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Ecological Assessment

Scoping Report

The Proposed Development of the Richards Bay Combined Cycle Power Plant (CCPP) and Associated Infrastructure on a site near Richards Bay, KwaZulu-Natal Province (Ref nr: SE1655)

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DISCLAIMER

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SPECIALIST ASSESSMENT DEPORT DETAILS AND DECLARATION OF INDEPENDENCE

Document title	The Proposed Development of the Richards Bay Combined Cycle Power Plant (CCPP) and Associated Infrastructure on a site near Richards Bay, KwaZulu-Natal Province (Ref nr: SE1655).
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I, Anita Rautenbach (7103180154085) declare that I:

- Am committed to biodiversity conservation, but concomitantly recognize the need for economic development. Whereas I appreciate the opportunity to also learn through the processes of constructive criticism and debate, I reserve the right to form and hold my own opinions and therefore will not willingly submit to the interests of other parties or change my statements to appease them.
- Am subcontracted as a specialist consultant by Afzelia Environmental Consultants to undertake an ecological scoping assessment for the proposed development of a 3000MW Combined Cycle Power Plant (CCPP) in Richards Bay, KwaZulu-Natal Province;
- Do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work performed;
- Have not and will not engage in conflicting interests in the undertaking of the activity;
- Undertake to disclose to the client and the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2014;
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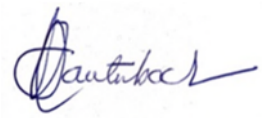

A. Rautenbach (Pr. Sci. Nat) Date: 2 May 2017

EXECUTIVE SUMMARY

Afzelia Environmental Consultants (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd to provide specialist input in terms of the EIA Regulations (2014), as amended on 07 April 2017, for the proposed development of a CCPP and associated infrastructure at Richards Bay, KwaZulu-Natal Province.

The following general conclusions were drawn upon completion of the scoping assessment:

- The study area falls within the 'Critically Endangered' Kwambonambi Hygrophilous Grassland ecosystem, containing two 'Vulnerable' and one 'Endangered'vegetation type. The study area also falls within a CBA: Irreplaceable designated area (KZNBSP, 2014).
- Terrestrial and aquatic habitat (wetlands) is in a poor state of ecological repair as a result of overgrazing and alien plant invasions and therefore not representative of CBA areas.
- Due to the transformed nature of the surrounding areas, connectivity is impaired and possible only to small undeveloped but environmentally compromised patches of natural vegetation.
- Consequently, overall species richness in the project site is in a downward cycle, with little prospect of improving.
- However remnants of the original vegetation remains, possibly providing habitat to a few Red Listed/Protected and endemic fauna and flora species with distributional ranges overlying the study area.
- In this case, the precautionary principle is to be applied, and further fieldwork should be conducted during the EIA Phase. By employing a focal species approach, the chances of detecting focal species will be increased.
- No information on air pollution from closed-cycle gas turbine plants is available. An Air Quality Impact assessment should be carried out to determine the air quality impacts of the proposed development for each phase of the project. Air emmissions requiring management at local and regional levels include sulphur dioxide, nitrogen oxide, nitrogen dioxide, carbon monoxide, VOCs, benzene (C_6H_6), POPS and particulate matter.

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ACRONYMS AND ABBREVIATIONS

ADU	Animal Demography Unit
BGIS	Biodiversity GIS (SANBI)
CBA	Critical Biodiversity Areas
CCPP	Combined Cycle Power Plant
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
eKZNw	Ezemvelo KZN Wildlife
ESA	Ecological support area
GIS	Geographic information system
GPS	Global positioning system
ha	hectares

IAPs	alien and invasive plants
IBA	Important Bird Areas
IUCN	International Union for Conservation of Nature
KZNBSP	KwaZulu-Natal Biodiversity Sector Plan
KZNSCP	KwaZulu-Natal Systematic Conservation Plan
KZNEBPA	KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill, 2014
LUDS	Land Use Decision Support
masl.	meters above sea level
mm	millimeters
NBA	National Biodiversity Assessment
NEMBA	National Environmental Biodiversity Act
NPAES	National Protected Areas Expansion Strategy
POPs	Persistent organic pollutants
QDS	Quarter degree grid square
SABAP	South African Bird Atlas Project
SANBI	South African Biodiversity Institute
SARCA	South African Reptile Conservation Assessment
SCC	Species of Conservation Concern

GLOSSARY OF TERMS

endemic	a plant or animal native or restricted to a certain place
ephemeral	lasting for only a very short time
geophyte	a perennial plant with an underground food storage organ such as a bulb, tuber, corm or rhizome
geoxylic suffritices	plants with enlarged, woody structures growing beneath the surface of the ground
graminoid	herbaceous plant with a grass-like morphology
herpetofauna	for the purpose of this report herpetofauna will refer to reptiles and frogs only
hydrophyte	a plant which grows only in or on water
hygrophilous	a plant growing in damp conditions
macrophytic	a macrophyte is an aquatic plant growing in or near water and is either emergent, or floating
NPAES focus areas	Large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, thereby making it suitable for the creation or expansion of large protected areas in the future.
pentad	five minutes of latitude by five minutes of longitude. One QDS comprise of nine pentads
quarter degree grid square	The division of longitude and latitude degree square cells into smaller units
riparian	plant communities characterized by hydrophilic plants located along water course.

