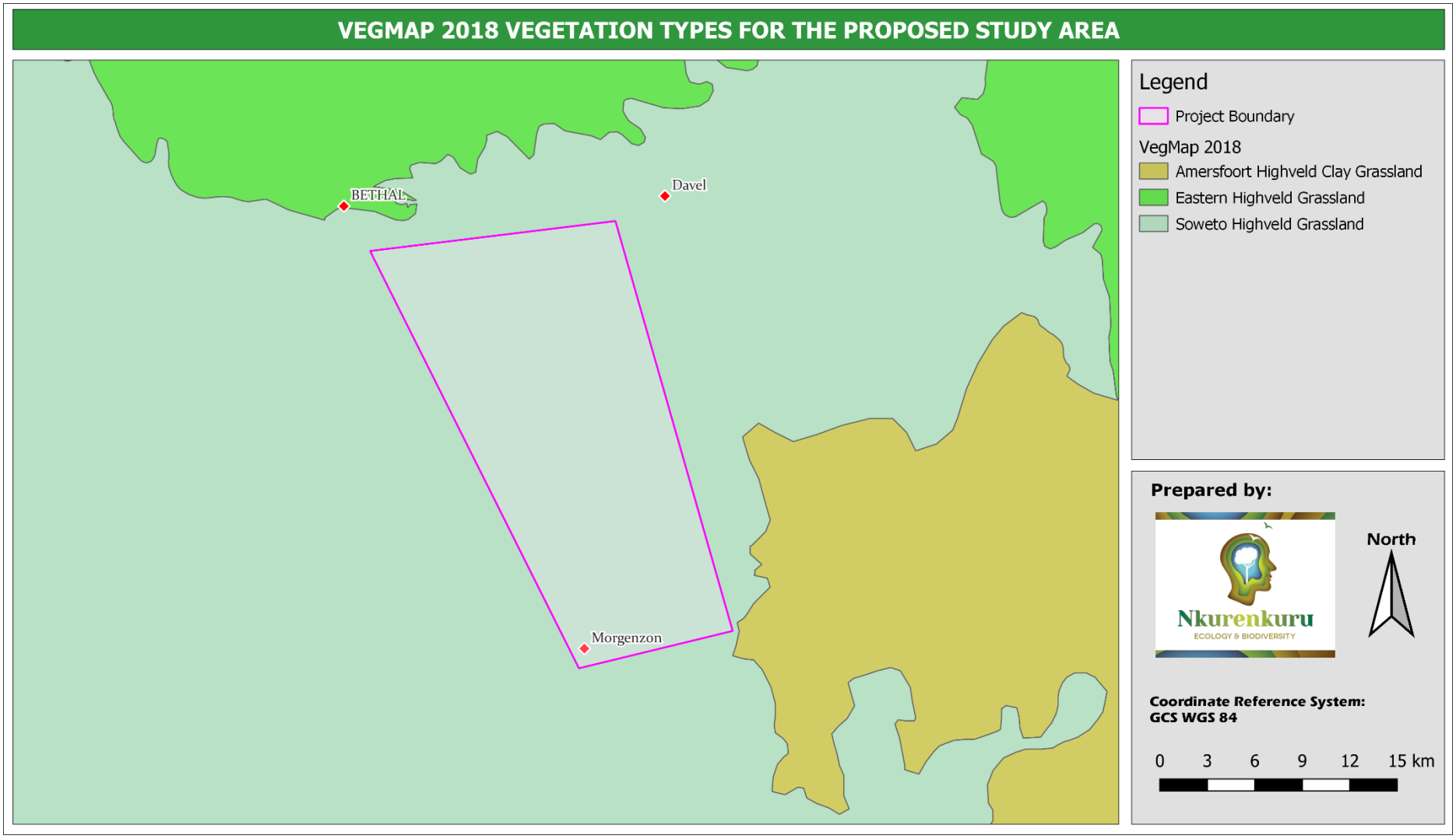

Figure 11: Map illustrating the different vegetation types, according to VegMap 2018, for the study area, as well as the general region.

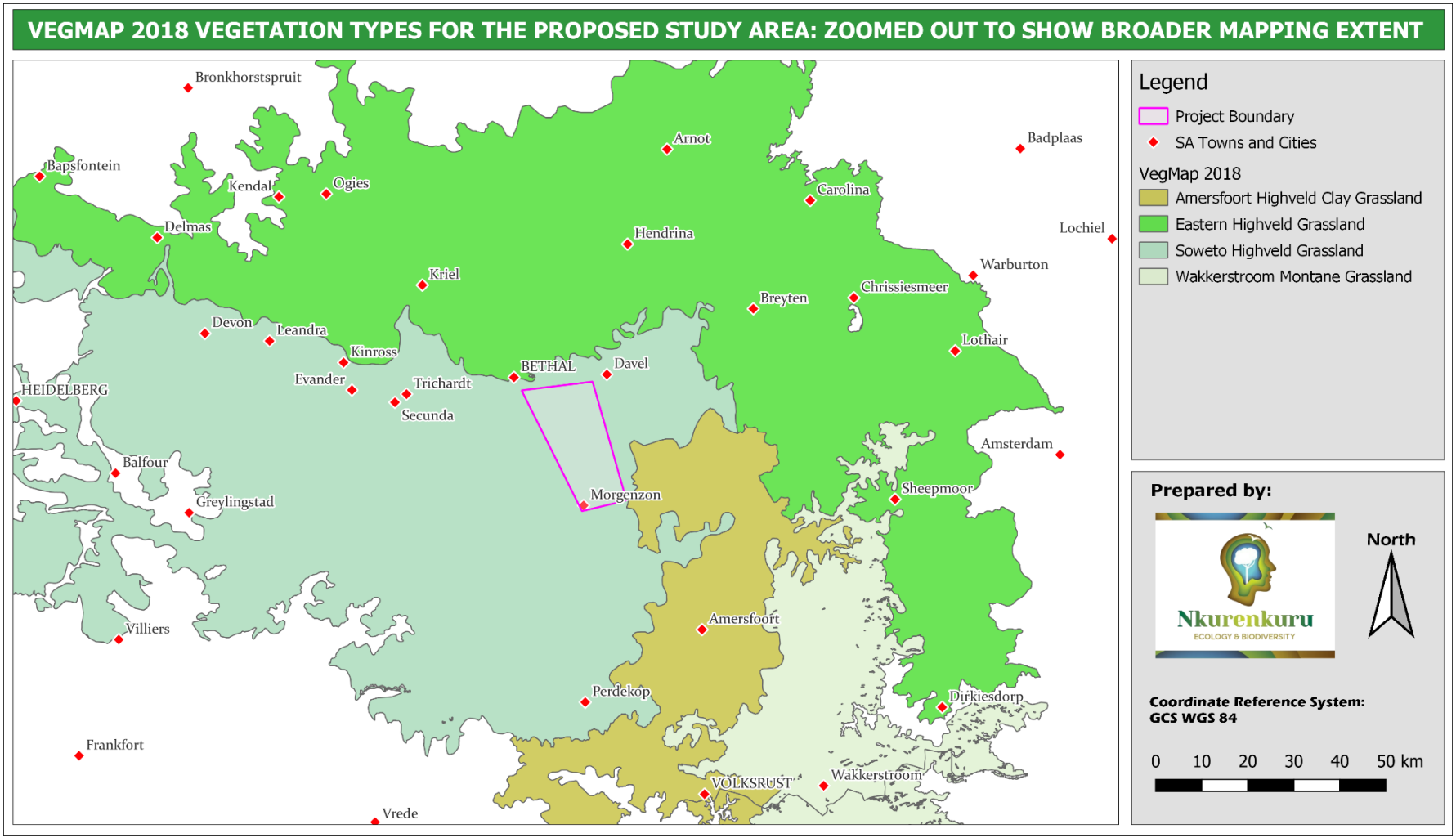

Figure 12: Map illustrating the different vegetation types, according to VegMap 2018, for the study area, as well as the general region. This map is zoomed out to show the larger extents of each of the vegetation types.

5.3.1.1. Soweto Highveld Grassland (Gm 8)

This vegetation type is distributed mainly in Mpumalanga and Gauteng, with small outliers in the State and NorthWest Provinces. It has an altitudinal range of 1420 – 1760 m. It is distributed in a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast, and the Vaal River in the south. The vegetation type extends further westwards along the southern edge of the Johannesburg Dome with parts of Soweto, and as far as Randfontein. In southern Gauteng it includes parts of Vanderbijlpark and Vereeniging, as well as Sasolburg in the northern Free State.

The vegetation type is characterised by gentle to moderate undulating landscapes on the Highveld plateau, and supports short to medium-high, dense, tufted grassland, which is dominated by *Themeda triandra* together with a variety of other grasses, such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus*, and *Tristachya leucothrix*. In undisturbed areas, scattered small wetlands, narrow stream alluvia, pans, and occasional ridges or rocky outcrops occur as a mosaic within the grassland.

Shale, sandstone, or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites are characteristic of this vegetation type. The Volksrust Formation (Karoo Supergroup) is found in the south, while rocks of the older Transvaal, Ventersdorp, and Witwatersrand Supergroups are significant in the west. The soils are deep and reddish on flat plains, and are typically of the Ea, Ba, and Bb land types.

The vegetation type receives summer rainfall with a MAP of about 662 mm. It has a cool temperate climate with high extremes between maximum summer and minimum winter temperatures, with a frequent occurrence of frost and large thermic diurnal differences, especially in autumn and spring.

For a description of the conservation/ecosystems status, extent remaining, as well as the conservation target set out for this vegetation type, refer to Section National Level of Conservation Priorities (Threatened Ecosystems)5.2.4 and Table 5.

Table 9: *Key species associated with Soweto Highveld Grassland (Gm 8).*

IMPORTANT SPECIES	
Growth Form (d = Dominant)	**Key Species**
Graminoids	*Andropogon appendiculatus (d), Brachiaria serrata (d), Cymbopogon pospischilii (d), Cynodon dactylon (d), Elionurus muticus (d), Eragrostis capensis (d), E. chloromelas (d), E. curvula (d), E. plana (d), E. planiculmis (d), E. racemosa (d), Heteropogon contortus (d), Hyparrhenia hirta (d), Setaria nigrirostris (d), S. sphacelata (d), Themeda triandra (d), Tristachya leucothrix (d), Andropogon schirensis, Aristida adscensionis, A. bipartita, A. congesta, A. junciformis subsp. galpinii, Cymbopogon caesius, Digitaria diagonalis, Diheteropogon amplectens,*

	Eragrostis micrantha, E. superba, Harpochloa falx, Microchloa caffra, Paspalum dilatatum.
Herbs	*Hermannia depressa (d), Acalypha angustata, Berkheya setifera, Dicoma anomala, Euryops gilfillanii, Geigeria aspera var. aspera, Graderia subintegra, Haplocarpha scaposa, Helichrysum miconiifolium, H. nudifolium var. nudifolium, H. rugosum, Hibiscus pusillus, Justicia anagalloides, Lippia scaberrima, Rhynchosia effusa, Schistostephium crataegifolium, Seago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.*
Geophytic Herbs	*Haemanthus humilis subsp. hirsutus, H. montanus.*
Herbaceous Climber	*Rhynchosia totta.*
Low Shrubs	*Anthospermum hispidulum, A. rigidum subsp. pumilum, Berkheya annectens, Felicia muricata, Ziziphus zeyheriana.*

5.3.1.2. Eastern Highveld Grassland (Gm 12)

This vegetation type is distributed throughout Mpumalanga and Gauteng Provinces, and occurs as plains between Belfast in the east, and the eastern side of Johannesburg in the west, and extends southwards to Bethal, Ermelo, and west of Piet Retief. The vegetation type has an altitudinal range of 1520 – 1780 m, but some parts are as low as 1300 m.

The vegetation type consists of slight to moderate undulating plains, and includes low hills and pan depressions. The vegetation is short, dense grassland dominated by grasses of the genera *Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya*. Small, scattered rocky outcrops have wiry, sour grasses and some woody species, such as *Acacia caffra*, *Celtis africana*, *Diospyros lycioides* subsp. *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii*, and *Searsia magalismontanum*.

Red to yellow sandy soils of the Ba and Bb land types dominate on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup), and two dominant land types are found, namely Bb (65%) and Ba (30%).

The vegetation type has a strong seasonal summer rainfall, with very dry winters. The MAP ranges from 650 – 900 mm, with an average of 726 mm. Rainfall is relatively uniform across most of this vegetation type, but increases significantly in the extreme southeast, which is evidenced from the MAP coefficient of variation of 25% across most of the unit, which drops to 21% in the east and southeast. Frost incidence ranges from 13 – 42 days, but is higher at higher elevations.

The unit is classified as Vulnerable with a target of protection of 24% (refer to Table 5). Only a very small fraction is conserved in statutory reserves such as Nooitgedacht Dam and Jericho Darn Nature Reserves, or in private reserves such as Holkranse, Kransbank, and Morgenstond. About 44% has been transformed primarily by cultivation, plantations, mines, urbanisation, and by building of dams. Cultivation may have had a more extensive impact, as indicated by landcover data. No serious alien invasions are reported, but *Acacia mearnsii* can become dominant in disturbed sites. Erosion is very low.

Table 10: Key species associated with Eastern Highveld Grassland (Gm 12).

DOMINANT SPECIES	
Growth Form (d = Dominant)	**Key Species**
Graminoids	*Aristida aequiglumis (d), A. congesta (d), A. junciformis subsp. galpinii (d), Brachiaria serrata (d), Cynodon dactylon (d), Digitaria monodactyla (d), D. tricholaenoides (d), Elionurus muticus (d), Eragrostis chloromelas (d), E. curvula (d), E. plana (d), E. racemosa (d), E. sclerantha (d), Heteropogon contortus (d), Loudetia simplex (d), Microchloa caffra (d), Monocymbium ceresiiforme (d), Setaria sphacelata (d), Sporobolus africanus (d), S. pectinatus (d), Themeda triandra (d), Trachypogon spicatus (d), Tristachya leucothrix (d), T. rehmannii (d), Alloteropsis semialata subsp. eckloniana, Andropogon appendiculatus, A. schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa fax, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides.*
Herbs	*Berkheya setifera (d), Haplocarpha scaposa (d), Justicia anagalloides (d), Pelargonium luridum (d), Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Eryops gilfillanii, E. transvaalensis subsp. setilobus, Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides subsp. latifolia, Seago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.*
Geophytic Herbs	*Gladiolus crassifolius, Haemanthus humilis subsp. hirsutus, Hypoxis rigidula var. pilosissima, Ledebouria ovatifolia.*
Succulent Herb	*Aloe ecklonis.*
Low Shrubs	*Anthospermum rigidum subsp. pumilum, Stoebe plumosa.*

5.3.1.3. Amersfoort Highveld Clay Grassland (Gm 13)

This vegetation type is distributed throughout Mpumalanga and Kwa-Zulu Natal Provinces, extending in a north-south band from south of Ermelo, down through Amersfoort to the Memel area in south. The vegetation type has an altitudinal range of 1580 – 1860 m.

The vegetation type is comprised of undulating grassland plains, with small scattered patches of dolerite outcrops in some areas. The vegetation is comprised of a short, closed grassland cover, largely dominated by a dense *Themeda triandra* sward, often severely grazed to form a short lawn.

The unit is characterised by vertic clay soils derived from dolerite that is intrusive in the Karoo sediments of the Madzaringwe Formation in the north and the Volksrust Formation and the Adelaide Subgroup in the south. The Dominant land type is Ca, while the Ea land type is of subordinate importance.

The unit receives rainfall mainly in early summer, which ranges from 620 mm in the west to 830 mm in the east, and it has a MAP of 694 mm. Temperatures are higher in the west than the east, and the vegetation type has a MAT of 14°C. Winters are cold and summers are mild, and frost incidence is very high.

The unit is classified as Least Threatened with a target of protection of 27% (refer to Table 5). None of the vegetation type is protected. About 25% of the vegetation type is transformed, mostly by cultivation (22%). The area is not suited to afforestation. Silver and black wattle (*Acacia*), and *Salix babylonica* invade drainage areas. Erosion potential is very low (57%) and low (40%).

Overgrazing leads to invasion of *Stoebe vulgaris*. Parts of this unit were once cultivated and now lie fallow and have been left to revegetate with pioneer species. These transformed areas are not picked up by satellite for transformation coverage and the percentage of grasslands still in a natural state may be underestimated.

Table 11: Key species associated with Amersfoort Highveld Clay Grassland (Gm 13).

DOMINANT SPECIES	
Growth Form (d = Dominant)	**Key Species**
Graminoids	*Andropogon appendiculatus (d), Brachiaria serrata (d), Digitaria monodactyla (d), D. tricholaenoides (d), Elionurus muticus (d), Eragrostis capensis (d), E. chloromelas (d), E. plana (d), E. racemosa (d), Harpochloa falx (d), Heteropogon contortus (d), Microchloa caffra (d), Panicum natalense (d), Setaria nigrirostris (d), S. sphacelata (d), Themeda triandra (d), Trichoneura grandiglumis (d), Tristachya leucothrix (d), Abildgaardia ovata, Andropogon schirensis, Aristida bipartita, A. congesta, A. junciformis subsp. galpinii, A. stipitata subsp. graciliflora, Bulbostylis contexta, Chloris virgata, Cymbopogon caesius, C. pospischilii, Cynodon dactylon, Digitaria diagonalis, D. ternata, Diheteropogon amplectens, Eragrostis curvula, Koeleria capensis, Panicum coloratum, Setaria incrassata.*
Herbs	*Berkheya setifera (d), Vernonia natalensis, V. oligocephala (d), Acalypha peduncularis, A. wilmsii, Berkheya insignis, B. pinnatifida, Crabbea acaulis, Cynoglossum hispidum, Dicoma anomala, Haplocarpha scaposa, Helichrysum caespititium, H. rugulosum, Hermannia coccocarpa, H. depressa, H. transvaalensis, Ipomoea crassipes, I. oblongata, Jamesbrittenia silenoides, Pelargonium luridum, Pentanisia prunelloides subsp. latifolia, Peucedanum magalismontanum, Pseudognaphalium luteoalbum, Rhynchosia effusa, Salvia repens, Schistostephium crataegifolium, Sonchus nanus, Wahlenbergia undulata.*
Herbaceous Climber	*Rhynchosia totta.*
Geophytic Herbs	*Boophone disticha, Eucomis autumnalis subsp. clavata, Hypoxis villosa var. obliqua, Zantedeschia albomaculata subsp. macrocarpa.*
Tall Shrubs	*Diospyros austroafricana, D. lycioides subsp. guerkei.*
Low Shrubs	*Anthospermum rigidum subsp. pumilum (d), Helichrysum melanacme (d), Chaetacanthus costatus, Euphorbia striata var. cuspidata, Gnidia burchellii, G. capitata, Polygala uncinata, Searsia discolor.*
Succulent Shrub	*Euphorbia clavarioides var. truncata.*

5.4. Broad-Scale Terrestrial and Freshwater Land Unit/Habitat Types

5.4.1. Terrestrial Land Units/Habitat Types

A preliminary mapping of the study area based on observable land features via Google Earth Satellite Imagery, has revealed that the study area consists primarily of five main functional types, namely: buildings/structures, active farmlands, fallow land (abandoned farmlands), natural grassland areas, and freshwater/drainage areas (which is comprised of small streams, wetlands, and natural or artificial dams) (Table 12; Figure 13).