1. INTRODUCTION

Afzelia Environmental Consultants (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd to undertake an ecological scoping assessment for the proposed development of a 3000 MW CCPP and associated infrastructure in KwaZulu-Natal (KZN) Province.

The plant will use gas, Liquefied Natural Gas (LNG) shipped to Richards Bay through the port or pipe or natural gas from Mozambique. Diesel will be mainly used for backup and will be trucked from the source. The CCPP will comprise of gas turbines, heat recovery steam generators, steam turbines, diesel storage tanks and auxiliaries (including gas and water pipelines) to support power generation. The plant will have an all-inclusive footprint of approximately 71 ha. This proposed development follows the need to develop a stable and reliable energy source in the area.

Primarily this report focuses on the identification of ecological sensitive areas, and the reigning status of flora and fauna species currently occurring or likely to occur on the study area, and whose conservation status should be considered in the final decision-making process. Special attention is paid to the qualitative and quantitative habitat conditions for Red Data and protected species deemed present, and mitigation measures are proposed to ameliorate the effect of the proposed development.

This assessment is in accordance with the 2014 EIA Regulations (GNR 324 - 327, Department of Environmental Affairs, 7 April 2017) emanating from Chapter 5 of the National Environmental Management Act (Act No. 107 of 1998).

2. SCOPE AND OBJECTIVES OF THE STUDY

Scope:

The purpose of the scoping assessment is to determine the main issues and potential impacts the proposed development may have on the environment through the use of existing data.

Objectives:

- To qualitatively and quantitatively assess the significance of the fauna and flora habitat components and the current general conservation status of the study area;
- To identify and comment on ecological sensitive areas and ecological service(s);
- Comment on the connectivity of natural vegetation and habitats along a 500 meter zone on adjacent terrain;
- To provide a list of fauna and flora species that occur or might occur, and to identify species of conservation concern;
- To determine the nature and extent of potential impacts during the construction and operation phases;
- The identification of no-go areas, where applicable;
- To summarize the potential impacts that will be considered further in the EIA Phase through specialist assessments and provide details of the methodology that should be adopted in assessing these impacts;
- To identify any environmental fatal flaws or red flag issues;
- The identification of any gaps in knowledge that must be addressed during the EIA Phase.

3. LIMITATIONS OF THE STUDY

The following limitations apply to the studies undertaken for this report:

- This report deals exclusively with the defined area and the impacts associated with the proposed development on the biodiversity and ecosystems of the area;
- The assessment concentrated on untransformed areas (natural vegetation), mainly through a brief walk-through.
- Only a rapid assessment of the available fauna and flora habitat that may be potentially impacted by the proposed development was conducted. Whilst fauna and flora species recorded during the site visit have been included in this report, this was based on site observations made during one brief site visit;
- The site visit was undertaken in summer (January 2017), and therefore does not cover the seasonal variation in conditions on the study area.
- Due to the dynamic nature of ecosystems, there is the likelihood that some aspects (of which some may be important) may have been overlooked.
- Information used to inform the assessment was limited to data and GIS coverage's available for the study area on National and Provincial scales.

4. METHODOLOGY

4.1 COLLECTION AND REVIEW OF EXISTING ENVIRONMENTAL DATA

A comprehensive desktop study was carried out to document all baseline ecological information for the study area which has been mapped at a desktop level. Mapping was informed by available digital imagery and other supporting datasets. The following spatial data sets were included (available from the SANBI BGIS website; www.sanbi.org):

- 2012 Vegetation Map of South Africa, Lesotho and Swaziland – (SANBI BGIS, [vector geospatial dataset];
- Biomes of southern Africa – (SANBI BGIS, [vector geospatial dataset] 2006);
- Important Bird Areas 2015 – BirdLife South Africa - [vector geospatial dataset];

National Biodiversity Assessment (NBA, 2011)

- National List of Threatened Ecosystems 2011 – SANBI [vector geospatial dataset];
- NBA 2011 Terrestrial Ecosystem Protection Level – SANBI BGIS Terrestrial Ecosystem Protection Level [vector geospatial dataset];
- NBA 2011 Terrestrial Formal Protected Areas – SANBI BGIS [vector geospatial dataset].
- 2010 National Protected Areas Expansion Strategy (NPAES)
- NPAES focus areas 2010 - North West Province of Rural, Environment and Agriculture Department [vector geospatial dataset];
- NPAES Protected Areas – Formal land-based 2010 - SANParks/SANBI [vector geospatial dataset];
- NPAES Protected Areas – Informal 2010 - SANParks/SANBI [vector geospatial dataset].

KZN Systematic Conservation Plan (KZNSCP, 2012)

- KZN Landscape Ecological Corridors 2010 - Ezemvelo KZN Wildlife (2010) Version 3.1. Unpublished GIS Coverage [kzncor05v3_1_10_wll.zip];

- KZNSCP: Vegetation types - Scott-Shaw, R. & Escott, B.J. (Eds) (2011) KwaZulu-Natal Provincial PreTransformation Vegetation Type Map – 2011. Unpublished GIS Coverage [kznveg05v2_011_wll.zip];
- KwaZulu-Natal Systematic Conservation Plan (KZNSCP); KZNSCP conservation status of vegetation types - Scott-Shaw, R. & Escott, B.J. (Eds) (2011) KwaZulu-Natal Provincial Pre-Transformation Vegetation Type Map – 2011. Unpublished GIS Coverage [kznveg05v2_011_wll.zip];
- KZNSCP: Terrestrial Systematic Conservation Plan - EKZNW (2010) Minimum Selection Surface (MINSET). Unpublished GIS Coverage [tscp_minset_dist_2010_wll.zip].