Almost half of the study area seems to consist of natural grasslands (44%), while agriculture (38.6%) comprises much of the rest of the study area. Natural grasslands are considered to have a high sensitivity rating, since the vegetation type indicated for the study area, as per VegMap 2018, is Soweto Highveld Grassland, which is considered to be Vulnerable.

Fallow land seems to comprise almost a tenth (8.2%) of the study area. It has been given a "medium" sensitivity rating since, although the areas are degraded and consist of secondary vegetation, they can usually revegetate to form Ecological Support Areas (ESA). Thus, these areas could potentially function as buffers and/or corridors adjacent to natural grasslands and drainage areas, that can be utilized by animal species. These areas could also potentially function as reservoirs for certain native plant species.

It is preferable that minimal, development occur within these natural areas so as to maintain the integrity of this vegetation type. Refer to Sections 5.2.4 and 5.2.5.1 for a short description of the most likely impacts as well as recommendations.

5.4.2. Freshwater/Drainage Features

Freshwater/drainage features cover an area of approximately 2949 ha (7.5%) and is manly characterized by channelled valley-bottom wetlands followed by seepage wetlands (Figure 13. Where the larger watercourses flow across flatter, broader plains, floodplains are typically present. No large depression wetlands are present within the project site, with most of the depression wetlands being small and endorheic. The location and extent of freshwater resource features within the project site, as mapped during this scoping phase study, are fairly consistent with the wetland coverage provided within SANBI's National Wetland Map 5 (refer to Figure 14). There is also some similarity between this map and the Mpumalanga Highveld Wetland Map (SANBI 2014) (Figure 15). However, some of the wetland features to the south have been over mapped within the Mpumalanga Highveld Wetland Map.

All freshwater/drainage features are regarded as sensitive features, providing valuable ecological functions and services. In order to preserve these functions and services various development recommendations have been provided (refer to Sections 5.2.2, 5.2.3

and 5.2.5.2:); and include the implementation of ecological buffers and the consideration of these areas as "No-Go" for certain development activities.

Table 12: Total area sizes (approximately) for land types occurring within the study area, as mapped based on currently available Google Earth Satellite Imagery.

Land Type	Sensitivity	Total Area (ha)	Total Area (%)
Agriculture	Low	15 166	38.6
Drainage	Very High	2 949	7.5
Fallow land	Medium	3 210	8.2
Natural areas	High	17 519	44.6
Structures	Low	435	1.1
	Grand Total	**39 279**	100.0

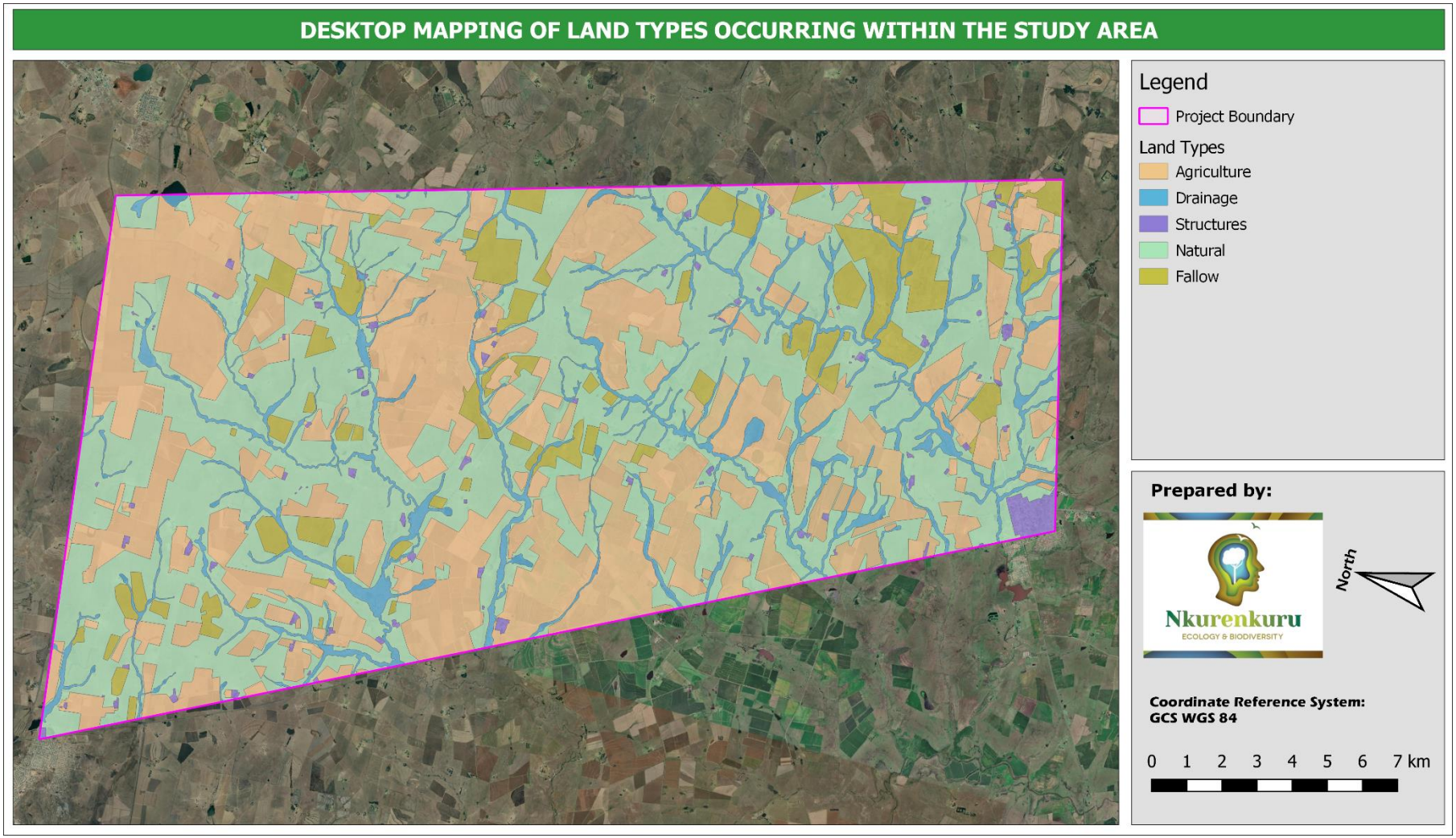

Figure 13: Desktop mapping of the land cover/habitat types occurring within the study area. Note that the map has been rotated sideways to optimize space (see the direction of the north arrow).

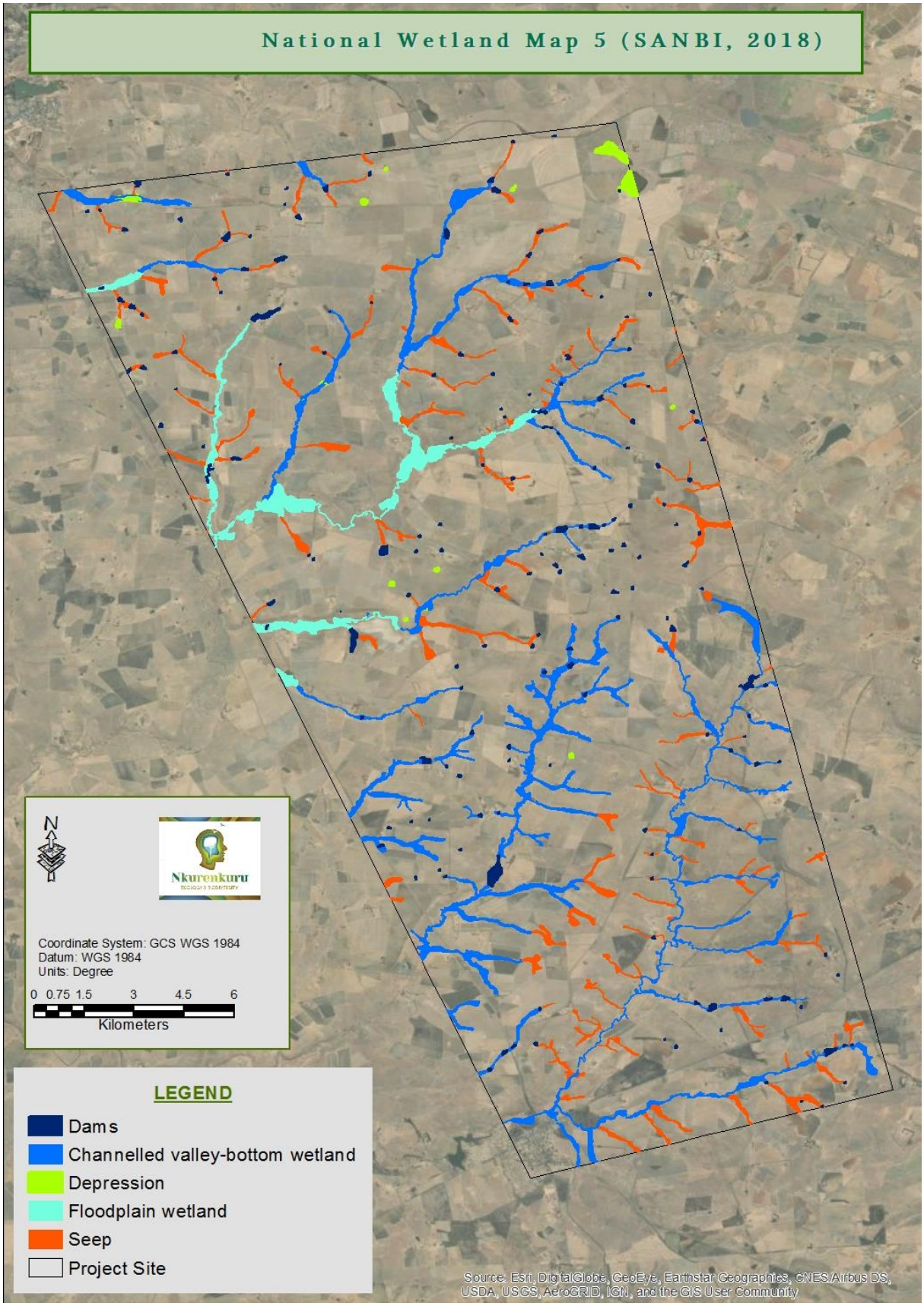

Figure 14: Freshwater/wetland features as mapped within SANBI's National Wetland Map 5.

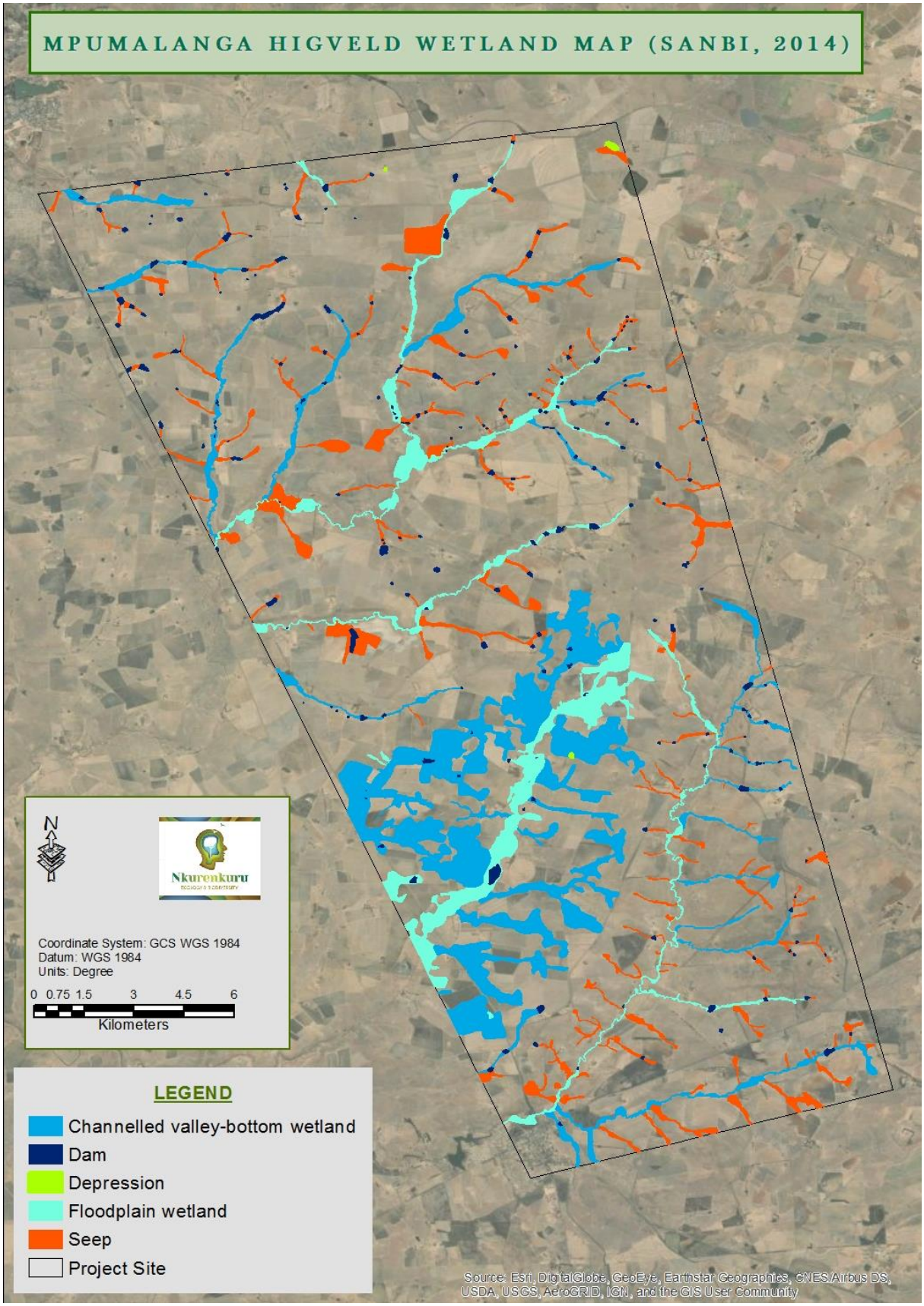

Figure 15: Freshwater/wetland features as mapped within the Mpumalanga Highveld Wetland Map (SANBI, 2014).

5.5. POSA Plant Species Observations

A list was obtained from the SANBI database (POSA — Plants of southern Africa; http://posa.sanbi.org/) containing all plant species that have been recorded to date from the surroundings of the study area (see section 2.2 for the extent of the area used for gathering records). POSA generated species lists also contain updated Red List information according to the Red List of South African Plants (Raimondo et al., 2009; updated online version: http://redlist.sanbi.org/). Species listed as protected were also identified in the list. Therefore, only SoCC that may potentially occur in the study area and the broader surrounds have been listed within the baseline study section of this report. The field surveys will be aimed at confirming which of these species occur within the study area, and whether any additional species that may not yet have been recorded in official databases, are present on site.

A total of 1 076 species have been recorded within the broader area based on the online plant search (see Appendix 1 for the full list). Of this, the top three representative families were Poaceae (148 spp., 14%), Asteraceae (140 spp., 13%), and Fabaceae (97 spp., 9%).

Furthermore, this list included a total of 18 Species of Conservation Concern (SCC) (Red List and highly range restricted species) and a further 88 provincially protected species (note that some of the Red List species are also protected; thus some overlap occurs between these numbers) (Table 13). The protected species are listed under Schedule 11 (Protected Plants) of the Mpumalanga Nature Conservation Act, no. 10 of 1998.

The initial screening report also revealed the potential presence of an additional three Medium Sensitive species, namely species 851, 691, and 1252 (for their protection, the identities of these species will not made public).

Finally, 82 alien plant species are recorded within the extracted area, with 13 of them being listed invasive species within NEM:BA Act No. 10 of 2004 (Alien and Invasive Species List, 2016) namely:

- *Acacia dealbata* (Silver wattle; Category 2)
- *Cestrum parqui* (Chilean cestrum; Category 1b)
- *Convolvulus arvensis* (Field bindweed, Wild morning-glory; Category 1b)
- *Datura stramonium* (Common thorn apple; Category 1b)
- *Echium plantagineum* (Patterson's curse; Category 1b)
- *Eucalyptus camaldulensis* (River red gum; Category 1b)
- *Ligustrum vulgare* (Common privet; Category 1b)
- *Linaria vulgaris* (Common toadflax, Butter-and-eggs; Category 1b)
- *Mirabilis jalapa* (Four-o'clock, Marvel-of -Peru; Category 1b)
- *Nasturtium officinale* (Watercress; Category 2)
- *Verbena brasiliensis* (Brazilian verbena; Category 1b)
- *Verbena rigida* (Veined verbena; Category 1b)
- *Xanthium spinosum* (Spiny cocklebur; Category 1b)

Table 13: Species of Conservation Concern that have been recorded within the broader region surrounding the study area, as per the SANBI POSA online database.