UThungulu District Municipality: Biodiversity Sector Plan (KZNBSP, 2014)

- Ezemvelo KZN Wildlife. KZN Biodiversity Sector Plans Local Corridors 2014 [Vector] 2014;
- KZN CBA Irreplaceable version 26012016 (2016). GIS Coverage [KZN_CBA_Irreplaceable_wll_26012016];
- KZN CBA Optimal version 03032016 (2016). GIS Coverage [KZN_CBA_Optimal_wll_03032016.zip];
- KZN ESA version 01022016 (2016). GIS Coverage [KZN_ESA_wll_01022016.zip];
- KZN ESA Species Specific version 01022016 (2016). GIS Coverage [KZN_ESA_Species_wll_01022016_01022016.zip];
- Ezemvelo Managed Protected Area Boundary – Areas recently acquired but not currently proclaimed (2016). Unpublished GIS Coverage [ekznw_pabnd_owned_not_yet_proclaimed_ 2016_wll.zip];
- DAFF Managed Forest Wilderness Area Boundary - DEA Protected Area Database Extract (2016). Published GIS Coverage [DAFF_forest_wilderness_area_wll_2016.zip];
- Ezemvelo KZN Wildlife. KZN Landscape Corridors 2016 [Vector] 2016;
- Ezemvelo KZN Wildlife (2016). KZN Private Nature Reserves (2016). Unpublished GIS Coverage [KZN_Private_NR_wll_2016.zip];
- Ezemvelo KZN Wildlife Proclaimed Protected Area boundary (2015). Unpublished GIS Coverage [ekznw_pabnd_2015_wdd.zip];
- Ezemvelo KZN Wildlife (2016) KZN Proclaimed Stewardship Sites (January 2016). Unpublished GIS Coverage [stewardship_wll_jan2016_draft.zip].
- KZN Proclaimed State Protected Areas not managed by Ezemvelo KZN Wildlife – (SANBI BGIS, [vector] 2016);
- KZN Land Cover - Ezemvelo KZN Wildlife (2011) KwaZulu-Natal Land Cover 2008 V1.1. Unpublished GIS Coverage [Clp_KZN_2008_LC_V1_1_grid_w31.zip].

Fauna and flora distribution data were obtained from various publications and field guides as a means to ascertain which species have historically been recorded within the Quarter Degree Grid Square 2831DD (refer to Sections 4.2 and 4.3).

4.2 VEGETATION ASSESSMENT

The primary sources of flora distribution data were obtained from the following information sources:

- The Vegetation of Southern Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012 delineation);
- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) for vegetation descriptions;
- Plants of Southern Africa: an online checklist (http://posa.sanbi.org);

- SANBI Red List of South African Plants: Threatened Species Program: (http://redlist.sanbi.org);
- *Field Guide to Trees of Southern Africa* (van Wyk & van Wyk, 2013).

4.3 FAUNA ASSESSMENTS

4.3.1 Mammal Assessment

As many mammals are either secretive, nocturnal, hibernators and/or seasonal, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of these species. This can be done with a high level of confidence, irrespective of season. The primary sources of mammalian distribution data were obtained from the following sources:

- *The Mammals of the Southern African Subregion* (Skinner & Chimimba, 2005);
- *Bats of Southern and Central Africa* (Monadjem *et al*., 2010);
- The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (www.ewt.org.za);
- ADU's MammalMap (mammalmap.adu.org.za);
- *A Field Guide to the Tracks and Signs of Southern, Central and East African Wildlife* (Stuart & Stuart, 2013).

4.3.2 Herpetofauna Assessment

The primary sources of herpetofauna distribution data were obtained from the following sources:

- SARCA (sarca.adu.org);
- A *Guide to the Reptiles of Southern Africa* (Alexander & Marais, 2007);
- *A Complete guide to the Snakes of Southern Africa* (Marais, 2004);
- *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);
- FrogMAP (frogmap.adu.org.za);
- *Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland* (Mintner *et al*., 2004).

4.3.3 Avifauna Assessment

Due to the inherent mobility of birds, it is important to consider avifauna not only on the study area, but also the avifauna beyond the study area. The broader areas include bird distribution data from the following pentads: 2845_3155; 2845_3200; 2840_3155 and 2840_3200.

The primary sources of avifaunal distribution data were obtained from the following sources:

- The First and Second Southern African Bird Atlas Projects (SABAP1 and SABAP2; Harrison *et al*., 1997, http://sabap2.adu.org.za);
- BirdLife South Africa Area (IBA) Directory (Barnes 1998);
- *The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland* (Taylor *et al*., 2015);
- Roberts VII Multimedia Birds of Southern Africa;
- *Newman's Birds of Southern Africa* (Newman, 2010);

- *Roberts Birds of Southern Africa* (Hockey *et al*., 2005).

In addition to desktop assessments, a brief field survey was conducted on 11 January 2017 to assess the general status and condition of available fauna and flora habitats.