Family	Species	IUCN	Protection Schedule
Apocynaceae	*Schizoglossum peglerae*	EN	
Asparagaceae	*Asparagus fractiflexus*	EN	
Aizoaceae	*Khadia carolinensis*	VU	
Amaryllidaceae	*Nerine gracilis*	VU	
Apocynaceae	*Aspidoglossum xanthosphaerum*	VU	
Apocynaceae	*Miraglossum davyi*	VU	
Apocynaceae	*Pachycarpus suaveolens*	VU	
Iridaceae	*Gladiolus paludosus*	VU	11
Apocynaceae	*Stenostelma umbelluliferum*	NT	
Asphodelaceae	*Kniphofia typhoides*	NT	11
Asteraceae	*Cineraria austrotransvaalensis*	NT	
Fabaceae	*Argyrolobium campicola*	NT	
Hyacinthaceae	*Merwilla plumbea*	NT	
Iridaceae	*Gladiolus robertsoniae*	NT	11
Orchidaceae	*Habenaria barbertoni*	NT	11
Euphorbiaceae	*Acalypha caperonioides var. caperonioides*	DD	
Hyacinthaceae	*Drimia elata*	DD	
Iridaceae	*Hesperantha rupestris*	DD	
Agapanthaceae	*Agapanthus inapertus subsp. intermedius*	LC	11
Amaryllidaceae	*Boophone disticha*	LC	11
Amaryllidaceae	*Brunsvigia natalensis*	LC	11
Amaryllidaceae	*Brunsvigia radulosa*	LC	11
Amaryllidaceae	*Crinum bulbispermum*	LC	11
Amaryllidaceae	*Crinum graminicola*	LC	11
Amaryllidaceae	*Cyrtanthus breviflorus*	LC	11
Amaryllidaceae	*Haemanthus humilis subsp. hirsutus*	LC	11
Amaryllidaceae	*Haemanthus montanus*	LC	11
Amaryllidaceae	*Scadoxus puniceus*	LC	11
Araceae	*Zantedeschia albomaculata subsp. albomaculata*	LC	11
Araceae	*Zantedeschia albomaculata subsp. macrocarpa*	LC	11
Araceae	*Zantedeschia rehmannii*	LC	11
Asphodelaceae	*Aloe ecklonis*	LC	11
Asphodelaceae	*Aloe graciliflora*	LC	11
Asphodelaceae	*Aloe jeppeae*	LC	11
Asphodelaceae	*Aloe maculata subsp. maculata*	LC	11
Asphodelaceae	*Kniphofia albescens*	LC	11
Asphodelaceae	*Kniphofia porphyrantha*	LC	11
Dioscoreaceae	*Dioscorea dregeana*	LC	11
Hyacinthaceae	*Eucomis montana*	LC	11
Hyacinthaceae	*Eucomis pallidiflora subsp. pallidiflora*	LC	11
Iridaceae	*Gladiolus crassifolius*	LC	11
Iridaceae	*Gladiolus dalenii subsp. dalenii*	LC	11
Iridaceae	*Gladiolus ecklonii*	LC	11
Iridaceae	*Gladiolus elliotii*	LC	11

Iridaceae	*Gladiolus longicollis subsp. longicollis*	LC	11
Iridaceae	*Gladiolus longicollis subsp. platypetalus*	LC	11
Iridaceae	*Gladiolus papilio*	LC	11
Iridaceae	*Gladiolus sericeovillosus subsp. calvatus*	LC	11
Iridaceae	*Gladiolus sericeovillosus subsp. sericeovillosus*	LC	11
Iridaceae	*Gladiolus vinosomaculatus*	LC	11
Iridaceae	*Gladiolus woodii*	LC	11
Iridaceae	*Hesperantha coccinea*	LC	11
Iridaceae	*Watsonia bella*	LC	11
Iridaceae	*Watsonia pulchra*	LC	11
Orchidaceae	*Brachycorythis ovata subsp. ovata*	LC	11
Orchidaceae	*Brachycorythis pubescens*	LC	11
Orchidaceae	*Brownleea parviflora*	LC	11
Orchidaceae	*Disa aconitoides subsp. aconitoides*	LC	11
Orchidaceae	*Disa cooperi*	LC	11
Orchidaceae	*Disa nervosa*	LC	11
Orchidaceae	*Disa patula var. transvaalensis*	LC	11
Orchidaceae	*Disa stachyoides*	LC	11
Orchidaceae	*Disa versicolor*	LC	11
Orchidaceae	*Disperis cooperi*	LC	11
Orchidaceae	*Disperis fanniniae*	LC	11
Orchidaceae	*Eulophia cooperi*	LC	11
Orchidaceae	*Eulophia hians var. hians*	LC	11
Orchidaceae	*Eulophia hians var. inaequalis*	LC	11
Orchidaceae	*Eulophia hians var. nutans*	LC	11
Orchidaceae	*Eulophia ovalis var. bainesii*	LC	11
Orchidaceae	*Eulophia ovalis var. ovalis*	LC	11
Orchidaceae	*Eulophia parvilabris*	LC	11
Orchidaceae	*Habenaria clavata*	LC	11
Orchidaceae	*Habenaria dives*	LC	11
Orchidaceae	*Habenaria epipactidea*	LC	11
Orchidaceae	*Habenaria falcicornis subsp. caffra*	LC	11
Orchidaceae	*Habenaria lithophila*	LC	11
Orchidaceae	*Neobolusia tysonii*	LC	11
Orchidaceae	*Orthochilus foliosus*	LC	11
Orchidaceae	*Orthochilus leontoglossus*	LC	11
Orchidaceae	*Orthochilus welwitschii*	LC	11
Orchidaceae	*Pterygodium dracomontanum*	LC	11
Orchidaceae	*Pterygodium nigrescens*	LC	11
Orchidaceae	*Satyrium hallackii subsp. ocellatum*	LC	11
Orchidaceae	*Satyrium neglectum subsp. neglectum var. neglectum*	LC	11
Orchidaceae	*Satyrium parviflorum*	LC	11
Orchidaceae	*Satyrium trinerve*	LC	11
Orchidaceae	*Schizochilus zeyheri*	LC	11
Proteaceae	*Protea roupelliae subsp. roupelliae*	LC	11
Hyacinthaceae	*Eucomis autumnalis subsp. clavata*	NE	11
Orchidaceae	*Satyrium longicauda var. longicauda*	NE	11

Amaryllidaceae	*Cyrtanthus stenanthus*	11
Amaryllidaceae	*Cyrtanthus tuckii*	11
Apocynaceae	*Ceropegia breviflora*	11
Apocynaceae	*Ceropegia rehmannii*	11
Asphodelaceae	*Aloe boylei*	11
Asphodelaceae	*Aloe davyana*	11
Asphodelaceae	*Aloe hlangapies*	11
Iridaceae	*Gladiolus sp.*	11
Orchidaceae	*Eulophia sp.*	11
Orchidaceae	*Orthochilus sp.*	11
Orchidaceae	*Orthochilus vinosus*	11

5.6. Faunal Screening Assessment

5.6.1. Mammal Diversity and Habitats

The IUCN Red List Spatial Data lists 85 mammal species that could be expected to occur within the vicinity of the project site. This is regarded as a moderately-low species diversity.

Of these species, sixteen are medium to large conservation dependant species, or species that had a historical range that included the project area, but with natural populations since becoming locally "extinct" in these areas. These species are now generally restricted to protected areas such as game reserves, game farms and protected areas, with most of these species being re-introduced in these areas.

Examples of such species are:

- African Wild Dog – *Lycaon pictus* (Endangered);
- Spotted Hyaena – *Crocuta crocuta* (Near Threatened);
- Lion – *Panthera leo* (Vulnerable);
- Cheetah – *Acinonyx jubatus* (Vulnerable);
- Hook-lipped Rhinoceros – *Diceros bicornis bicornis* (Endangered);
- Red Hartebeest – *Alcelaphus caama* (Not Evaluated);
- African Savanna Buffalo – *Syncerus caffer* (Least Concern); and

These species are not expected to occur in the project site and are removed from the expected Species of Conservation Concern (SCC) list.

Of these 69 remaining mammals, two are introduced/exotic mammals (House Mouse – *Mus musculus* and Brown Rat – *Rattus norvegicus*). The remaining 67 mammals are regarded as indigenous species that contain or may contain natural populations within the area. Of these natural occurring mammals, thirty-five species been previously recorded within the larger survey area (Quarter Degree Grids: 2629DA, 2629CB, 2629AD, 2629BC) according to the Animal Demographic Unit (ADU) database, indicating a significant undersupplying within the area (https://vmus.adu.org.za/vm_sp_list.php). The most often recorded species were;

- Four Striped Grass Mouse– *Rhabdomys pumilio* (No. of Records: 28)
- South African Hedgehog – *Atelerix frontalis* (No. of Records: 16);
- Natal Multimammate Mouse – *Mastomys natalensis* (No. of Records: 1);
- Highveld Gerbil – *Gerbilliscus brantsii* (No. of Records: 10);
- Striped Polecat – *Ictonyx striatus* (No. of Records: 8);
- Cape Hare – Lepus capensis (No. of Records: 6); and
- Yellow Mongoose – *Cynictis Penicillata* (No. of Records: 5);

5.6.2. Mammal Species of Conservation Concern (SCC)

SCCs include those species listed within the Regional Red Data List (2016), Global Red Data List (2015), that indicate severe recent population decline and those species or populations of species that are highly range restricted.

Of the remaining 67 small- to medium sized mammal species, that have a natural distribution range that include the project site and have a likelihood of occurring within the project site, fourteen (14) are listed as being of conservation concern on a regional or global basis (Table 14).

The list of potential species includes:

- One species that are listed as Endangered (EN) on a regional basis;
- Five (5) that are listed as Vulnerable (VU) on a regional basis; and
- Eight (8) that are listed as Near Threatened (NT) on a regional scale.

Table 14: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016)

Species	Common Name	Conservation Status			Likelihood of Occurrence
		Red Data	IUCN	TOPS	
Redunca fulvorufula	Mountain Reedbuck	NT	LC		Moderate
Panthera pardus	Leopard	NT	NT	Protected	High

Species	Common Name	Conservation Status			Likelihood of Occurrence
		Red Data	IUCN	TOPS	
Poecilogale albinucha	African Striped Weasel	EN	LC		High
Crocidura mariquensis	Swamp Musk Shrew	LC	VU	VU	Low
Dasymys incomtus	African Marsh Rat	NT	LC		Moderate
Otomys auratus	Southern African Vlei Rat	NT	LC		Moderate
Aonyx capensis	Cape Clawless Otter	NT	LC		Low
Parahyaena brunnea	Brown Hyaena	NT	LC		High
Leptailurus serval	Serval	NT	NT	Protected	High
Ambysomus septentrionalis	Highveld Golden Mole	NT	NT	Protected	Moderate
Crocidura maquassiensis	Maquassie Musk Shrew	NT	NT	Protected	High
Mystromys albicaudatus	White-tailed Mouse	NT	NT		Moderate
Hydrictis maculicollis	Spotted -necked Otter	VU	LC		Moderate
Chrysochloris villosus	Rough-haired Golden Mole	VU	LC		Moderate

5.6.3. Protected Mammal Species

These area species that are either protected nationally within TOPS (Threatened and Protected Species Issued in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004) or provincially within Schedule 1 and 2 of the Northern Cape Nature Conservation Act No 9 of 2009.

TOPS Regulations:

- The Threatened or Protected Species (TOPS) regulations, 2007, provide a national approach to sustainable use of species that are threatened with extinction, or in need of national protection, while ensuring the survival of the species in the wild, thus ensuring the conservation of the species.
- The TOPS regulations address multiple issues including: unethical hunting practices such as hunting in confined spaces, or hunting of tranquilised animals or by means of bait; activities related to the management of damage-causing animals; hybridisation and spreading diseases as a result of translocation; activities threatening cycad populations; and registration of captive breeding and keeping facilities.
- NEMBA enabled the Minister to prohibit activities that may impact on the survival of species in the wild, and to regulate activities to ensure sustainable use of indigenous biological resources.
- According to the definitions provided within the TOPS regulations (Section 56 (1)):
  - a Protected Species (56(1)(d)) is any indigenous species which are of high conservation value or national importance, or required regulation in order to ensure that the species are managed in an ecologically sustainable manner. Furthermore, all indigenous species listed within CITES (Conservation on International Trade in Endangered Species of Wild Fauna and Flora) are also automatically listed as a Protected Species within TOPS.

Schedule 2, 3 and 4 of the Mpumalanga Province Nature Conservation Act No 10 of 1998 (MPNCA):

- The aim/purpose of the Act is to provide for;
  - the sustainable utilisation of wild animals, aquatic biota and plants;
  - to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora;
  - to provide for offences and penalties for contravention of the Act;
  - to provide for the appointment of nature conservators to implement the provisions of the Act;
  - to provide for the issuing of permits and other authorisations; and
  - to provide for matters connected therewith.

Table 15: List of Protected mammal species (according to national provincial regulations) that have a distribution that include the project site.

Species	Common Name	TOPS (NEM:BA)	CITES	MPNCA Schedule 1	MPNCA Schedule 4	Likelihood of Occurrence
Aonyx capensis	Cape Clawless Otter	Protected	II	2		High
Hydrictis maculicollis	Spotted -necked Otter	Protected	II	2		Moderate
Mellovora capensis	Honey Badger	Protected		2		High
Parahyaena brunnea	Brown Hyaena	Protected		2		Moderate
Orycteropus afer	Aardvark	Protected		2		High
Proteles cristatus	Aardwolf		II	2		High
Redunca fulvorufula	Mountain Reedbuck			2		High
Raphicerus campestris	Steenbok			2		High
Atelerix frontalis	Southern African Hedgehog			2		High
Panthera pardus	Leopard	VU	I		4	Low
Leptailurus serval	Serval	Protected	II			High
Vulpes chama	Cape Fox	Protected				Moderate

5.6.4. Reptile Diversity

The IUCN Red List Spatial Data lists 66 reptile species that could be expected to occur within the vicinity of the project site. This is comparatively moderate-low suggesting that reptile diversity at the site is likely to be fairly moderate.

Of these 66 reptile species, 24 have been previously recorded within the larger survey area (Quarter Degree Grids: 2629DA, 2629CB, 2629AD, 2629BC) according to the Animal Demographic Unit (ADU) database, indicating under sampling within the region. Species that has been frequently observed within the these QDGs are:

- Speckled Rock Skink – *Trachylepis punctatissima* (No. of Records: 15);
- Eastern Thread Snake – *Leptotyphlops scutifrons conjunctus* (No. of Records: 14);
- Bibron's Blind Snake – *Afrotyphlops bibronii* (No. of Records: 10);

» Distant's Ground Agama – *Agama aculeata distanti* (No. of Records: 7);
» Black-headed Centipede-eater – *Aparallactus capensis* (No. of Records: 7); and
» Rhombic Egg-eater – *Dasypeltis scabra* (No. of Records: 7).

5.6.5. Reptile Species of Conservation Concern (SCC)

SCCs include those species listed within the Regional Red Data List (2017), Global Red Data List (2015), that indicate severe recent population decline and those species or populations of species that are highly range restricted.

Of the 66 reptile species that have a natural distribution range that include the project site, and have a likelihood of occurring within the project site, only one are listed as being of conservation concern on a regional or global basis namely; Coppery Grass Lizard – *Chamaesaura aenea* (Near Threatened and Endemic). This species has a moderate likely hood of occurrence

5.6.6. Protected Reptile Species

These are species that are either protected nationally within TOPS (Threatened and Protected Species Issued in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004) or provincially within Schedule 2, 3 and 4 of the Mpumalanga Province Nature Conservation Act No 10 of 1998.

All of the reptilian species apart from the water leguaan (*Varanus niloticus*), rock leguaan (*Varanus exanthematicus*) as well as all species of snakes (Order Serpentes) are regarded as Schedule 2 Protected Species.

Apart from the above mentioned provincially protected species, no TOPS species are likely to occur within the project site.

5.6.7. Amphibian Diversity

The IUCN Red List Spatial Data lists nineteen (19) amphibian species that occur within the region.

Of these nineteen amphibian species, thirteen species has been previously recorded within the larger survey area (Quarter Degree Grids: 2629DA, 2629CB, 2629AD, 2629BC) according to the Animal Demographic Unit (ADU) database. The most frequently recorded species area:

» Rattling Frog – *Semnodactylus wealii* (No. of Records: 10);
» Cape River Frog – *Amietia fuscigula* (No. of Records: 8);

» Common Caco – *Cacosternum boettgeri* (No. of Records: 8);
» Natal Sand Frog – *Tomopterna natalensis* (No. of Records: 7); and
» Raucous Toad – *Sclerophrys capensis* (No. of Records: 7)

5.6.8. Amphibian Species of Conservation Concern (SCC)

SCCs include those species listed within the Regional Red Data List (2017), Global Red Data List (2015), that indicate severe recent population decline and those species or populations of species that are highly range restricted.

Of the nineteen amphibian species that have a natural distribution range that include the project site, none are listed as being of conservation concern on a regional or global basis.

5.6.9. Protected Amphibian Species

These area species that are either protected nationally within TOPS (Threatened and Protected Species Issued in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004) or provincially within Schedule 1 and 2 of the Northern Cape Nature Conservation Act No 9 of 2009.

Only one protected species has a distribution range that include the project site, namely African Bull Frog (Pyxicephalus adspersus). This specie has a Moderate likelihood of occurrence.

6. TERRESTRIAL AND TERRESTRIAL SCREENING PHASE SENSITIVITY ASSESSMENT

The Sensitivity Map provided below (Figure 16) is based on the findings and conclusions made within Sections 5.2.3, 5.2.4, 5.2.5.1, 5.2.5.2, 5.4.1 and 5.4.2.

From a developmental perspective, development within the Low- and (cultivated areas) and Low-Medium (secondary grassland) sensitive are regarded as the most suitable/preferable. Development within the primary grassland areas, that are not included within the CBAs (medium sensitive) are regarded as acceptable, with the implementation of appropriate mitigation measures. In terms of the confirmed CBAs and, development within the Irreplaceable CBAs are regarded as unacceptable and these areas should be regarded as "No-Go" areas for both the WEF and SEF developments. The Optimal CBAs are regarded as unsuitable/unacceptable for the development of the Solar PV facility due to the nature of the development (transformation of large contiguous areas), however, in terms of the development of the Wind Energy Facility, some placement of wind turbines, cabling and access roads, within these Optimal Natural Areas, are regarded acceptable. Construction activities within these areas, will however have be restricted as far as possible, and to a small as possible area. Existing access routes should be used as far as possible.

Meticulous planning, especially in terms of the location of wind turbines and any new access routes should be done (in close consultation with the Ecologist).

Regarded the freshwater resource features:

» The following buffer areas are recommended, and should be for maintaining the freshwater resource features REC (Recommended Ecological Category) allowing the persistence of the current present ecological status as well as their functions and services.
  - All small, endorheic seepages and depressions with a low to moderate Ecological Importance: 50m buffers from the outer edge of the freshwater resource features.
  - All larger outward draining (exoreic), interconnected wetland features with high Ecological Importance: 100m buffers from the outer edge of the freshwater resource features.

» All freshwater features with their buffer areas have been classified as either Very High- or High sensitive and should be regarded as "No-Go" areas apart from the following activities and infrastructure which may be allowed (although restricted to an absolute minimum footprint):
  - only activities relating to the route access and cabling:
    - the use/upgrade of existing roads and watercourse crossings are the preferred options;
    - Where no suitable existing roads and watercourse crossings exist, the construction of new access roads and watercourse crossings can be allowed, however this should be deemed as a last resort.
    - All underground cabling should be laid either within access roads or next to access roads (as close as possible).

» In terms of activities and infrastructure planned within the FEPA1 prioritized Catchment: Careless and uncontrolled activities may lead to indirect negative impacts on the lower lying watercourses. Thus, the following mitigation measures should be considered;
  - During the planning and design phase the following aspects should be considered and addressed:
    - Natural runoff patterns within the catchments: Provide mitigation measures that will manage/simulate these natural runoff patterns and prevent erosion.
    - Natural/normal water inputs, flow patterns and flood peaks associated with the lower lying watercourses: Provide mitigation measures in order to maintain these hydrological characteristics (drivers).
    - Landscape/Ecological Connectivity: Provide mitigation measures that will prevent the fracturing of landscape (maintain connectivity between upland terrestrial habitats and downstream freshwater resource features)

- Recommended Ecological Categories (RECs) of downstream freshwater resource features: Maintain these RECs.

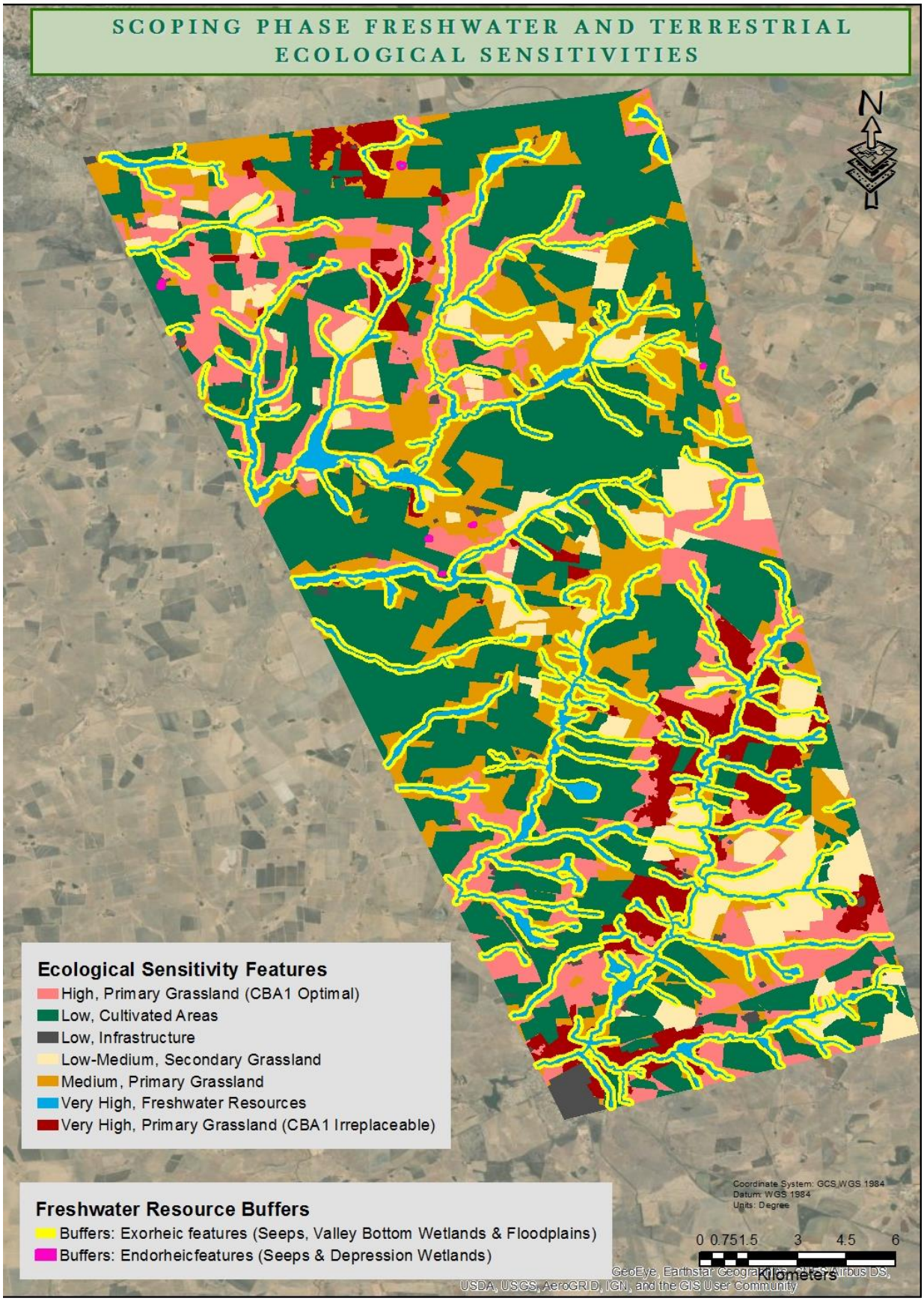

Figure 16: Freshwater and Terrestrial Ecological Sensitivity Map (Scoping Phase).

7. SCOPING PHASE IMPACT ASSESSMENT

Expected impacts of the proposed development (WEF, SEF and Grid Infrastructure) will mostly be focused on the vegetation (and supporting substrate) and freshwater resource features. Possible impacts could also be expected on bird species or small mammals and invertebrates. Potential expected impacts on the biodiversity are listed below, but it must be stressed that this evaluation is preliminary and based on desktop information and will only be finalised after a field study of the area in the EIA phase.

7.1. Terrestrial Ecological Impact Assessment

Overview of the most significant impacts of the proposed development

» *Impacts on vegetation and protected plant species*

At Vegetation Level:

As mentioned above the most likely and significant impact will be on the vegetation. The proposed development may lead to direct loss of vegetation. Consequences of the impact occurring may include:

- general loss of habitat for sensitive species;
- loss in variation within sensitive habitat due to a loss of portions thereof;
- general reduction in biodiversity;
- increased fragmentation (depending on the location of the impact);
- disturbance to processes maintaining biodiversity and ecosystem goods and services; and
- loss of ecosystem goods and services.

At species level:

Even though only one species of conservation concern (SCC) has been previously recorded within the region, there is a potential for SCC to occur within the development footprint due to suitable habitat. Such species are especially vulnerable to infrastructure development due to the fact that they cannot move out of the path of the construction activities and are also affected by overall loss of habitat. SCC (red data species) include those listed as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened plant species, loss of a population or individuals could lead to a direct change in the conservation status of the species and possible extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences may include:

- fragmentation of populations of affected species;
- reduction in the area of occupancy of affected species; and
- loss of genetic variation within affected species.

These may all lead to a negative change in the conservation status of the affected species, which implies a reduction in the chances of the species' overall survival.

The impacts can be largely mitigated through avoidance of potential sensitive areas and listed species by allowing a minimum clearance of vegetation (restricted to the absolute necessary areas) etc.

» *Direct Faunal impacts*

Faunal species will primarily be affected by the overall loss of habitat. Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species and species confined and dependant on specified habitats would not be able to avoid the construction activities and might be killed. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. This impact is highly likely to occur during the construction phase and would also potentially occur with resident fauna within the facility after construction.

SCC (red data species) include those listed as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species, possible extinction. This may arise if the proposed infrastructure is located where it will impact on such individual or populations. Consequences may include:

- fragmentation of populations of affected species;
- reduction in area of occupancy of affected species; and
- loss of genetic variation within affected species

These may all lead to a negative change in the conservation status of the affected species, which implies a reduction in the chances of the species' overall survival.

Disturbance of faunal species can be maintained to a minimum and low significance by implanting effective mitigation measures.

» *Soil erosion and associated degradation of ecosystems*

Soil erosion is a frequent risk associated with the development of WEF and SEF on account of the vegetation clearing and disturbance associated with the construction phase of the development and may continue occurring throughout the operational phase. Service roads and panels will generate an increase in runoff during intense rainfall events and may exaggerate the effects of erosion. These eroded materials may enter the nearby streams and rivers and may potentially impact these systems through siltation and change in chemistry and turbidity of the water.

With effective mitigation measures in place including regular monitoring the occurrence, spread and potential cumulative effects of erosion may be limited to an absolute minimum.

» *Alien Plant Invasions*

Major factors contributing to invasion by alien invader plants includes habitat disturbance and associated destruction of indigenous vegetation. Consequences of this may include:

- further loss and displacement of indigenous vegetation;
- change in vegetation structure leading to a change in various habitat characteristics;
- change in plant species composition;
- change in soil chemistry properties;
- loss of sensitive habitats;
- loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
- fragmentation of sensitive habitats;
- change in flammability of vegetation, depending on alien species;
- hydrological impacts due to increased transpiration and runoff; and
- impairment of wetland function.

Although the potential severity of this impact may be high, it can be easily mitigated through regular alien control.

» *Impacts on Critical Biodiversity Areas and Broad-Scale Ecological Processes*

Issue	**Nature of Impact during the <u>Construction and Decommission Phases</u>**	**Extent of Impact**	**No-Go Areas**
Disturbance to and loss of indigenous natural vegetation.	Construction of infrastructure will lead to direct loss of vegetation, causing a localised or more extensive reduction in the overall extent of vegetation. Consequences of the clearing and loss of indigenous semi – to near-natural vegetation occurring may include: » Increased vulnerability of remaining vegetation to future disturbance, including extreme climatic events; » General loss of habitat for sensitive fauna and flora species; » Loss in variation within sensitive habitats due to loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on the location of the impact) and associated reduced viability of species populations; » Alteration of the habitat suitable for plant populations by altering surface structure. This will change species composition and associated species interactions; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and	Local	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » Confirmed CBAs (Irreplaceable) » Recommended Freshwater Buffers » Freshwater Resource Features » Confirmed CBAs (Optimal): Only for PV facility

	» Loss of ecosystem goods and services.		
Disturbance or loss of threatened/protected plants.	SCC could potentially occur in the study area. Flora is affected by an overall loss or alteration of habitat and due to its limited ability to extend or change its distribution range. In the case of SCC, a loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences of this may include: » Fragmentation and decline of populations of affected species; » Reduction in the area of occupancy of affected species; » Loss of genetic variation within affected species; » Alteration of the habitat suitable for plant associations by altering of the surface structure. This will change species composition and associated species interactions and species ability to persist; and » Future extinction debt of particular species of flora and fauna. These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chance of survival of the species.	Local	No "No-Go" areas have been identified up to date.

Loss of habitat for fauna species of conservation concern.	Fauna species of conservation concern are indirectly affected primarily by a loss of or alteration of habitat and associated resources. Animals are mobile and, in most cases, can move away from a potential threat, unless they are bound to a specific habitat that is also spatially limited and will be negatively impacted by a development. Nevertheless, the proposed development will reduce the extent of habitat available to fauna. For any species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a suitable habitat, population, or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include: » Loss of populations of affected species; » Reduction in area of occupancy of affected species; » Loss of genetic variation within affected species; and » Future extinction debt of a particular species. There are a number of red data species that have been recorded for the wider area within which the study area	Local	No "No-Go" areas have been identified up to date.

	is located. Their presence and the necessity to keep their habitats intact in the study area needs to be confirmed during a field survey in the EIA phase.		
Disturbance to migration routes and associated impacts to species populations.	Site preparation and construction activities may interfere with the current migration routes of fauna species. This may lead to: » Reduced ability of species to move between breeding and foraging grounds, reducing breeding success rates; » Reduced genetic variation due to reduced interaction amongst individuals or populations as a result of fragmentation effects caused by the proposed developments	Site and surroundings	No "No-Go" areas have been identified up to date.
Impact on Critical Biodiversity Areas.	Development within the CBAs and ESAs may negatively impact biodiversity and the ecological functioning of these features.	Local and Regional	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » Confirmed CBAs (Irreplaceable) » Confirmed CBAs (Optimal): Only for PV facility
Establishment and spread of declared weeds and alien invader plants.	Major factors contributing to invasion by alien invader plants include excessive disturbance to vegetation, creating a window of opportunity for the establishment of alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the site by machinery traversing through areas with such plants or materials that may contain regenerative materials of such species. Consequences of the establishment and spread of invasive plants include:	Local and Regional	No "no-go" areas have been identified to date but the potential for alien invasive species present in or around the study area is regarded as moderate. The extent to which the site contains alien plants will be determined in the EIA phase through detailed investigation and field-survey.

	» Loss of indigenous vegetation; » Change in vegetation structure leading to change in or loss of various habitat characteristics; » Change in plant species composition; » Altered and reduced food resources for fauna; » Change in soil chemical properties; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Fragmentation of sensitive habitats; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; » Increased production and associated dispersal potential of alien invasive plants, especially to lower-lying wetland areas, and » Impairment of wetland function.		

Gaps in knowledge & recommendations for further study

» The initial desk-top investigation of the study area indicates that a few protected and red-data species as well as sensitive habitats potentially occur on the site. However, once the final layout has been designed in accordance to findings of a field investigation, the likelihood that the development will compromise the survival of any species of conservation concern is expected to be limited.

» **Plant species of conservation concern will only be identifiable during the growing season; thus any field survey of vegetation should only commence from November and be completed by April.**

» Although previous collection records from the area exist, the study area itself may not have been previously surveyed and there may be additional species that have not yet been captured in the existing species databases for the area. A detailed ecological survey and sensitivity assessment will be undertaken during the EIA phase.

Issue	**Nature of Impact during the <u>Operational Phase</u>**	**Extent of Impact**	**No-Go Areas**

Disturbance or loss of indigenous natural vegetation.	Hard and engineered surface create areas of altered surface characteristics, rainfall interception patterns. Consequently, it can be expected that within the Facility development footprint, the species composition and topsoil characteristics will change significantly. A sparser or less stable vegetation, together with the altered surface and runoff characteristics may lead to: » Increased vulnerability of the remaining vegetation to future disturbance, including erosion; » General loss or significant alteration of habitats for sensitive species; » Loss in variation within sensitive habitats due to a loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on location of impact); » Future extinction debt of a particular species; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Loss of ecosystem goods and services.	Local	No "no-go' areas so far identified.
Altered runoff patterns due compacted areas.	Hard, engineered surfaces create surfaces of rainfall interception, where rainfall is collected and concentrated at the edges from where it then moves onto the ground in larger, concentrated quantities as opposed to small drops being directly intercepted and raindrop impact dispersed by	Site and surroundings	No "no-go" areas regarding high risk erodible soils have been identified to date. This must be verified during a detailed investigation and field-survey as part of the EIA phase

	vegetation, then absorbed by the ground. This may lead to a localised increase in runoff during rainfall events, which may result in localised accelerated erosion. Likewise, access roads and areas where soils have been compacted during construction will have a low rainfall infiltration rate, hence creating more localised runoff from those surfaces. Runoff will thus have to be monitored and channelled where necessary to prevent erosion over larger areas.		
Establishment and spread of declared weeds and alien invader plants.	The envisaged altered vegetation cover after construction and during the operation phase of the proposed development will create a window of opportunity for the establishment of alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the site by machinery or persons traversing through areas with such plants or materials that may contain regenerative materials of such species. Consequences of the establishment and spread of invasive plants include: » Loss of indigenous vegetation or change in vegetation structure leading to an even more significant change in or loss of various habitat characteristics; » Loss of plant resources available to fauna; » Change in soil chemical properties;	Local to regional	No "no-go" areas have been identified to date but the potential for alien invasive species present in or around the study area is regarded as moderate. The extent to which the site contains alien plants will be determined in the EIA phase through detailed investigation and field-survey.

	» Loss or fragmentation of sensitive or restricted habitats; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; » Increased production and associated dispersal potential of alien invasive plants		

Gaps in knowledge & recommendations for further study

» The largest opportunity for mitigating any negative impacts exists during the design phase, if layouts adhere to the findings and recommendations of detailed field studies and investigations carried out during the EIA phase.
» Limited knowledge does, however exist on the potential and ease with which vegetation can be re-established after construction given the variable rainfall regime of the region; which species would be able to persist in the altered environment on and around the proposed development; and what effect this altered species composition and –density will have on ecosystem intactness and –functionality.
» Regular monitoring of a minimum set of environmental parameters throughout the operational phase, coupled with an adaptive environmental management program, will thus be essential to prevent any environmental degradation and any cumulative effects of the development beyond its periphery.

The significance of the proposed development in terms of Duration, Magnitude, Probability as well as cumulative impacts

» Most of the above-mentioned impacts are probable, although the extent, duration, and magnitude of these impacts can be minimalised to levels where these impacts can be regarded as low significance by having the necessary mitigation measures implemented. By exclusion of certain sensitive areas from the development footprint area, the probability of some of these above-mentioned impacts occurring within these habitats can be avoided.
» The duration of the project is expected to be long term (~20-25 years) and subsequently most of the impacts are also expected to be long term. However, some impacts are expected to be of short term and confined to the construction phase. For example, the disturbance of some animal species will be confined to the construction phase and as human movement decreases during the operation phase some species may return to the

site. Furthermore, impacts such as erosion and invasion of alien invasive species, with effective mitigation measures including regular monitoring in place, can be retained to a medium to short duration although monitoring and implementation of mitigation measures will have to be implemented throughout the lifespan of the proposed development.

» Although most impacts associated with the proposed development are expected to be local, affecting mainly the immediate environment, the potential does exist for some impacts to be exacerbated and even spread outside the development footprint area if left unattended, eventually posing a potential threat to important environmental processes and functionality. Impacts that may potentially pose a threat to the magnitude and duration, if left unattended or not mitigated accordingly, include invasion by invasive alien species, soil erosion, significant disturbance and alteration of important wetland habitats and watercourses.

» The most significant cumulative impact that the proposed development will have is the potential impact on Broad-Scale Ecological possesses and the impact on Critical Biodiversity Areas.

» Cumulative impacts of developments on population viability of species can be reduced significantly if new developments are kept as close as possible to existing developed and/or transformed areas or, where such is not possible, different sections of a development be kept as close together as possible. Thus, new power lines should follow routes of existing servitudes if such exist. Renewable energy facilities, like solar WEFs and PVs should be constructed as close as possible to existing infrastructure or substations, and if several developments are planned within close proximity, these developments should be situated as close together as possible, not scattered throughout the landscape.

- Excessive clearing of vegetation can and will influence runoff and stormwater flow patterns and dynamics, which could cause excessive accelerated erosion of plains, and this could also have detrimental effects on the downslope freshwater resource systems.
  - Rehabilitation and revegetation of all surfaces disturbed or altered during construction is desirable.
  - Runoff from sealed surfaces or surfaces that need to be kept clear of vegetation to facilitate operation of a development needs to be monitored regularly to ensure that erosion control and stormwater management measures are adequate to prevent the degradation of the surrounding environment.
- Large-scale disturbance of indigenous vegetation creates a major opportunity for the establishment of invasive species and the uncontrolled spread of alien invasives into adjacent agricultural land and rangelands.
  - A regular monitoring and eradication protocol must be part of all developments long term management plans.

7.2. Aquatic/Freshwater Resource Impact Assessment

The majority of impacts associated with the development would occur during the construction phase as a result of the disturbance associated with the operation of heavy machinery at the site and the presence of construction personnel. The major risk factors and contributing

activities associated with the development are identified below before the impacts are assessed. These are not necessarily a reflection of the impacts that would occur, but rather a discussion on overall potential impacts and/or extent of these potential impacts that would occur if mitigation measures are not considered and/ or sensitive areas not avoided.

Overview of the most significant impacts of the proposed development

Construction and operation may lead to potential indirect loss of / or damage to potential freshwater resource habitats. This may potentially lead to localised loss of sensitive habitat and may lead to downstream impacts that affect a greater extent of freshwater resources or impact on these systems functions and biodiversity. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetlands can have an impact on the functioning of those wetlands. Consequences may include:

- *increased loss of soil;*
- *loss of/or disturbance to indigenous wetland vegetation;*
- *loss of sensitive wetland habitats;*
- *loss or disturbance to individuals of rare, endangered, endemic and/or protected species that occur in wetlands;*
- *fragmentation of sensitive habitats;*
- *impairment of wetland function;*
- *change in channel morphology in downstream wetlands, potentially leading to further loss of wetland vegetation; and*
- *reduction in water quality in wetlands downstream*

Various freshwater resource features have preliminary been identified. The extent, condition as well as functions and services of these freshwater resources will be determined during the EIA phase Assessment and final appropriate buffers will be recommended.

Issue	**Nature of Impact during the <u>Construction and Decommision Phases</u>**	**Extent of Impact**	**No-Go Areas**
Disturbance to and loss of wetland vegetation	Construction of infrastructure may lead to direct loss of vegetation, causing a localised or more extensive reduction in the overall extent of vegetation.	Local	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and

	Potential consequences include: » General loss of habitat for sensitive fauna and flora species; » General reduction in biodiversity; » Reduction in the ability of the wetlands to fulfil their ecological services and functions such as flood attenuation and the enhancement of water quality through the precipitation and storage of nitrates and toxicants; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Exposure of soil to erosion.		» All Freshwater Buffer Areas The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).
Impact on freshwater resource systems through the possible increase in surface water runoff	An increase in the surface water budget of the wetlands and watercourses, due to an increase in volume and velocity of surface water flow from the cleared construction areas into the wetlands, may result in the loss of natural wetland/aquatic vegetation and potentially expose the wetland/aquatic soils to erosion.	Local and immediate surroundings	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and » All Freshwater Buffer Areas The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).
Increase sedimentation and erosion	Activities associated with the construction phase may potentially lead to some direct or indirect loss of or damage to the identified wetlands and watercourses. Impacts on these systems will most likely be:	Local and immediate surroundings	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and » All Freshwater Buffer Areas

	» Vegetation clearing within the development area may result in an increase in surface water flow and expose areas prone to erosion and these areas may expand / spread into the wetlands. » The eroded material may enter the wetlands and may potentially impact these systems through siltation.		The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).
Impact on localized surface water quality	Chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement etc.) could potentially be washed downslope into the wetlands and potentially affect water quality.	Local and immediate surroundings	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and » All Freshwater Buffer Areas The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).
Loss of habitat for fauna dependent on such habitats.	Fauna species of conservation concern are indirectly affected primarily by a loss of or alteration of habitat and associated resources. Animals are mobile and, in most cases, can move away from a potential threat, unless they are bound to a specific habitat that is also spatially limited, such as isolated, endorheic pans, and will be negatively impacted by a development. For any species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a suitable	Local	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and » All Freshwater Buffer Areas The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).

	habitat, population, or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include: » Loss of populations of affected species; » Reduction in area of occupancy of affected species; » Loss of genetic variation within affected species; and » Future extinction debt of a particular species. There is SCC that may potentially utilized these habitat types.		