4.4 THE PROBABILITY OF OCCURRENCE OF FLORA AND FAUNA SPECIES

FLORA

The probability of occurrence of Red Listed/Protected flora species was based on their correlation with the following environmental variables:

- Geographic distribution
- Habitat requirements
- Altitude
- Climate
- Rainfall

FAUNA

The local occurrence of fauna species is closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and aquatic associated vegetation cover. It is therefore possible to deduce the presence or absence of fauna species by evaluating the habitat types within the context of global distributional ranges. The desktop component of this report involved collating vegetation characteristics and literature relevant to the fauna of the Province, to draw up lists of fauna species that may be present in the study area.

Four parameters were used to assess the probability of occurrence of Red Listed and Protected species:

- Habitat requirements – Most Red Listed/Protected species, have very specific habitat requirements; the presence of these habitats on the study area was evaluated;
- Habitat status - The ecological condition of available habitat in the study area;
- Habitat linkage – The connectivity of the study area to surrounding habitats and adequacy of these linkages;
- Geographic distribution of species.

The estimated probability of occurrence of flora and fauna species is presented in three categories:

- High (71–100%) would be applicable to species with a distributional range overlying the study area as well as the presence of prime habitat. A further consideration included in this category is for a species to be common, abundant and widespread;
- Medium (41-70%) pertains to a species with its distributional range peripherally overlying the study area, or required habitat on the study area being sub-optimal; the size of the area as it relates to its likelihood to sustain a viable breeding population, as well as its geographical location. These species normally do not occur at high population numbers, but cannot be deemed as rare;
- Low (0–40%) are applicable to species with its distributional range peripheral to the study area, and habitat that is sub-optimal. These species are generally deemed to be rare.

4.5 ASSESSMENT METHODOLOGY FOR RED LISTED AND PROTECTED FAUNA AND FLORA SPECIES

South Africa uses the internationally endorsed IUCN Red List categories and criteria to measure a species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. The conservation status of species for all taxa was determined using categories described by the International Union for the Conservation of Nature (IUCN), as well as the National Environmental: Biodiversity Act (No. 10 of 2004; hereafter reffered to as NEMBA) regulations on Threatened and Protected species (updated species regulations of March 2015) in South Africa. The KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill (2014) hereafter referred to as KZNEBPA, was used to evaluate species conservation status on a Provincial scale.

It is important to note that although the category names in the NEMBA lists are similar to those in the IUCN Red Lists, and NEMBA category definitions are broadly similar to those of the IUCN categories, they are not equivalent because different classification systems were used. Therefore, a species classification in NEMBA may differ from its Red List category.

The KZNEBPA (2014) stipulates which wild species are to be protected and managed in terms of human use such as collecting, fishing, hunting, capture, transport and trade. It deals with rare and endangered species within the KZN Province and the powers needed to protect them from exploitation and damage.

For the flora assessment, the List of Protected Tree species, Section 12 (1) (d) Schedule A (National Forest Act (Act No. 84 of 1998; updated species regulations of 2014), was included.

National IUCN Categories: (SANBI, 2015)

Categories marked with N are non-IUCN, National Red List categories for species not in danger of extinction, but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

Extinct (**EX**): A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.

Extinct in the Wild (**EW**): A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.

Regionally Extinct (**RE**): A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.

Critically Endangered, Possibly Extinct (**CR PE**): Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.

Critically Endangered (**CR**): A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.

Endangered (**EN**): A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.

Vulnerable (**VU**): A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.

Near Threatened (**NT**): A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable, and is therefore likely to become at risk of extinction in the near future.

[N]Critically Rare: A species is Critically Rare when it is known to occur at a single site, but are not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.

[N]Rare: A species is Rare when it meets at least one of four South African criteria for rarity, but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:

- Restricted range: Extent of Occurrence (EOO) <500 km^2, OR;
- Habitat specialist: Species are restricted to a specialised microhabitat so that it has a very small area of occupancy (AOO), typically smaller than 20 km^2, OR;
- Low densities of individuals: Species always occur as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR;
- Small global population: Less than 10 000 mature individuals.

[N]Declining: A species is declining when it does not meet or nearly meet any of the five IUCN criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline of the species.

Least Concern (**LC**): A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. A species classified as Least Concern is considered at low risk of extinction. Widespread and abundant species are typically classified in this category.

Data Deficient - Insufficient Information (**DDD**): A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species are well defined. Listing of species in this category indicates that more information is required and that future research could show that a threatened classification is appropriate.

Data Deficient - Taxonomically Problematic (**DDT**): A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.

Not Evaluated (**NE):** A species is Not Evaluated when it has not been evaluated against the criteria. The National Red List of South African plants are a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in Plants of southern Africa: an online checklist (POSA) are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated.

Threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered, Endangered or Vulnerable is a threatened species.

Species of conservation concern are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD).

NEMBA Categories:

Critically Endangered (**CR**) – Indigenous species facing an extremely high risk of extinction in the wild in the immediate future.

Endangered Species (**EN**) – Indigenous species facing a high risk of extinction in the wild in the near future, although they are not a critically endangered species.

Vulnerable Species (**VU**) – Indigenous species facing a high risk of extinction in the wild in the medium-term future, although they are not a critically endangered species or an endangered species.

Protected Species (**PROT**) – Indigenous species of high conservation value or national importance that require national protection.

KZNEBPA Categories:

- Schedule 3 – KwaZulu-Natal Protected Animal Species: A list of protected animal species, including a listing of certain prohibited and restricted activities with respect to such species.

- Schedule 4 – Restricted Use of Protected Animal Species: Schedule 4 lists the restricted use of protected animal species and provides for certain prohibited and restricted activities in such respect.

- Schedule 7 – KwaZulu-Natal Threatened Plant Species: Schedule 7 lists the threatened plant species and provides for certain prohibited and restricted activities with respect to such species.

- Schedule 8 – KwaZulu-Natal Protected Plant Species: Schedule 8 lists the protected plant species and provides for certain prohibited and restricted activities with respect to such species.

5. RESULTS

5.1 RELEVANT ENVIRONMENTAL LEGISLATION

In South Africa, there are dedicated legal, policy and planning tools for biodiversity management and conservation, linked to broader environmental management on International, National and Provincial levels. Table 1 lists key legislation relevant to biodiversity conservation and management in KwaZulu-Natal that were taken into consideration for during the assessment.

TABLE 1. The key legislation relevant to biodiversity and conservation in KwaZulu-Natal.

INTERNATIONAL	Convention on Biological Diversity (CBD, 1993)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
NATIONAL	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (No. 107 of 1998)
	NEMA: Protected Areas Act (No. 57 of 2003)
	National Environmental Management Biodiversity Act (No.10 of 2004)
	National Environmental Management Biodiversity Act (No. 10 of 2004), Threatened and Protected Species Regulations (Notice 255 of 2015)
	The Environmental Conservation Act and associated EIA Regulations (No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	National Environmental Management Air Quality Act (No. 39 of 2004)
	Natural Scientific Professions Act (No. 27 of 2003)
	National Forest Act (No. 84 of 1998)
	Conservation of Agricultural Resources Act (No. 43 of 1983)
REGIONAL	Natal Nature Conservation Ordinance (No. 15 of 1974)
	KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill, 2014
	KwaZulu-Natal Nature Conservation Management Act (No. 9 of 1997)
	KwaZulu-Natal Planning and Development Act (No. 6 of 2008)
	Local Government Municipal System's Act (No. 32 of 2000)

In addition to the legal requirements (Table 1), the following National and Regional guidelines were taken into consideration:

- Guidelines for Biodiversity Impact Assessments in KZN (2013);
- UThungulu District Municipality: Biodiversity Sector Plan (2014);
- KwaZulu-Natal Systematic Conservation Plan (KZNSCP, 2012);
- Ezemvelo KZN Wildlife Strategy (2009 – 2014);
- Technical Report for the National Freshwater Ecosystem Priority Areas (Nel *et al.*, 2011);
- uMhlathuze Local Municipality: Final IDP Review 2015/2016;
- uMhlathuze Local Municipality Land Use Scheme Regulations (2014);
- Lexicon of Biodiversity Planning in South Africa (2016).

5.2 STUDY AREA

The study area (Erf 2/11376 and Erf 4/11376) is located in Richards Bay on the north coast of KwaZulu-Natal, approximately 170 km north of Durban, in the uMhlathuze Local Municipality of the UThungulu District Municipality. It lies approximately 5 km west of Richards Bay along the Western Arterial highway in the Industrial zone of Richards Bay, with Mondi Richards Bay bordering the study area on the east. Erf 4/11376: GPS coordinates: Lat – 28.767751; Long 31.988576; Erf 2/11376: GPS coordinates: Lat -28.769893; Long 31.985309 (Figures 1 & 2). The area is approximately 71ha in extent.