Gaps in knowledge & recommendations for further study

» A detailed Surface Hydrological survey and assessment will be undertaken during the EIA phase according to methods outlined in this report.
» Following, the determination of habitat integrity and sensitivity (during EIA phase), especially towards the impacts associated with such a WEF development; appropriate buffers will be recommended as well as activities which may be acceptable within the buffer areas without threatening the integrity of the wetland areas.

Issue	**Nature of Impact during the <u>Operational Phase</u>**	**Extent of Impact**	**No-Go Areas**
Impact on freshwater resource systems through the possible increase	An increase in the surface water budget of the wetlands and watercourses, due to an increase in volume and velocity of surface water flow from the cleared areas and from any compacted and hard surfaces.	Local to immediate surroundings	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and » All Freshwater Buffer Areas

in surface water runoff	This may result in: » a change in vegetation composition and structure, » the exposure of wetland soils leaving these areas prone to soil erosion; » increase in sedimentation and subsequently a reduction in water quality; and » reduction in the ability of the wetlands to fulfil vital ecological functions and services such as flood attenuation and precipitation of minerals such as nitrates and toxicants.		The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).
Impact on localized surface water quality	Chemical pollutants (hydrocarbons from service equipment and vehicles etc.) could potentially be washed downslope into these wetlands and potentially affect water quality.	Local to immediate surroundings	The following areas have been classified as "No-Go" areas for most of the activities associated with the proposed development: » All Freshwater Resource features; and » All Freshwater Buffer Areas The only activities allowed within these areas are the use/upgrade of existing routes and watercourse crossings (new routes only last resort) as well as underground cabling (within roads).
Gaps in knowledge & recommendations for further study » A detailed Surface Hydrological survey and assessment will be undertaken during the EIA phase according to methods outlined in this report. » Following the determination of habitat integrity and sensitivity (during EIA phase), especially towards the impacts associated with such a WEF development; appropriate buffers will be recommended as well as activities which may be acceptable within the buffer areas without threatening the integrity of the wetland areas.			
The significance of the proposed development in terms of Duration, Magnitude, Probability as well as cumulative impacts			

The duration of the project is expected to be long term (~20-25 years) and subsequently most of the impacts are also expected to be long term. However, some impacts are expected to be of short term and confined to the construction phase. For example, the disturbance of some animal species will be confined to the construction phase and as human movement decreases during the operation phase some species may return to the site. Furthermore, impacts such as erosion and invasion of alien invasive species, with effective mitigation measures including regular monitoring in place, can be retained to a medium to short duration although monitoring and implementation of mitigation measures will have to be implemented throughout the lifespan of the proposed development.

Due to the fact that these identified wetlands have been subjected to very long term (>12 years) cultivation practices, as well as other forms of disturbances these wetlands have lost some of their functions and services with the remainder occurring in a limited and highly altered manner. Subsequently, their value (ecological importance and sensitivity) has been significantly reduced. It is also probable that this value will only slightly increase if rehabilitated to a satisfactory level (will never be able to rehabilitate to original form). Taking the current state, value and rehabilitation potential into account, the potential significance, magnitude, extent of the above described impacts is regarded as very low. Furthermore, with the necessary mitigation measures, the significance of these impacts can be even further reduced.

Furthermore, potential cumulative impacts are:

» The compromise of ecological processes as well as ecological functioning of these important freshwater resource habitats

- Transformation of intact habitat could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to habitat fragmentation and potentially disruption of habitat connectivity and furthermore impair their ability to respond to environmental fluctuations. This is especially of relevance for larger watercourses and wetlands serving as important groundwater recharge and floodwater attenuation zones, important microhabitats for various organisms and important corridor zones for faunal movement.
    - The following mitigation measures will be taken into account during the EIA phase Impact Assessment (in order to reduce the contribution of this development to cumulative impacts):
        - The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be maintained.
        - Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
        - The potential stormwater impacts of the proposed developments areas should be mitigated on-site to address any erosion or water quality impacts.
        - Good housekeeping measures as stipulated in the EMPr for the project should be in place where construction activities take place to prevent contamination of any freshwater features.

	- Where possible, infrastructure should coincide with existing infrastructure or areas of disturbance (such as existing roads). - Disturbed areas should be rehabilitated through reshaping of the surface to resemble that prior to the disturbance and vegetated with suitable local indigenous vegetation.

8. PLAN OF STUDY FOR EIA

The plan of study for the detailed EIA-phase of the project was informed by this scoping report and the preliminary ecological constraints and development implications highlighted within this ecological scoping report.

The Terrestrial Biodiversity (Fauna and Flora and Terrestrial Habitat) Assessment as well as Aquatic Biodiversity Assessment will be conducted in accordance with the protocols and procedures (3(a-d)) as set out in Section 24(5)(a) and (h) of the National Environmental Act, 1998, which has been gazetted on 10 January 2020.

Furthermore, the Terrestrial Biodiversity (Fauna and Flora) Impact Assessment will be undertaken in accordance with the Species Environmental Assessment Best Practice Guidelines.

8.1. Plan of Study for Detailed Terrestrial Ecological Assessment

» Detailed baseline field survey to assess baseline terrestrial vegetation status, species composition, condition and importance, with a focus on mapping and assessing untransformed grassland vegetation and habitat. A key distinction will be made between primary and secondary vegetation communities, and the representatives of any remaining intact grassland vegetation communities by comparison with known reference state/composition.

- » Baseline vegetation surveys to include an assessment of faunal SCC which will need to be documented and GPS coordinates taken for species encountered in the field.
- » The focus of faunal surveys should be on assessing habitat condition and requirements for key mammal and herpetofaunal species and documenting the presence and location of any SCC in the field.
- » Identification and assessment of the estimated significance of key ecological impacts to vegetation, plant species and fauna.
- » Confirm any fatal flaws from a terrestrial ecological perspective to inform planning and layout of development proposed.
- » Assess the need and desirability for terrestrial biodiversity offsets (where necessary) and provide preliminary recommendations.

Recommendations in terms of impact mitigation and management aimed at reducing impacts significant in line with the principles of the 'mitigation hierarchy', including possible biodiversity buffer zones, development realignments, onsite controls (Best Management Practices: BMPs) and initial post-development rehabilitation requirements (i.e. conceptual terrestrial habitat rehabilitation strategy).

8.2. Plan of Study for Detailed Freshwater Resource Assessment

- » A detailed baseline field survey to delineate and classify all freshwater resource features within the project site has already been done. However, the field survey for the EIA will focus on the assessment on freshwater resource condition, functioning and importance/sensitivity.
- » Identification and assessment of the estimated significance of key ecological impacts to wetlands/watercourses.
- » Assess the need and desirability for wetland/watercourse offsets (if necessary) and provide preliminary recommendations.

Recommendations in terms of impact mitigation and management aimed at reducing impacts significant in line with the principles of the 'mitigation hierarchy', including relevant wetland buffer zones, development realignments, onsite controls (Best Management Practices: BMPs) and initial post-development rehabilitation requirements (i.e. conceptual wetland rehabilitation strategy).

9. CONCLUSION AND RECOMMENDATIONS

This study aimed to conduct a screening assessment of the projects site to:

- » Identify any ecological sensitive areas (freshwater and terrestrial);
- » Confirm or dispute the current use of the land and environment sensitivity as identified by the national web-based environmental screening tool;
- » Provide motivation and evidence of either the verified or different use of the land and environmental sensitivity;
- » Identify sensitive areas to be avoided (including corresponding spatial data);
- » Provide recommendations regarding the areas available for the development of wind and solar energy facilities as well as the associated grid infrastructure

Habitat sensitivity classification was based on available GIS coverages including various terrestrial ecosystems and biodiversity data, and the expert's mapping from Google Earth satellite imagery (altitude 1 to 2 km).

Land use within the project site is mostly for farming. The study area consists of a mosaic of buildings/structures, active farmland ("agriculture"), fallow land (abandoned farmlands which consist of secondary vegetation; "fallow"), natural grasslands, and freshwater resource features or drainage areas (which is comprised of small streams, wetlands, shallow pans and depressions, and artificial dams).

Farming practices consist a mixture of cultivation (mainly maize with some soya bean cultivation), livestock farming (predominantly cattle on natural to near-natural grasslands and planted pastures), and to lesser extent game farming.

From a developmental perspective, development within the Low- and (cultivated areas) and Low-Medium (secondary grassland) sensitive are regarded as the most suitable/preferable. Development within the primary grassland areas, that are not

included within the CBAs (medium sensitive) are regarded as acceptable, with the implementation of appropriate mitigation measures. In terms of the confirmed CBAs and, development within the Irreplaceable CBAs are regarded as unacceptable and these areas should be regarded as "No-Go" areas for both the WEF and SEF developments. The Optimal CBAs are regarded as unsuitable/unacceptable for the development of the Solar PV facility due to the nature of the development (transformation of large contiguous areas), however, in terms of the development of the Wind Energy Facility, some placement of wind turbines, cabling and access roads, within these Optimal Natural Areas, are regarded acceptable. Construction activities within these areas, will however have be restricted as far as possible, and to a small as possible area. Existing access routes should be used as far as possible. Meticulous planning, especially in terms of the location of wind turbines and any new access routes should be done (in close consultation with the Ecologist).

Regarded the freshwater resource features:

» The following buffer areas are recommended, and should be for maintaining the freshwater resource features REC (Recommended Ecological Category) allowing the persistence of the current present ecological status as well as their functions and services.
  - All small, endorheic seepages and depressions with a low to moderate Ecological Importance: 50m buffers from the outer edge of the freshwater resource features.
  - All larger outward draining (exoreic), interconnected wetland features with high Ecological Importance: 100m buffers from the outer edge of the freshwater resource features.

» All freshwater features with their buffer areas have been classified as either Very High- or High sensitive and should be regarded as "No-Go" areas apart from the following activities and infrastructure which may be allowed (although restricted to an absolute minimum footprint):
  - only activities relating to the route access and cabling:
    - the use/upgrade of existing roads and watercourse crossings are the preferred options;
    - Where no suitable existing roads and watercourse crossings exist, the construction of new access roads and watercourse crossings can be allowed, however this should be deemed as a last resort.
    - All underground cabling should be laid either within access roads or next to access roads (as close as possible).

» In terms of activities and infrastructure planned within the FEPA1 prioritized Catchment: Careless and uncontrolled activities may lead to indirect negative impacts on the lower lying watercourses. Thus, the following mitigation measures should be considered;
  - During the planning and design phase the following aspects should be considered and addressed:

- Natural runoff patterns within the catchments: Provide mitigation measures that will manage/simulate these natural runoff patterns and prevent erosion.
- Natural/normal water inputs, flow patterns and flood peaks associated with the lower lying watercourses: Provide mitigation measures in order to maintain these hydrological characteristics (drivers).
- Landscape/Ecological Connectivity: Provide mitigation measures that will prevent the fracturing of landscape (maintain connectivity between upland terrestrial habitats and downstream freshwater resource features)
- Recommended Ecological Categories (RECs) of downstream freshwater resource features: Maintain these RECs.

Overall, no significant ecological as well as freshwater resource flaws, that could pose a risk to the proposed development, were identified during the scoping phase assessment; this will however, be confirmed during a detailed field study of the vegetation of the area.

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11. APPENDICES

Appendix 1 Plant Species List (Site and POSA Generated List)

The species list presented here is a combination of online (POSA) and site survey data. Descriptions of colours and symbols are given below:

Species marked with "*": Protected species.
Species marked with "†": Red List species.
Species highlighted in blue: Alien species.
Species marked with NEM:BA: Alien species listed in the NEM:BA Alien and Invasive Species Regulations.
Species marked with MP: Mpumalanga Endemic.

Family	Species	IUCN	Family	Species	IUCN
Acanthaceae	*Blepharis natalensis*	LC	Fabaceae	*Zornia milneana*	LC
Acanthaceae	*Blepharis subvolubilis*	LC	Fissidentaceae	*Fissidens palmifolius*	
Acanthaceae	*Crabbea acaulis*	LC	Gentianaceae	*Chironia krebsii*	LC
Acanthaceae	*Crabbea hirsuta*	LC	Gentianaceae	*Chironia palustris* subsp. *palustris*	LC
Acanthaceae	*Dyschoriste burchellii*	LC	Gentianaceae	*Chironia palustris* subsp. *transvaalensis*	LC
Acanthaceae	*Justicia anagalloides*	LC	Gentianaceae	*Chironia purpurascens* subsp. *humilis*	LC
Acanthaceae	*Ruellia cordata*	LC	Gentianaceae	*Exochaenium grande*	LC
Acanthaceae	*Thunbergia atriplicifolia*	LC	Gentianaceae	*Sebaea exigua*	LC
Acanthaceae	*Thunbergia pondoensis*	LC	Gentianaceae	*Sebaea leiostyla*	LC
Achariaceae	*Kiggelaria africana*	LC	Gentianaceae	*Sebaea repens*	LC
Agapanthaceae	**Agapanthus inapertus* subsp. *intermedius*	LC	Gentianaceae	*Sebaea sedoides* var. *sedoides*	LC
Agavaceae	*Chlorophytum comosum*	LC	Geraniaceae	*Geranium multisectum*	LC
Agavaceae	*Chlorophytum cooperi*	LC	Geraniaceae	*Geranium robustum*	LC
Agavaceae	*Chlorophytum fasciculatum*	LC	Geraniaceae	*Geranium wakkerstroomianum*	LC
Agavaceae	*Chlorophytum galpinii*		Geraniaceae	*Monsonia angustifolia*	LC
Aizoaceae	*Delosperma* sp.		Geraniaceae	*Monsonia attenuata*	LC
Aizoaceae	*Delosperma sutherlandii*	LC	Geraniaceae	*Monsonia brevirostrata*	LC
Aizoaceae	†*Khadia carolinensis*[MP]	VU	Geraniaceae	*Pelargonium alchemilloides*	LC
Aizoaceae	*Ruschia* sp.		Geraniaceae	*Pelargonium luridum*	LC
Alliaceae	*Allium* sp.		Geraniaceae	*Pelargonium minimum*	LC
Alliaceae	*Tulbaghia acutiloba*	LC	Geraniaceae	*Pelargonium sidoides*	LC
Alliaceae	*Tulbaghia cernua*	LC	Gesneriaceae	*Streptocarpus dunnii*	LC
Alliaceae	*Tulbaghia leucantha*	LC	Gesneriaceae	*Streptocarpus galpinii*	LC
Alliaceae	*Tulbaghia ludwigiana*	LC	Gesneriaceae	*Streptocarpus pentherianus*	LC
Alliaceae	*Tulbaghia* sp.		Hyacinthaceae	*Albuca baurii*	LC
Amaranthaceae	*Achyranthes aspera* var. *aspera*		Hyacinthaceae	*Albuca setosa*	LC
Amaranthaceae	*Alternanthera pungens*		Hyacinthaceae	*Albuca shawii*	LC
Amaranthaceae	*Amaranthus hybridus* subsp. *hybridus* var. *hybridus*		Hyacinthaceae	*Albuca* sp.	
Amaranthaceae	*Amaranthus thunbergii*	LC	Hyacinthaceae	*Albuca virens* subsp. *virens*	LC
Amaranthaceae	*Chenopodium album*		Hyacinthaceae	*Dipcadi brevifolium*	LC
Amaranthaceae	*Chenopodium hircinum*		Hyacinthaceae	*Dipcadi marlothii*	LC
Amaranthaceae	*Chenopodium phillipsianum*		Hyacinthaceae	*Dipcadi viride*	LC
Amaranthaceae	*Cyathula cylindrica* var. *cylindrica*	LC	Hyacinthaceae	*Drimia calcarata*	LC
Amaranthaceae	*Cyathula uncinulata*	LC	Hyacinthaceae	*Drimia depressa*	LC
Amaranthaceae	*Dysphania ambrosioides*		Hyacinthaceae	†*Drimia elata*	DD
Amaranthaceae	*Dysphania multifida*		Hyacinthaceae	*Drimia multisetosa*	LC

Amaranthaceae	*Dysphania schraderiana*		Hyacinthaceae	*Drimia pauciflora*	
Amaranthaceae	*Gomphrena celosioides*		Hyacinthaceae	*Drimia sphaerocephala*	LC
Amaryllidaceae	**Boophone disticha*	LC	Hyacinthaceae	**Eucomis autumnalis* subsp. *clavata*	NE
Amaryllidaceae	**Brunsvigia natalensis*	LC	Hyacinthaceae	**Eucomis montana*	LC
Amaryllidaceae	**Brunsvigia radulosa*	LC	Hyacinthaceae	**Eucomis pallidiflora* subsp. *pallidiflora*	LC
Amaryllidaceae	**Crinum bulbispermum*	LC	Hyacinthaceae	*Ledebouria burkei* subsp. *burkei*	LC
Amaryllidaceae	**Crinum graminicola*	LC	Hyacinthaceae	*Ledebouria cooperi*	LC
Amaryllidaceae	**Cyrtanthus breviflorus*	LC	Hyacinthaceae	*Ledebouria humifusa*	LC
Amaryllidaceae	**Cyrtanthus stenanthus*		Hyacinthaceae	*Ledebouria leptophylla*	LC
Amaryllidaceae	**Cyrtanthus tuckii*		Hyacinthaceae	*Ledebouria ovatifolia*	
Amaryllidaceae	**Haemanthus humilis* subsp. *hirsutus*	LC	Hyacinthaceae	*Ledebouria revoluta*	LC
Amaryllidaceae	**Haemanthus montanus*	LC	Hyacinthaceae	*Ledebouria* sp.	
Amaryllidaceae	*Nerine angustifolia*	LC	Hyacinthaceae	†*Merwilla plumbea*	NT
Amaryllidaceae	†*Nerine gracilis*	VU	Hyacinthaceae	*Ornithogalum candicans*	LC
Amaryllidaceae	*Nerine krigei*	LC	Hyacinthaceae	*Ornithogalum capillare*	LC
Amaryllidaceae	*Nerine laticoma*	LC	Hyacinthaceae	*Ornithogalum flexuosum*	LC
Amaryllidaceae	*Nerine rehmannii*	LC	Hyacinthaceae	*Ornithogalum juncifolium* var. *juncifolium*	NE
Amaryllidaceae	**Scadoxus puniceus*	LC	Hyacinthaceae	*Schizocarphus nervosus*	LC
Anacardiaceae	*Ozoroa engleri*	LC	Hydrocharitaceae	*Lagarosiphon major*	LC
Anacardiaceae	*Searsia dentata*	LC	Hypericaceae	*Hypericum aethiopicum* subsp. *sonderi*	LC
Anacardiaceae	*Searsia discolor*	LC	Hypericaceae	*Hypericum lalandii*	LC
Anacardiaceae	*Searsia dregeana*	LC	Hypoxidaceae	*Empodium elongatum*	LC
Anacardiaceae	*Searsia gerrardii*	LC	Hypoxidaceae	*Hypoxis acuminata*	LC
Anacardiaceae	*Searsia rigida* var. *rigida*	LC	Hypoxidaceae	*Hypoxis argentea* var. *argentea*	LC
Anacardiaceae	*Searsia tumulicola* var. *tumulicola*	LC	Hypoxidaceae	*Hypoxis filiformis*	LC
Apiaceae	*Afrosciadium magalismontanum*	LC	Hypoxidaceae	*Hypoxis gerrardii*	LC
Apiaceae	*Berula repanda*	LC	Hypoxidaceae	*Hypoxis hemerocallidea*	LC
Apiaceae	*Centella asiatica*	LC	Hypoxidaceae	*Hypoxis iridifolia*	LC
Apiaceae	*Conium chaerophylloides*	LC	Hypoxidaceae	*Hypoxis multiceps*	LC
Apiaceae	*Heteromorpha arborescens* var. *abyssinica*	LC	Hypoxidaceae	*Hypoxis rigidula* var. *rigidula*	LC
Apocynaceae	*Anisotoma pedunculata*	LC	Hypoxidaceae	*Hypoxis* sp.	
Apocynaceae	*Asclepias albens*	LC	Iridaceae	*Aristea torulosa*	LC
Apocynaceae	*Asclepias aurea*	LC	Iridaceae	*Babiana bainesii*	LC
Apocynaceae	*Asclepias brevicuspis*	LC	Iridaceae	*Crocosmia paniculata*	LC
Apocynaceae	*Asclepias crassinervis*	LC	Iridaceae	*Dierama insigne*	LC
Apocynaceae	*Asclepias cucullata* subsp. *cucullata*	LC	Iridaceae	*Dierama mossii*	LC
Apocynaceae	*Asclepias cultriformis*	LC	Iridaceae	*Dierama* sp.	
Apocynaceae	*Asclepias eminens*	LC	Iridaceae	*Dierama tyrium*	LC
Apocynaceae	*Asclepias fulva*	LC	Iridaceae	**Gladiolus crassifolius*	LC
Apocynaceae	*Asclepias gibba* var. *gibba*	LC	Iridaceae	**Gladiolus dalenii* subsp. *dalenii*	LC
Apocynaceae	*Asclepias gibba* var. *media*	LC	Iridaceae	**Gladiolus ecklonii*	LC
Apocynaceae	*Asclepias macropus*	LC	Iridaceae	**Gladiolus elliotii*	LC
Apocynaceae	*Asclepias multicaulis*	LC	Iridaceae	**Gladiolus longicollis* subsp. *longicollis*	LC
Apocynaceae	*Asclepias* sp.		Iridaceae	**Gladiolus longicollis* subsp. *platypetalus*	LC
Apocynaceae	*Asclepias stellifera*	LC	Iridaceae	†**Gladiolus paludosus*	VU
Apocynaceae	*Aspidoglossum araneiferum*	LC	Iridaceae	**Gladiolus papilio*	LC
Apocynaceae	*Aspidoglossum biflorum*	LC	Iridaceae	†**Gladiolus robertsoniae*	NT
Apocynaceae	*Aspidoglossum glanduliferum*	LC	Iridaceae	**Gladiolus sericeovillosus* subsp. *calvatus*	LC
Apocynaceae	*Aspidoglossum interruptum*	LC	Iridaceae	**Gladiolus sericeovillosus* subsp. *sericeovillosus*	LC
Apocynaceae	*Aspidoglossum lamellatum*	LC	Iridaceae	**Gladiolus* sp.	
Apocynaceae	*Aspidoglossum ovalifolium*	LC	Iridaceae	**Gladiolus vinosomaculatus*	LC
Apocynaceae	†*Aspidoglossum xanthosphaerum*	VU	Iridaceae	**Gladiolus woodii*	LC
Apocynaceae	**Ceropegia breviflora*		Iridaceae	**Hesperantha coccinea*	LC
Apocynaceae	**Ceropegia rehmannii*		Iridaceae	*Hesperantha longicollis*	LC

Apocynaceae	*Cordylogyne globosa*	LC	Iridaceae	*†Hesperantha rupestris*[MP]	DD
Apocynaceae	*Gomphocarpus fruticosus* subsp. *fruticosus*	LC	Iridaceae	*Moraea elliotii*	LC
Apocynaceae	*†Miraglossum davyi*[MP]	VU	Iridaceae	*Moraea pallida*	LC
Apocynaceae	*Miraglossum pulchellum*	LC	Iridaceae	*Moraea pubiflora*	LC
Apocynaceae	*Pachycarpus campanulatus* var. *sutherlandii*	LC	Iridaceae	*Moraea simulans*	LC
Apocynaceae	*Pachycarpus dealbatus*	LC	Iridaceae	*Moraea stricta*	LC
Apocynaceae	*Pachycarpus grandiflorus* subsp. *grandiflorus*	LC	Iridaceae	**Watsonia bella*	LC
Apocynaceae	*Pachycarpus macrochilus*	LC	Iridaceae	**Watsonia pulchra*	LC
Apocynaceae	*Pachycarpus plicatus*	LC	Juncaceae	*Juncus dregeanus* subsp. *dregeanus*	LC
Apocynaceae	*Pachycarpus scaber*	LC	Juncaceae	*Juncus exsertus*	LC
Apocynaceae	*Pachycarpus schinzianus*	LC	Juncaceae	*Juncus oxycarpus*	LC
Apocynaceae	*†Pachycarpus suaveolens*	VU	Juncaceae	*Juncus punctorius*	LC
Apocynaceae	*Parapodium costatum*	LC	Lamiaceae	*Acrotome hispida*	LC
Apocynaceae	*Raphionacme hirsuta*	LC	Lamiaceae	*Acrotome inflata*	LC
Apocynaceae	*Riocreuxia picta*	LC	Lamiaceae	*Aeollanthus buchnerianus*	LC
Apocynaceae	*Riocreuxia polyantha*	LC	Lamiaceae	*Ajuga ophrydis*	LC
Apocynaceae	*Schizoglossum atropurpureum* subsp. *atropurpureum*	LC	Lamiaceae	*Leonotis ocymifolia* var. *raineriana*	
Apocynaceae	*Schizoglossum nitidum*	LC	Lamiaceae	*Mentha aquatica*	LC
Apocynaceae	*†Schizoglossum peglerae*	EN	Lamiaceae	*Mentha longifolia* subsp. *polyadena*	LC
Apocynaceae	*Sisyranthus huttoniae*	LC	Lamiaceae	*Ocimum obovatum* subsp. *obovatum* var. *obovatum*	NE
Apocynaceae	*Sisyranthus imberbis*	LC	Lamiaceae	*Platostoma rotundifolium*	LC
Apocynaceae	*Stenostelma periglossoides*		Lamiaceae	*Pycnostachys reticulata*	LC
Apocynaceae	*†Stenostelma umbelluliferum*	NT	Lamiaceae	*Rotheca hirsuta*	LC
Apocynaceae	*Woodia* sp.		Lamiaceae	*Salvia aurita* var. *galpinii*	LC
Apocynaceae	*Xysmalobium asperum*	LC	Lamiaceae	*Salvia repens* var. *repens*	LC
Apocynaceae	*Xysmalobium parviflorum*	LC	Lamiaceae	*Salvia repens* var. *transvaalensis*	LC
Apocynaceae	*Xysmalobium stockenstromense*	LC	Lamiaceae	*Salvia runcinata*	LC
Apocynaceae	*Xysmalobium undulatum*		Lamiaceae	*Salvia* sp.	
Apocynaceae	*Xysmalobium undulatum* var. *undulatum*	LC	Lamiaceae	*Stachys hyssopoides*	LC
Aponogetonaceae	*Aponogeton junceus*	LC	Lamiaceae	*Stachys kuntzei*	LC
Araceae	**Zantedeschia albomaculata* subsp. *albomaculata*	LC	Lamiaceae	*Stachys natalensis* var. *natalensis*	LC
Araceae	**Zantedeschia albomaculata* subsp. *macrocarpa*	LC	Lamiaceae	*Stachys nigricans*	LC
Araceae	**Zantedeschia rehmannii*	LC	Lamiaceae	*Stachys* sp.	
Asparagaceae	*Asparagus bechuanicus*	LC	Lamiaceae	*Syncolostemon albiflorus*	LC
Asparagaceae	*Asparagus cooperi*	LC	Lamiaceae	*Syncolostemon concinnus*	LC
Asparagaceae	*Asparagus devenishii*	LC	Lamiaceae	*Syncolostemon pretoriae*	LC
Asparagaceae	*†Asparagus fractiflexus*	EN	Lamiaceae	*Teucrium trifidum*	LC
Asparagaceae	*Asparagus laricinus*	LC	Lentibulariaceae	*Utricularia prehensilis*	LC
Asparagaceae	*Asparagus ramosissimus*	LC	Limeaceae	*Limeum viscosum* subsp. *transvaalense*	LC
Asparagaceae	*Asparagus* sp.		Limeaceae	*Limeum viscosum* subsp. *viscosum* var. *glomeratum*	NE
Asparagaceae	*Asparagus virgatus*	LC	Linaceae	*Linum thunbergii*	LC
Asphodelaceae	**Aloe boylei*		Linderniaceae	*Linderniella nana*	
Asphodelaceae	**Aloe davyana*		Lobeliaceae	*Cyphia elata*	LC
Asphodelaceae	**Aloe ecklonis*	LC	Lobeliaceae	*Lobelia erinus*	LC
Asphodelaceae	**Aloe graciliflora*[MP]	LC	Lobeliaceae	*Lobelia flaccida* subsp. *flaccida*	LC
Asphodelaceae	**Aloe hlangapies*		Lobeliaceae	*Lobelia sonderiana*	LC
Asphodelaceae	**Aloe jeppeae*	LC	Lobeliaceae	*Monopsis decipiens*	LC
Asphodelaceae	**Aloe maculata* subsp. *maculata*	LC	Lythraceae	*Ammannia sagittifolia* var. *sagittifolia*	
Asphodelaceae	*Bulbine abyssinica*	LC	Lythraceae	*Ammannia schinzii*	
Asphodelaceae	*Bulbine capitata*	LC	Malvaceae	*Grewia flava*	LC
Asphodelaceae	**Kniphofia albescens*	LC	Malvaceae	*Grewia occidentalis* var. *occidentalis*	LC
Asphodelaceae	**Kniphofia porphyrantha*	LC	Malvaceae	*Hermannia coccocarpa*	LC
Asphodelaceae	*†*Kniphofia typhoides*	NT	Malvaceae	*Hermannia cordata*	LC

Asphodelaceae	*Trachyandra asperata* var. *carolinensis*[MP]	LC	Malvaceae	*Hermannia cristata*	LC
Asphodelaceae	*Trachyandra asperata* var. *macowanii*	LC	Malvaceae	*Hermannia depressa*	LC
Asphodelaceae	*Trachyandra asperata* var. *nataglencoensis*	LC	Malvaceae	*Hermannia oblongifolia*	LC
Asphodelaceae	*Trachyandra asperata* var. *swaziensis*	LC	Malvaceae	*Hermannia parviflora*	LC
Asphodelaceae	*Trachyandra gerrardii*	LC	Malvaceae	*Hermannia* sp.	
Asphodelaceae	*Trachyandra saltii* var. *saltii*	LC	Malvaceae	*Hermannia transvaalensis*	LC
Aspleniaceae	*Asplenium aethiopicum*	LC	Malvaceae	*Hibiscus aethiopicus* var. *ovatus*	LC
Aspleniaceae	*Asplenium capense*	LC	Malvaceae	*Hibiscus microcarpus*	LC
Aspleniaceae	*Asplenium cordatum*	LC	Malvaceae	*Hibiscus trionum*	
Asteraceae	*Acanthospermum glabratum*		Malvaceae	*Malva parviflora* var. *parviflora*	
Asteraceae	*Adenanthellum osmitoides*	LC	Malvaceae	*Pavonia columella*	LC
Asteraceae	*Afroaster hispidus*	LC	Melianthaceae	*Melianthus dregeanus* subsp. *insignis*	LC
Asteraceae	*Afroaster serrulatus*	LC	Menispermaceae	*Stephania abyssinica* var. *tomentella*	LC
Asteraceae	*Arctotis arctotoides*	LC	Menyanthaceae	*Nymphoides thunbergiana*	LC
Asteraceae	*Artemisia afra* var. *afra*	LC	Molluginaceae	*Psammotropha myriantha*	LC
Asteraceae	*Athrixia elata*	LC	Myrsinaceae	*Rapanea melanophloeos*	LC
Asteraceae	*Berkheya discolor*	LC	Myrtaceae	*Eucalyptus camaldulensis*[NEM:BA]	
Asteraceae	*Berkheya echinacea* subsp. *echinacea*	LC	Nyctaginaceae	*Mirabilis jalapa*[NEM:BA]	
Asteraceae	*Berkheya insignis*	LC	Ochnaceae	*Ochna natalitia*	LC
Asteraceae	*Berkheya onopordifolia* var. *onopordifolia*	LC	Oleaceae	*Ligustrum vulgare*[NEM:BA]	
Asteraceae	*Berkheya pinnatifida* subsp. *ingrata*	LC	Onagraceae	*Epilobium capense*	LC
Asteraceae	*Berkheya radula*	LC	Onagraceae	*Oenothera jamesii*	
Asteraceae	*Berkheya setifera*	LC	Onagraceae	*Oenothera stricta* subsp. *stricta*	
Asteraceae	*Berkheya speciosa* subsp. *lanceolata*	LC	Onagraceae	*Oenothera tetraptera*	
Asteraceae	*Berkheya zeyheri* subsp. *zeyheri*	LC	Orchidaceae	**Brachycorythis ovata* subsp. *ovata*	LC
Asteraceae	*Bidens pilosa*		Orchidaceae	**Brachycorythis pubescens*	LC
Asteraceae	*Callilepis salicifolia*	LC	Orchidaceae	**Brownleea parviflora*	LC
Asteraceae	*†Cineraria austrotransvaalensis*	NT	Orchidaceae	**Disa aconitoides* subsp. *aconitoides*	LC
Asteraceae	*Cineraria lyratiformis*	LC	Orchidaceae	**Disa cooperi*	LC
Asteraceae	*Conyza gouanii*	LC	Orchidaceae	**Disa nervosa*	LC
Asteraceae	*Conyza pinnata*		Orchidaceae	**Disa patula* var. *transvaalensis*	LC
Asteraceae	*Conyza podocephala*		Orchidaceae	**Disa stachyoides*	LC
Asteraceae	*Cotula australis*	LC	Orchidaceae	**Disa versicolor*	LC
Asteraceae	*Crepis hypochaeridea*		Orchidaceae	**Disperis cooperi*	LC
Asteraceae	*Denekia capensis*	LC	Orchidaceae	**Disperis fanniniae*	LC
Asteraceae	*Dichrocephala integrifolia* subsp. *integrifolia*	LC	Orchidaceae	**Eulophia cooperi*	LC
Asteraceae	*Dicoma anomala* subsp. *anomala*	LC	Orchidaceae	**Eulophia hians* var. *hians*	LC
Asteraceae	*Dicoma anomala* subsp. *gerrardii*	LC	Orchidaceae	**Eulophia hians* var. *inaequalis*	LC
Asteraceae	*Dicoma* sp.		Orchidaceae	**Eulophia hians* var. *nutans*	LC
Asteraceae	*Dimorphotheca caulescens*	LC	Orchidaceae	**Eulophia ovalis* var. *bainesii*	LC
Asteraceae	*Dimorphotheca jucunda*	LC	Orchidaceae	**Eulophia ovalis* var. *ovalis*	LC
Asteraceae	*Dimorphotheca spectabilis*	LC	Orchidaceae	**Eulophia parvilabris*	LC
Asteraceae	*Dimorphotheca zeyheri*	LC	Orchidaceae	**Eulophia* sp.	
Asteraceae	*Erigeron bonariensis*		Orchidaceae	*†*Habenaria barbertoni*	NT
Asteraceae	*Erigeron canadensis*		Orchidaceae	**Habenaria clavata*	LC
Asteraceae	*Euryops gilfillanii*	LC	Orchidaceae	**Habenaria dives*	LC
Asteraceae	*Euryops laxus*	LC	Orchidaceae	**Habenaria epipactidea*	LC
Asteraceae	*Euryops pedunculatus*	LC	Orchidaceae	**Habenaria falcicornis* subsp. *caffra*	LC
Asteraceae	*Euryops transvaalensis* subsp. *setilobus*	LC	Orchidaceae	**Habenaria lithophila*	LC
Asteraceae	*Felicia filifolia* subsp. *filifolia*	LC	Orchidaceae	**Neobolusia tysonii*	LC
Asteraceae	*Felicia muricata* subsp. *muricata*	LC	Orchidaceae	**Orthochilus foliosus*	LC