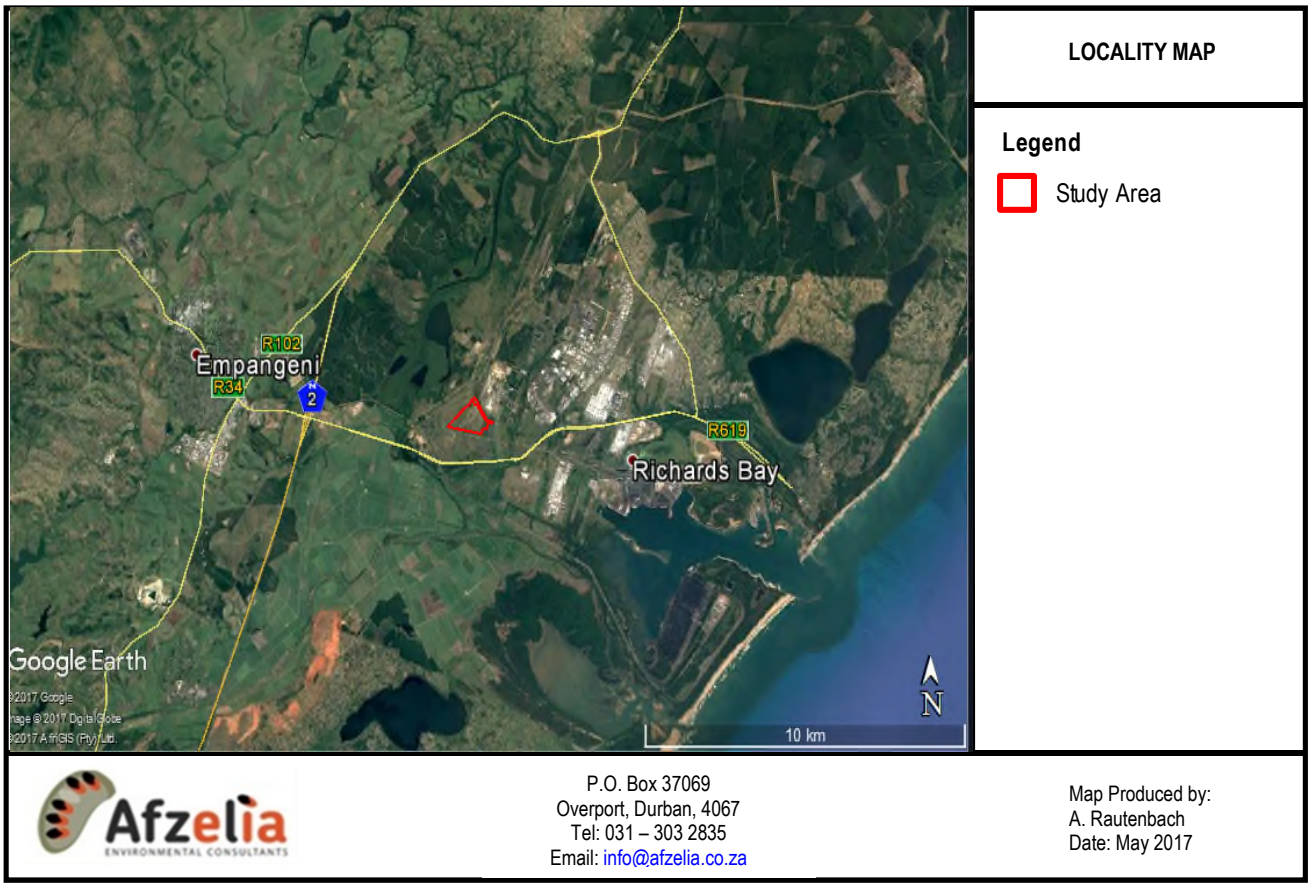

FIGURE 1. Google Earth view of the study area in relation to Richards Bay in KwaZulu-Natal.

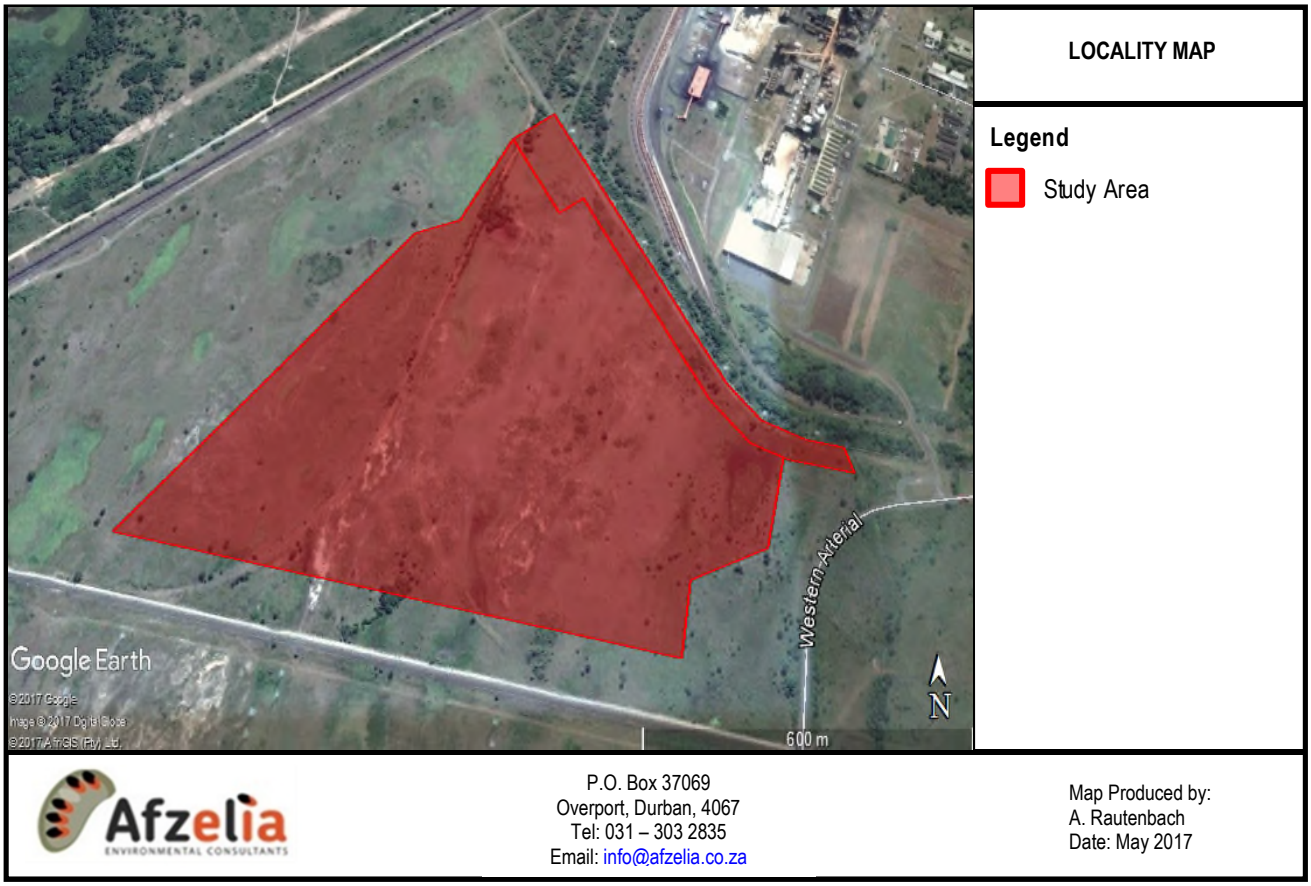

FIGURE 2. Google Earth view of the study area in relation to Richards Bay in KwaZulu-Natal.

5.3 CLIMATE AND RAINFALL

The general area is characterised by a subtropical climate. Summers are warm and wet, and winters are mild, moist to dry, and frost free. The Richards Bay area has an average annual rainfall of 1128 mm. The average annual temperature is 21.5 °C, with daytime temperatures peaking from January to March at 29°C. Daytime highs in winter from June to August are 23°C, with minimum temperatures of 12°C. Long-term climatic data has been summarised in the graph presented in Figure 3.

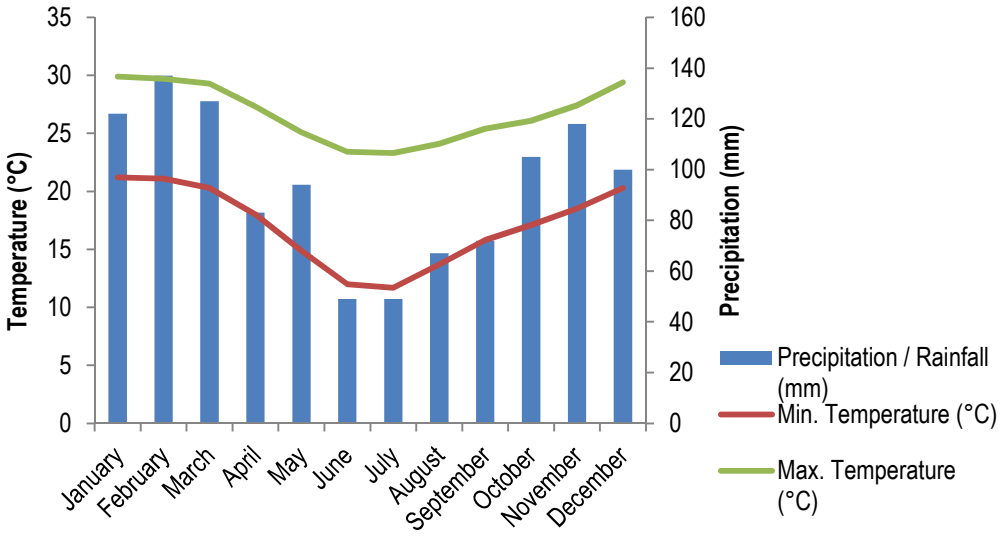

FIGURE 2. Average minimum and maximum temperatures and monthly rainfall for Richards Bay (adapted from http://en/climate-data.org).

5.4 TOPOGRAPHY

The study area is located on the flat coastal plains of the Natal Coastal Belt with elevation ranging from approximately 23 – 31 masl.

5.5 CURRENT LAND USE AND INFRASTRUCTURE

Currently the study area is being used for communal cattle grazing (Figure 4A). A cattle boma and informal dwelling is located on the northern sections of the study area (Figure 4B). The area is bisected by a gravel road, and a railway line is located close to the southern site boundary.

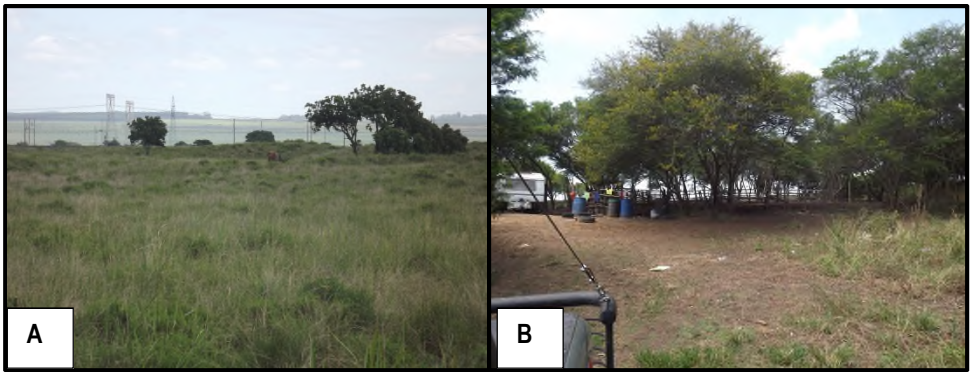

FIGURE 3. A - The study area is being used for communal cattle grazing.
B - An informal dwelling and cattle boma located towards the northern site boundary.