Asteraceae	*Felicia muricata* subsp. *strictifolia*	LC	Orchidaceae	**Orthochilus leontoglossus*	LC
Asteraceae	*Gamochaeta antillana*		Orchidaceae	**Orthochilus* sp.	
Asteraceae	*Gamochaeta pensylvanica*		Orchidaceae	**Orthochilus vinosus*	
Asteraceae	*Gazania krebsiana* subsp. *arctotoides*	LC	Orchidaceae	**Orthochilus welwitschii*	LC
Asteraceae	*Gazania krebsiana* subsp. *serrulata*	LC	Orchidaceae	**Pterygodium dracomontanum*	LC
Asteraceae	*Gazania* sp.		Orchidaceae	**Pterygodium nigrescens*	LC
Asteraceae	*Geigeria aspera* var. *aspera*	LC	Orchidaceae	**Satyrium hallackii* subsp. *ocellatum*	LC
Asteraceae	*Geigeria burkei* subsp. *burkei* var. *burkei*	NE	Orchidaceae	**Satyrium longicauda* var. *longicauda*	NE
Asteraceae	*Geigeria burkei* subsp. *burkei* var. *intermedia*	NE	Orchidaceae	**Satyrium neglectum* subsp. *neglectum* var. *neglectum*	LC
Asteraceae	*Geigeria burkei* subsp. *valida*	LC	Orchidaceae	**Satyrium parviflorum*	LC
Asteraceae	*Geigeria filifolia*	LC	Orchidaceae	**Satyrium trinerve*	LC
Asteraceae	*Gerbera ambigua*	LC	Orchidaceae	**Schizochilus zeyheri*	LC
Asteraceae	*Gerbera piloselloides*	LC	Orobanchaceae	*Alectra capensis*	LC
Asteraceae	*Gerbera viridifolia*	LC	Orobanchaceae	*Buchnera reducta*	LC
Asteraceae	*Gnaphalium filagopsis*	LC	Orobanchaceae	*Buchnera* sp.	
Asteraceae	*Haplocarpha lyrata*	LC	Orobanchaceae	*Cycnium adonense*	LC
Asteraceae	*Haplocarpha nervosa*	LC	Orobanchaceae	*Cycnium tubulosum* subsp. *tubulosum*	LC
Asteraceae	*Haplocarpha scaposa*	LC	Orobanchaceae	*Harveya speciosa*	LC
Asteraceae	*Helichrysum adenocarpum* subsp. *adenocarpum*	LC	Orobanchaceae	*Melasma scabrum* var. *scabrum*	LC
Asteraceae	*Helichrysum albilanatum*	LC	Orobanchaceae	*Sopubia cana* var. *cana*	LC
Asteraceae	*Helichrysum aureum* var. *monocephalum*	NE	Orobanchaceae	*Sopubia simplex*	LC
Asteraceae	*Helichrysum auronitens*	LC	Orobanchaceae	*Sopubia* sp.	
Asteraceae	*Helichrysum caespititium*	LC	Orobanchaceae	*Striga asiatica*	LC
Asteraceae	*Helichrysum callicomum*	LC	Orobanchaceae	*Striga bilabiata* subsp. *bilabiata*	LC
Asteraceae	*Helichrysum cephaloideum*	LC	Orobanchaceae	*Striga elegans*	LC
Asteraceae	*Helichrysum chionosphaerum*	LC	Orobanchaceae	*Striga gesnerioides*	LC
Asteraceae	*Helichrysum miconiifolium*	LC	Orthotrichaceae	*Orthotrichum diaphanum*	
Asteraceae	*Helichrysum molestum*	LC	Oxalidaceae	*Oxalis convexula*	LC
Asteraceae	*Helichrysum mundtii*	LC	Oxalidaceae	*Oxalis corniculata*	
Asteraceae	*Helichrysum nudifolium* var. *nudifolium*	LC	Oxalidaceae	*Oxalis obliquifolia*	LC
Asteraceae	*Helichrysum nudifolium* var. *pilosellum*	LC	Oxalidaceae	*Oxalis smithiana*	LC
Asteraceae	*Helichrysum opacum*	LC	Papaveraceae	*Papaver aculeatum*	LC
Asteraceae	*Helichrysum oreophilum*	LC	Peraceae	*Clutia hirsuta* var. *hirsuta*	LC
Asteraceae	*Helichrysum psilolepis*	LC	Peraceae	*Clutia monticola* var. *monticola*	LC
Asteraceae	*Helichrysum rugulosum*	LC	Peraceae	*Clutia natalensis*	LC
Asteraceae	*Helichrysum splendidum*	LC	Peraceae	*Clutia* sp.	
Asteraceae	*Helichrysum subglomeratum*	LC	Peraceae	*Clutia virgata*	LC
Asteraceae	*Hilliardiella aristata*	LC	Phrymaceae	*Mimulus gracilis*	LC
Asteraceae	*Hilliardiella elaeagnoides*		Phyllanthaceae	*Phyllanthus glaucophyllus*	LC
Asteraceae	*Hilliardiella hirsuta*	LC	Phyllanthaceae	*Phyllanthus maderaspatensis*	LC
Asteraceae	*Hilliardiella nudicaulis*	LC	Phytolaccaceae	*Phytolacca heptandra*	LC
Asteraceae	*Hypochaeris radicata*		Plantaginaceae	*Linaria vulgaris*[NEM:BA]	NE
Asteraceae	*Lactuca inermis*	LC	Plantaginaceae	*Plantago lanceolata*	LC
Asteraceae	*Lasiospermum pedunculare*	LC	Plantaginaceae	*Veronica anagallis-aquatica*	LC
Asteraceae	*Lopholaena segmentata*	LC	Poaceae	*Agrostis continuata*	LC
Asteraceae	*Macledium zeyheri* subsp. *zeyheri*	LC	Poaceae	*Agrostis eriantha* var. *eriantha*	LC
Asteraceae	*Nidorella anomala*	LC	Poaceae	*Agrostis gigantea*[NEM:BA]	
Asteraceae	*Nidorella auriculata*	LC	Poaceae	*Agrostis lachnantha* var. *lachnantha*	LC
Asteraceae	*Nidorella hottentotica*	LC	Poaceae	*Agrostis* sp.	
Asteraceae	*Nidorella resedifolia* subsp. *resedifolia*	LC	Poaceae	*Alloteropsis semialata* subsp. *eckloniana*	LC
Asteraceae	*Osteospermum moniliferum* subsp. *canescens*	LC	Poaceae	*Alloteropsis semialata* subsp. *semialata*	LC
Asteraceae	*Osteospermum scariosum* var. *scariosum*	NE	Poaceae	*Andropogon appendiculatus*	LC
Asteraceae	*Othonna natalensis*	LC	Poaceae	*Andropogon lacunosus*	LC
Asteraceae	*Parapolydora fastigiata*		Poaceae	*Andropogon schirensis*	LC

Asteraceae	*Platycarphella parvifolia*	LC	Poaceae	*Anthoxanthum odoratum* var. *odoratum*	NE
Asteraceae	*Polydora angustifolia*	LC	Poaceae	*Aristida adscensionis*	LC
Asteraceae	*Pseudognaphalium luteoalbum*	LC	Poaceae	*Aristida bipartita*	LC
Asteraceae	*Pseudognaphalium oligandrum*	LC	Poaceae	*Aristida canescens* subsp. *canescens*	LC
Asteraceae	*Pseudopegolettia tenella*		Poaceae	*Aristida congesta* subsp. *barbicollis*	LC
Asteraceae	*Pulicaria scabra*	LC	Poaceae	*Aristida congesta* subsp. *congesta*	LC
Asteraceae	*Schistostephium crataegifolium*	LC	Poaceae	*Aristida diffusa* subsp. *burkei*	LC
Asteraceae	*Schkuhria pinnata*		Poaceae	*Aristida junciformis* subsp. *junciformis*	LC
Asteraceae	*Senecio affinis*	LC	Poaceae	*Aristida recta*	LC
Asteraceae	*Senecio albanensis* var. *albanensis*	LC	Poaceae	*Aristida scabrivalvis* subsp. *scabrivalvis*	LC
Asteraceae	*Senecio bupleuroides*	LC	Poaceae	*Aristida* sp.	
Asteraceae	*Senecio burchellii*	LC	Poaceae	*Aristida vestita*	LC
Asteraceae	*Senecio coronatus*	LC	Poaceae	*Arundinella nepalensis*	LC
Asteraceae	*Senecio erubescens* var. *erubescens*	NE	Poaceae	*Avena sativa*	NE
Asteraceae	*Senecio gregatus*	LC	Poaceae	*Avena* sp.	
Asteraceae	*Senecio hieracioides*	LC	Poaceae	*Bothriochloa insculpta*	LC
Asteraceae	*Senecio inaequidens*	LC	Poaceae	*Brachiaria eruciformis*	LC
Asteraceae	*Senecio inornatus*	LC	Poaceae	*Brachiaria humidicola*	LC
Asteraceae	*Senecio isatideus*	LC	Poaceae	*Brachiaria serrata*	LC
Asteraceae	*Senecio laevigatus* var. *integrifolius*	LC	Poaceae	*Briza minor*	NE
Asteraceae	*Senecio laevigatus* var. *laevigatus*	LC	Poaceae	*Bromus catharticus*	NE
Asteraceae	*Senecio latifolius*	LC	Poaceae	*Bromus leptoclados*	LC
Asteraceae	*Senecio madagascariensis*	LC	Poaceae	*Bromus* sp.	
Asteraceae	*Senecio othonniflorus*	LC	Poaceae	*Catalepis gracilis*	LC
Asteraceae	*Senecio oxyriifolius* subsp. *oxyriifolius*	LC	Poaceae	*Chloris virgata*	LC
Asteraceae	*Senecio rhomboideus*	LC	Poaceae	*Ctenium concinnum*	LC
Asteraceae	*Senecio scitus*	LC	Poaceae	*Cymbopogon caesius*	LC
Asteraceae	*Senecio* sp.		Poaceae	*Cymbopogon dieterlenii*	LC
Asteraceae	*Senecio speciosus*	LC	Poaceae	*Cymbopogon pospischilii*	NE
Asteraceae	*Senecio subcoriaceus*	LC	Poaceae	*Cymbopogon prolixus*	LC
Asteraceae	*Senecio venosus*	LC	Poaceae	*Cynodon dactylon*	LC
Asteraceae	*Seriphium plumosum*		Poaceae	*Cynodon hirsutus*	LC
Asteraceae	*Sonchus asper* subsp. *asper*		Poaceae	*Cynodon transvaalensis*	LC
Asteraceae	*Sonchus nanus*	LC	Poaceae	*Dactylis glomerata*	NE
Asteraceae	*Sonchus oleraceus*		Poaceae	*Digitaria ciliaris*	NE
Asteraceae	*Tagetes minuta*		Poaceae	*Digitaria diagonalis* var. *diagonalis*	LC
Asteraceae	*Tolpis capensis*	LC	Poaceae	*Digitaria diversinervis*	LC
Asteraceae	*Ursinia montana* subsp. *montana*	LC	Poaceae	*Digitaria eriantha*	LC
Asteraceae	*Ursinia nana* subsp. *leptophylla*	LC	Poaceae	*Digitaria flaccida*	LC
Asteraceae	*Ursinia nana* subsp. *nana*	LC	Poaceae	*Digitaria sanguinalis*	NE
Asteraceae	*Ursinia paleacea*	LC	Poaceae	*Digitaria* sp.	
Asteraceae	*Ursinia tenuiloba*	LC	Poaceae	*Digitaria ternata*	LC
Asteraceae	*Xanthium spinosum*[NEM:BA]		Poaceae	*Digitaria tricholaenoides*	LC
Asteraceae	*Zinnia peruviana*		Poaceae	*Diheteropogon amplectens* var. *amplectens*	LC
Bartramiaceae	*Philonotis falcata*		Poaceae	*Echinochloa crus-galli*	LC
Bartramiaceae	*Philonotis hastata*		Poaceae	*Ehrharta erecta* var. *natalensis*	LC
Begoniaceae	*Begonia sutherlandii* subsp. *sutherlandii*	LC	Poaceae	*Eleusine coracana* subsp. *africana*	LC
Blechnaceae	*Blechnum attenuatum*	LC	Poaceae	*Elionurus muticus*	LC
Boraginaceae	*Anchusa riparia*	LC	Poaceae	*Enneapogon scoparius*	LC
Boraginaceae	*Cynoglossum austroafricanum*	LC	Poaceae	*Eragrostis caesia*	LC
Boraginaceae	*Cynoglossum hispidum*	LC	Poaceae	*Eragrostis capensis*	LC
Boraginaceae	*Cynoglossum lanceolatum*	LC	Poaceae	*Eragrostis chloromelas*	LC
Boraginaceae	*Echium plantagineum*[NEM:BA]		Poaceae	*Eragrostis cilianensis*	LC
Boraginaceae	*Lithospermum cinereum*	LC	Poaceae	*Eragrostis curvula*	LC
Boraginaceae	*Myosotis graminifolia*	LC	Poaceae	*Eragrostis gummiflua*	LC

Boraginaceae	*Myosotis sylvatica*		Poaceae	*Eragrostis lehmanniana* var. *chaunantha*	LC
Brassicaceae	*Brassica rapa*		Poaceae	*Eragrostis lehmanniana* var. *lehmanniana*	LC
Brassicaceae	*Erucastrum austroafricanum*	LC	Poaceae	*Eragrostis mexicana* subsp. *virescens*	NE
Brassicaceae	*Lepidium schinzii*	LC	Poaceae	*Eragrostis obtusa*	LC
Brassicaceae	*Lepidium transvaalense*	LC	Poaceae	*Eragrostis patentissima*	LC
Brassicaceae	*Nasturtium officinale*[NEM:BA]		Poaceae	*Eragrostis plana*	LC
Brassicaceae	*Rorippa fluviatilis* var. *fluviatilis*	LC	Poaceae	*Eragrostis planiculmis*	LC
Brassicaceae	*Rorippa nudiuscula*	LC	Poaceae	*Eragrostis racemosa*	LC
Brassicaceae	*Sinapis arvensis*		Poaceae	*Eragrostis remotiflora*	LC
Brassicaceae	*Sisymbrium capense*	LC	Poaceae	*Eragrostis sclerantha* subsp. *sclerantha*	LC
Brassicaceae	*Sisymbrium turczaninowii*	LC	Poaceae	*Eragrostis* sp.	
Brassicaceae	*Turritis glabra*		Poaceae	*Eragrostis tef*	NE
Bryaceae	*Bryum apiculatum*		Poaceae	*Eriochrysis brachypogon*	LC
Bryaceae	*Bryum argenteum*		Poaceae	*Festuca caprina*	LC
Bryaceae	*Bryum cellulare*		Poaceae	*Festuca scabra*	LC
Campanulaceae	*Wahlenbergia* sp.		Poaceae	*Fingerhuthia africana*	LC
Campanulaceae	*Wahlenbergia undulata*	LC	Poaceae	*Fingerhuthia sesleriiformis*	LC
Campanulaceae	*Wahlenbergia virgata*	LC	Poaceae	*Harpochloa falx*	LC
Caryophyllaceae	*Cerastium arabidis*	LC	Poaceae	*Hemarthria altissima*	LC
Caryophyllaceae	*Cerastium capense*	LC	Poaceae	*Heteropogon contortus*	LC
Caryophyllaceae	*Dianthus basuticus* subsp. *basuticus* var. *basuticus*	NE	Poaceae	*Holcus lanatus*	NE
Caryophyllaceae	*Dianthus mooiensis* subsp. *mooiensis* var. *dentatus*	NE	Poaceae	*Hyparrhenia anamesa*	LC
Caryophyllaceae	*Dianthus transvaalensis*	LC	Poaceae	*Hyparrhenia dregeana*	LC
Caryophyllaceae	*Herniaria erckertii* subsp. *erckertii*	LC	Poaceae	*Hyparrhenia hirta*	LC
Caryophyllaceae	*Pollichia campestris*	LC	Poaceae	*Hyparrhenia* sp.	
Caryophyllaceae	*Silene burchellii* subsp. *modesta*	LC	Poaceae	*Imperata cylindrica*	
Caryophyllaceae	*Silene burchellii* subsp. *pilosellifolia*		Poaceae	*Koeleria capensis*	LC
Caryophyllaceae	*Silene undulata*		Poaceae	*Leersia hexandra*	LC
Celastraceae	*Gymnosporia buxifolia*	LC	Poaceae	*Lolium multiflorum*	NE
Celastraceae	*Maytenus undata*	LC	Poaceae	*Lolium temulentum*	NE
Cleomaceae	*Cleome monophylla*	LC	Poaceae	*Lophacme digitata*	LC
Colchicaceae	*Colchicum longipes*	LC	Poaceae	*Loudetia densispica*	LC
Colchicaceae	*Colchicum melanthioides* subsp. *transvaalense*	LC	Poaceae	*Loudetia simplex*	LC
Colchicaceae	*Colchicum striatum*	LC	Poaceae	*Melinis nerviglumis*	LC
Colchicaceae	*Gloriosa modesta*	LC	Poaceae	*Melinis* sp.	
Commelinaceae	*Commelina africana* var. *africana*	LC	Poaceae	*Microchloa caffra*	LC
Commelinaceae	*Commelina africana* var. *krebsiana*	LC	Poaceae	*Miscanthus junceus*	LC
Commelinaceae	*Commelina africana* var. *lancispatha*	LC	Poaceae	*Monocymbium ceresiiforme*	LC
Commelinaceae	*Commelina benghalensis*	LC	Poaceae	*Panicum coloratum*	LC
Commelinaceae	*Cyanotis speciosa*	LC	Poaceae	*Panicum ecklonii*	LC
Convolvulaceae	*Convolvulus arvensis*[NEM:BA]		Poaceae	*Panicum natalense*	LC
Convolvulaceae	*Convolvulus natalensis*	LC	Poaceae	*Panicum schinzii*	LC
Convolvulaceae	*Convolvulus sagittatus*	LC	Poaceae	*Panicum* sp.	
Convolvulaceae	*Convolvulus thunbergii*	LC	Poaceae	*Panicum volutans*	LC
Convolvulaceae	*Falkia oblonga*	LC	Poaceae	*Paspalum dilatatum*	NE
Convolvulaceae	*Ipomoea bathycolpos*	LC	Poaceae	*Paspalum distichum*	LC
Convolvulaceae	*Ipomoea crassipes* var. *crassipes*	LC	Poaceae	*Pennisetum macrourum*	LC
Convolvulaceae	*Ipomoea oblongata*	LC	Poaceae	*Pennisetum sphacelatum*	LC
Convolvulaceae	*Ipomoea ommanneyi*	LC	Poaceae	*Pennisetum thunbergii*	LC
Convolvulaceae	*Ipomoea simplex*	LC	Poaceae	*Pennisetum unisetum*	LC
Convolvulaceae	*Xenostegia tridentata* subsp. *angustifolia*	LC	Poaceae	*Perotis* sp.	
Crassulaceae	*Crassula alba* var. *alba*	NE	Poaceae	*Phalaris arundinacea*	NE
Crassulaceae	*Crassula barbata* subsp. *barbata*	LC	Poaceae	*Phalaris canariensis*	NE
Crassulaceae	*Crassula compacta*	LC	Poaceae	*Phalaris minor*	NE

Crassulaceae	*Crassula lanceolata* subsp. *transvaalensis*	LC	Poaceae	*Poa annua*	NE
Crassulaceae	*Crassula natans* var. *minus*	LC	Poaceae	*Poa binata*	LC
Crassulaceae	*Crassula setulosa* var. *setulosa forma setulosa*	NE	Poaceae	*Pogonarthria squarrosa*	LC
Crassulaceae	*Crassula* sp.		Poaceae	*Rendlia altera*	LC
Crassulaceae	*Crassula tuberella*	LC	Poaceae	*Sacciolepis chevalieri*	LC
Crassulaceae	*Crassula vaginata* subsp. *vaginata*	LC	Poaceae	*Sacciolepis typhura*	LC
Cucurbitaceae	*Coccinia adoensis*	LC	Poaceae	*Schizachyrium sanguineum*	LC
Cucurbitaceae	*Cucumis anguria* var. *longaculeatus*	LC	Poaceae	*Setaria incrassata*	LC
Cucurbitaceae	*Cucumis hirsutus*	LC	Poaceae	*Setaria italica*	NE
Cucurbitaceae	*Cucumis myriocarpus* subsp. *myriocarpus*	LC	Poaceae	*Setaria nigrirostris*	LC
Cucurbitaceae	*Cucumis zeyheri*	LC	Poaceae	*Setaria pumila*	LC
Cyperaceae	*Abildgaardia ovata*	LC	Poaceae	*Setaria* sp.	
Cyperaceae	*Ascolepis capensis*	LC	Poaceae	*Setaria sphacelata* var. *sphacelata*	LC
Cyperaceae	*Bulbostylis boeckeleriana*	LC	Poaceae	*Setaria sphacelata* var. *torta*	LC
Cyperaceae	*Bulbostylis humilis*	LC	Poaceae	*Sorghum bicolor* subsp. *arundinaceum*	LC
Cyperaceae	*Bulbostylis oritrephes*	LC	Poaceae	*Sporobolus centrifugus*	LC
Cyperaceae	*Bulbostylis schoenoides*	LC	Poaceae	*Sporobolus discosporus*	LC
Cyperaceae	*Bulbostylis scleropus*	LC	Poaceae	*Sporobolus fimbriatus*	LC
Cyperaceae	*Carex glomerabilis*	LC	Poaceae	*Sporobolus* sp.	
Cyperaceae	*Carex ludwigii*		Poaceae	*Stiburus alopecuroides*	LC
Cyperaceae	*Carex rhodesiaca*	LC	Poaceae	*Stiburus conrathii*	LC
Cyperaceae	*Carex spartea*		Poaceae	*Stipagrostis zeyheri* subsp. *sericans*	LC
Cyperaceae	*Cyperus congestus*	LC	Poaceae	*Themeda triandra*	LC
Cyperaceae	*Cyperus denudatus*	LC	Poaceae	*Trachypogon spicatus*	LC
Cyperaceae	*Cyperus difformis*	LC	Poaceae	*Tragus berteronianus*	LC
Cyperaceae	*Cyperus esculentus* var. *esculentus*	LC	Poaceae	*Tragus racemosus*	LC
Cyperaceae	*Cyperus fastigiatus*	LC	Poaceae	*Trisetopsis imberbis*	
Cyperaceae	*Cyperus longus* var. *longus*	NE	Poaceae	*Tristachya leucothrix*	LC
Cyperaceae	*Cyperus longus* var. *tenuiflorus*	NE	Poaceae	*Urochloa panicoides*	LC
Cyperaceae	*Cyperus marginatus*	LC	Polygalaceae	*Polygala africana*	LC
Cyperaceae	*Cyperus obtusiflorus* var. *flavissimus*	LC	Polygalaceae	*Polygala albida* subsp. *albida*	LC
Cyperaceae	*Cyperus rigidifolius*	LC	Polygalaceae	*Polygala gerrardii*	LC
Cyperaceae	*Cyperus rupestris* var. *rupestris*	LC	Polygalaceae	*Polygala gracilenta*	LC
Cyperaceae	*Cyperus schlechteri*	LC	Polygalaceae	*Polygala hottentotta*	LC
Cyperaceae	*Cyperus uitenhagensis*	LC	Polygalaceae	*Polygala ohlendorfiana*	LC
Cyperaceae	*Cyperus usitatus*	LC	Polygalaceae	*Polygala transvaalensis*	
Cyperaceae	*Eleocharis dregeana*	LC	Polygalaceae	*Polygala transvaalensis* subsp. *transvaalensis*	LC
Cyperaceae	*Eleocharis limosa*	LC	Polygalaceae	*Polygala uncinata*	LC
Cyperaceae	*Fimbristylis complanata*	LC	Polygalaceae	*Polygala virgata* var. *decora*	LC
Cyperaceae	*Fuirena coerulescens*	LC	Polygonaceae	*Fallopia convolvulus*	
Cyperaceae	*Isolepis cernua* var. *cernua*	LC	Polygonaceae	*Oxygonum dregeanum* subsp. *canescens* var. *canescens*	NE
Cyperaceae	*Isolepis costata*	LC	Polygonaceae	*Oxygonum dregeanum* subsp. *swazicum*	LC
Cyperaceae	*Isolepis sepulcralis*	LC	Polygonaceae	*Persicaria amphibia*	LC
Cyperaceae	*Isolepis setacea*	LC	Polygonaceae	*Persicaria decipiens*	LC
Cyperaceae	*Kyllinga alata*	LC	Polygonaceae	*Persicaria hystricula*	LC
Cyperaceae	*Kyllinga erecta* var. *erecta*	LC	Polygonaceae	*Persicaria lapathifolia*	
Cyperaceae	*Kyllinga pulchella*	LC	Polygonaceae	*Persicaria madagascariensis*	
Cyperaceae	*Pycreus betschuanus*	LC	Polygonaceae	*Polygonum aviculare*	
Cyperaceae	*Pycreus chrysanthus*	LC	Polygonaceae	*Polygonum plebeium*	LC
Cyperaceae	*Pycreus cooperi*	LC	Polygonaceae	*Rumex acetosella* subsp. *angiocarpus*	
Cyperaceae	*Pycreus macranthus*	LC	Polygonaceae	*Rumex crispus*	
Cyperaceae	*Pycreus nitidus*	LC	Polygonaceae	*Rumex lanceolatus*	LC
Cyperaceae	*Rhynchospora brownii*	LC	Polygonaceae	*Rumex sagittatus*	LC
Cyperaceae	*Schoenoplectus decipiens*	LC	Polygonaceae	*Rumex* sp.	
Cyperaceae	*Schoenoplectus muricinux*	LC	Polygonaceae	*Rumex woodii*	LC

Cyperaceae	*Schoenoplectus pulchellus*	LC	Pontederiaceae	*Pontederia ovalis*	
Cyperaceae	*Schoenoxiphium* sp.		Portulacaceae	*Portulaca oleracea*	
Cyperaceae	*Scirpoides burkei*	LC	Pottiaceae	*Didymodon tophaceus*	
Dioscoreaceae	**Dioscorea dregeana*	LC	Pottiaceae	*Trichostomum brachydontium*	
Dipsacaceae	*Cephalaria pungens*	LC	Proteaceae	**Protea roupelliae* subsp. *roupelliae*	LC
Dipsacaceae	*Cephalaria zeyheriana*	LC	Pteridaceae	*Cheilanthes eckloniana*	LC
Dipsacaceae	*Scabiosa columbaria*	LC	Pteridaceae	*Cheilanthes hirta* var. *brevipilosa forma laxa*	
Dryopteridaceae	*Dryopteris athamantica*	LC	Pteridaceae	*Cheilanthes hirta* var. *hirta*	LC
Ebenaceae	*Diospyros austroafricana* var. *microphylla*	LC	Pteridaceae	*Cheilanthes hirta* var. *nemorosa*	LC
Ebenaceae	*Diospyros lycioides* subsp. *guerkei*	LC	Pteridaceae	*Cheilanthes multifida* subsp. *lacerata*	LC
Ebenaceae	*Euclea crispa* subsp. *crispa*	LC	Pteridaceae	*Cheilanthes quadripinnata*	LC
Ebenaceae	*Euclea* sp.		Pteridaceae	*Cheilanthes viridis* var. *viridis*	LC
Ericaceae	*Erica alopecurus* var. *alopecurus*	LC	Pteridaceae	*Pellaea calomelanos* var. *calomelanos*	LC
Ericaceae	*Erica cerinthoides* var. *cerinthoides*	NE	Pteridaceae	*Pityrogramma argentea*	LC
Ericaceae	*Erica drakensbergensis*	LC	Ranunculaceae	*Clematis brachiata*	LC
Ericaceae	*Erica oatesii*		Ranunculaceae	*Peltocalathos baurii*	LC
Eriocaulaceae	*Eriocaulon sonderianum*	LC	Ranunculaceae	*Ranunculus dregei*	LC
Euphorbiaceae	*Acalypha angustata*	LC	Ranunculaceae	*Ranunculus multifidus*	LC
Euphorbiaceae	†*Acalypha caperonioides* var. *caperonioides*	DD	Ranunculaceae	*Ranunculus trichophyllus*	LC
Euphorbiaceae	*Acalypha depressinervia*	LC	Rhamnaceae	*Ziziphus mucronata* subsp. *mucronata*	LC
Euphorbiaceae	*Acalypha* sp.		Rhamnaceae	*Ziziphus zeyheriana*	LC
Euphorbiaceae	*Acalypha wilmsii*	LC	Ricciaceae	*Riccia cavernosa*	
Euphorbiaceae	*Euphorbia arida*	LC	Ricciaceae	*Riccia crystallina*	
Euphorbiaceae	*Euphorbia clavarioides*	LC	Ricciaceae	*Riccia stricta*	
Euphorbiaceae	*Euphorbia gueinzii*	LC	Rosaceae	*Agrimonia bracteata*	LC
Euphorbiaceae	*Euphorbia inaequilatera*	LC	Rosaceae	*Alchemilla capensis*	LC
Euphorbiaceae	*Euphorbia inaequilatera* var. *inaequilatera*	NE	Rosaceae	*Alchemilla woodii*	LC
Euphorbiaceae	*Euphorbia natalensis*	LC	Rosaceae	*Rubus ludwigii* subsp. *ludwigii*	LC
Euphorbiaceae	*Euphorbia* sp.		Rosaceae	*Sanguisorba minor* subsp. *muricata*	
Euphorbiaceae	*Euphorbia striata*	LC	Rubiaceae	*Anthospermum herbaceum*	LC
Fabaceae	*Acacia dealbata*[NEM:BA]	NE	Rubiaceae	*Anthospermum rigidum* subsp. *rigidum*	LC
Fabaceae	*Aeschynomene rehmannii* var. *leptobotrya*	LC	Rubiaceae	*Canthium inerme*	LC
Fabaceae	*Aeschynomene rehmannii* var. *rehmannii*	LC	Rubiaceae	*Cephalanthus natalensis*	LC
Fabaceae	*Alysicarpus zeyheri*	LC	Rubiaceae	*Galium capense* subsp. *capense*	LC
Fabaceae	†*Argyrolobium campicola*	NT	Rubiaceae	*Galium capense* subsp. *garipense* var. *garipense*	NE
Fabaceae	*Argyrolobium harveyanum*	LC	Rubiaceae	*Kohautia amatymbica*	LC
Fabaceae	*Argyrolobium humile*	LC	Rubiaceae	*Kohautia caespitosa* subsp. *brachyloba*	LC
Fabaceae	*Argyrolobium lotoides*	LC	Rubiaceae	*Pentanisia angustifolia*	LC
Fabaceae	*Argyrolobium pauciflorum*	LC	Rubiaceae	*Pentanisia prunelloides*	
Fabaceae	*Argyrolobium rupestre* subsp. *rupestre*	LC	Rubiaceae	*Pentanisia prunelloides* subsp. *latifolia*	LC
Fabaceae	*Argyrolobium speciosum*	LC	Rubiaceae	*Pentanisia prunelloides* subsp. *prunelloides*	LC
Fabaceae	*Argyrolobium transvaalense*	LC	Rubiaceae	*Richardia brasiliensis*	NE
Fabaceae	*Argyrolobium tuberosum*	LC	Rubiaceae	*Spermacoce natalensis*	LC
Fabaceae	*Aspalathus callosa*	LC	Rubiaceae	*Vangueria pygmaea*	LC
Fabaceae	*Chamaecrista capensis* var. *capensis*	LC	Rubiaceae	*Vangueria thamnus*	LC
Fabaceae	*Crotalaria distans* subsp. *distans*	LC	Ruscaceae	*Eriospermum abyssinicum*	
Fabaceae	*Crotalaria eremicola* subsp. *eremicola*	LC	Ruscaceae	*Eriospermum cooperi* var. *cooperi*	LC
Fabaceae	*Crotalaria globifera*	LC	Ruscaceae	*Eriospermum corymbosum*	LC
Fabaceae	*Crotalaria magaliesbergensis*	LC	Ruscaceae	*Eriospermum porphyrium*	LC
Fabaceae	*Crotalaria* sp.		Ruscaceae	*Eriospermum* sp.	

Fabaceae	*Crotalaria sphaerocarpa* subsp. *sphaerocarpa*	LC	Rutaceae	*Ruta graveolens*	
Fabaceae	*Crotalaria virgulata* subsp. *grantiana*	LC	Salicaceae	*Salix babylonica* var. *babylonica*	
Fabaceae	*Dichilus strictus*	LC	Santalaceae	*Thesium asterias*	LC
Fabaceae	*Dolichos angustifolius*	LC	Santalaceae	*Thesium costatum* var. *costatum*	LC
Fabaceae	*Dolichos falciformis*	LC	Santalaceae	*Thesium costatum* var. *juniperinum*	LC
Fabaceae	*Elephantorrhiza elephantina*	LC	Santalaceae	*Thesium goetzeanum*	LC
Fabaceae	*Elephantorrhiza praetermissa*	LC	Santalaceae	*Thesium lesliei*	LC
Fabaceae	*Eriosema cordatum*	LC	Santalaceae	*Thesium pallidum*	LC
Fabaceae	*Eriosema kraussianum*	LC	Santalaceae	*Thesium resedoides*	LC
Fabaceae	*Eriosema nutans*	LC	Santalaceae	*Thesium scirpioides*	LC
Fabaceae	*Eriosema salignum*	LC	Santalaceae	*Thesium* sp.	
Fabaceae	*Eriosema simulans*	LC	Scrophulariaceae	*Chaenostoma floribundum*	LC
Fabaceae	*Eriosema* sp.		Scrophulariaceae	*Chaenostoma neglectum*	LC
Fabaceae	*Erythrina zeyheri*	LC	Scrophulariaceae	*Chaenostoma patrioticum*	LC
Fabaceae	*Indigastrum fastigiatum*	LC	Scrophulariaceae	*Diclis reptans*	LC
Fabaceae	*Indigofera buchananii*	LC	Scrophulariaceae	*Diclis rotundifolia*	LC
Fabaceae	*Indigofera dimidiata*	LC	Scrophulariaceae	*Gomphostigma virgatum*	LC
Fabaceae	*Indigofera dregeana*	LC	Scrophulariaceae	*Hebenstretia angolensis*	LC
Fabaceae	*Indigofera evansiana*	LC	Scrophulariaceae	*Hebenstretia comosa*	LC
Fabaceae	*Indigofera frondosa*	LC	Scrophulariaceae	*Hebenstretia oatesii* subsp. *oatesii*	LC
Fabaceae	*Indigofera hedyantha*	LC	Scrophulariaceae	*Hebenstretia rehmannii*[MP]	LC
Fabaceae	*Indigofera hilaris* var. *hilaris*	LC	Scrophulariaceae	*Jamesbrittenia aurantiaca*	LC
Fabaceae	*Indigofera longibarbata*	LC	Scrophulariaceae	*Jamesbrittenia montana*	LC
Fabaceae	*Indigofera melanadenia*	LC	Scrophulariaceae	*Jamesbrittenia* sp.	
Fabaceae	*Indigofera obscura*	LC	Scrophulariaceae	*Jamesbrittenia stricta*	LC
Fabaceae	*Indigofera placida*	LC	Scrophulariaceae	*Limosella longiflora*	LC
Fabaceae	*Indigofera rostrata*	LC	Scrophulariaceae	*Limosella maior*	LC
Fabaceae	*Indigofera sanguinea*	LC	Scrophulariaceae	*Limosella* sp.	
Fabaceae	*Indigofera* sp.		Scrophulariaceae	*Manulea bellidifolia*	LC
Fabaceae	*Indigofera tristoides*	LC	Scrophulariaceae	*Manulea paniculata*	LC
Fabaceae	*Indigofera zeyheri*	LC	Scrophulariaceae	*Manulea rhodantha* subsp. *aurantiaca*	LC
Fabaceae	*Lablab purpureus* subsp. *uncinatus*	LC	Scrophulariaceae	*Melanospermum rupestre*	LC
Fabaceae	*Leobordea adpressa* subsp. *adpressa*	LC	Scrophulariaceae	*Melanospermum* sp.	
Fabaceae	*Leobordea divaricata*	LC	Scrophulariaceae	*Melanospermum transvaalense*	LC
Fabaceae	*Leobordea eriantha*	LC	Scrophulariaceae	*Nemesia fruticans*	LC
Fabaceae	*Leobordea foliosa*	LC	Scrophulariaceae	*Nemesia* sp.	
Fabaceae	*Leobordea mucronata*		Scrophulariaceae	*Selago capitellata*	LC
Fabaceae	*Lessertia affinis*	LC	Scrophulariaceae	*Selago cucullata*	LC
Fabaceae	*Lessertia frutescens* subsp. *microphylla*	LC	Scrophulariaceae	*Selago densiflora*	LC
Fabaceae	*Listia heterophylla*	LC	Scrophulariaceae	*Selago galpinii*	LC
Fabaceae	*Lotononis evansiana*[MP]		Scrophulariaceae	*Selago* sp.	
Fabaceae	*Lotononis laxa*	LC	Scrophulariaceae	*Teedia lucida*	LC
Fabaceae	*Lotus discolor* subsp. *discolor*	LC	Scrophulariaceae	*Tetraselago longituba*	LC
Fabaceae	*Medicago laciniata* var. *laciniata*	NE	Scrophulariaceae	*Zaluzianskya elongata*	LC
Fabaceae	*Medicago sativa*	NE	Scrophulariaceae	*Zaluzianskya rubrostellata*	LC
Fabaceae	*Melolobium alpinum*	LC	Scrophulariaceae	*Zaluzianskya* sp.	
Fabaceae	*Melolobium calycinum*	LC	Scrophulariaceae	*Zaluzianskya spathacea*	LC
Fabaceae	*Melolobium candicans*	LC	Solanaceae	*Cestrum parqui*[NEM:BA]	
Fabaceae	*Melolobium microphyllum*	LC	Solanaceae	*Datura stramonium*[NEM:BA]	
Fabaceae	*Melolobium obcordatum*	LC	Solanaceae	*Physalis angulata*	
Fabaceae	*Melolobium wilmsii*	LC	Solanaceae	*Physalis viscosa*	
Fabaceae	*Pearsonia cajanifolia* subsp. *cryptantha*	LC	Solanaceae	*Solanum aculeatissimum*	
Fabaceae	*Pearsonia sessilifolia* subsp. *filifolia*	LC	Solanaceae	*Solanum campylacanthum*	
Fabaceae	*Pearsonia sessilifolia* subsp. *sessilifolia*	LC	Solanaceae	*Solanum capense*	LC
Fabaceae	*Rhynchosia adenodes*	LC	Solanaceae	*Solanum humile*	
Fabaceae	*Rhynchosia pauciflora*	LC	Solanaceae	*Solanum lichtensteinii*	LC

Fabaceae	*Rhynchosia pedunculata*		Solanaceae	*Solanum retroflexum*	LC
Fabaceae	*Rhynchosia reptabunda*	LC	Solanaceae	*Withania somnifera*	LC
Fabaceae	*Rhynchosia totta* var. *totta*	LC	Thymelaeaceae	*Gnidia fastigiata*	LC
Fabaceae	*Senegalia ataxacantha*	LC	Thymelaeaceae	*Gnidia gymnostachya*	LC
Fabaceae	*Tephrosia capensis* var. *acutifolia*	LC	Thymelaeaceae	*Gnidia nodiflora*	LC
Fabaceae	*Tephrosia capensis* var. *capensis*	LC	Thymelaeaceae	*Lasiosiphon burchellii*	LC
Fabaceae	*Tephrosia multijuga*	LC	Thymelaeaceae	*Lasiosiphon caffer*	LC
Fabaceae	*Tephrosia natalensis* subsp. *natalensis*	LC	Thymelaeaceae	*Lasiosiphon capitatus*	LC
Fabaceae	*Tephrosia semiglabra*	LC	Thymelaeaceae	*Lasiosiphon kraussianus*	
Fabaceae	*Trifolium africanum* var. *africanum*	NE	Thymelaeaceae	*Lasiosiphon microcephalus*	
Fabaceae	*Trifolium africanum* var. *lydenburgense*	NE	Typhaceae	*Typha capensis*	LC
Fabaceae	*Trifolium burchellianum* subsp. *burchellianum*	LC	Valerianaceae	*Valeriana capensis* var. *capensis*	LC
Fabaceae	*Trifolium pratense* var. *pratense*	NE	Verbenaceae	*Chascanum latifolium* var. *transvaalense*	LC
Fabaceae	*Vachellia karroo*	LC	Verbenaceae	*Chascanum* sp.	
Fabaceae	*Vigna oblongifolia* var. *oblongifolia*	LC	Verbenaceae	*Lantana rugosa*	LC
Fabaceae	*Vigna* sp.		Verbenaceae	*Verbena brasiliensis*[NEM:BA]	
Fabaceae	*Vigna unguiculata* subsp. *unguiculata* var. *unguiculata*	NE	Verbenaceae	*Verbena rigida*[NEM:BA]	
Fabaceae	*Vigna vexillata* var. *vexillata*	LC	Vitaceae	*Cissus diversilobata*	LC
Fabaceae	*Zornia capensis* subsp. *capensis*	LC	Xyridaceae	*Xyris gerrardii*	LC
Fabaceae	*Zornia linearis*	LC	Zygophyllaceae	*Tribulus terrestris*	LC