5.6 NATURAL WATER COURSES AND WETLANDS

No natural water courses were noted on the study area. However, several wetland areas are present, but are in a poor ecological state. Wetland areas on the southern boundary is covered with duckweed and trampled by cattle (Figure 5A). Some hygrophilous plant species were noted in depressions towards the northern, western, southern and central sections of the site, indicating the presence of water, however at the time of the site visit the area was quite dry (Figure 5B).

FIGURE 4. A - Wetlands towards the southern boundary are trampled by cattle and the water covered by duckweed. B - Hygrophilous plants on several depressions towards the northern, western, southern and central section's indicate the presence of water.

5.7 CONSERVATION CONTEXT

The conservation importance of the study area was assessed on National (NBA, 2011), Provincial (KZNSCP, 2012) and District (UThungulu District Municipality: BSP, 2014) scales.

5.7.1 National Level Conservation Priorities

5.7.1.1 PROTECTED AREAS AND OTHER CONSERVATION AREAS

Protected areas include National Parks, Provincial Nature Reserves, Local Authority Nature reserves, Wildlife Management Areas, Private Nature Reserves, IBA Areas, Game Farms, Game Reserves, Nationally Protected Forest Patches and NPAES focus areas.

The following protected areas are located within a 30 km radius of the study area (Figure 6):

- Richards Bay Nature Reserve and IBA – 5.1 km to the southeast
- Enseleni Nature Reserve – 7.8 km to the north
- Ngoye Nature Reserve and IBA – 23.3 km to the southwest
- Thukela NPAES focus area – 22.9 km to the west

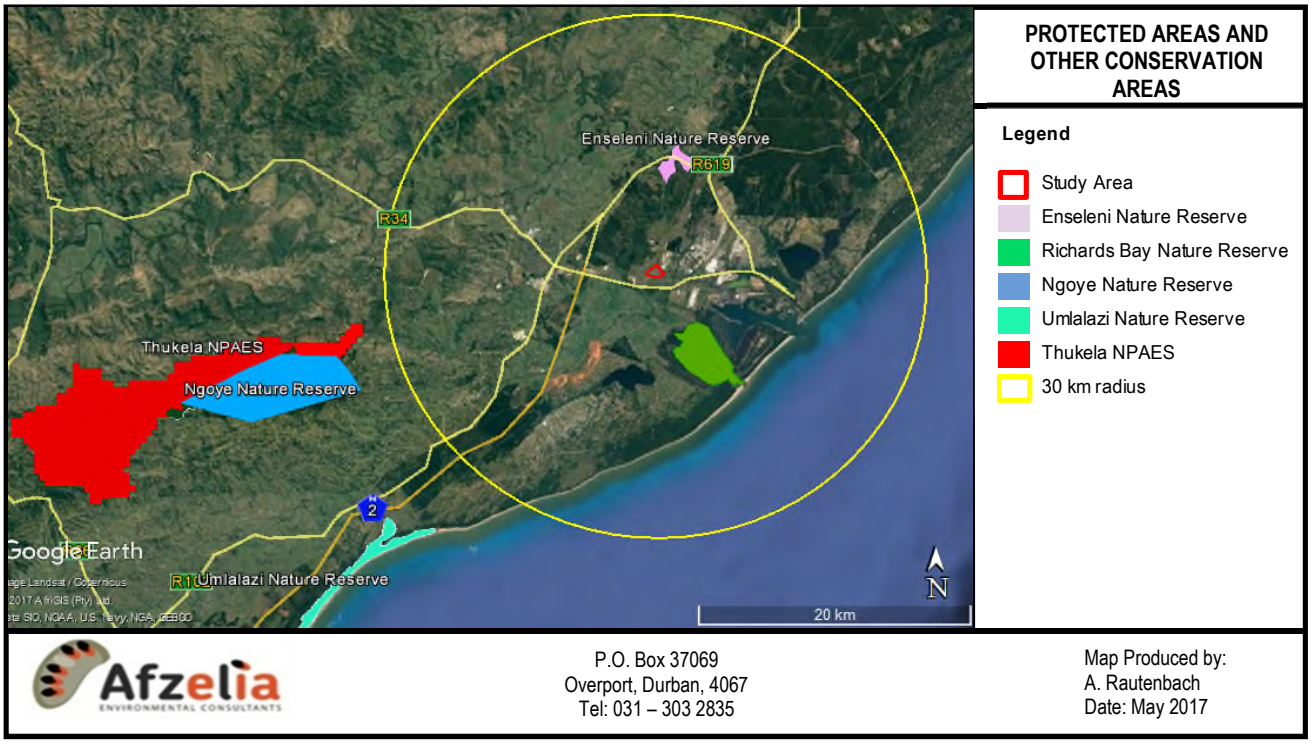

FIGURE 5. Protected areas and other conservation areas in relation to the study area.

5.7.1.2 THREATENED ECOSYSTEMS

The first list of nationally threatened terrestrial ecosystems in South Africa was gazetted in December 2011 (NEMBA: National List of ecosystems that are threatened and in need of protection, G34809, GoN 1002), with the aim of reducing the rate of ecosystem and species extinction, by preventing further degradation and loss of structure, function and composition. This list also includes ecosystems outside of protected areas. Ecosystems are listed in one of four categories: critically endangered (CR), endangered, (EN), vulnerable (VU) or protected.

Ecosystem delineation was based on the South African Vegetation Map (Mucina & Rutherford, 2006); National Forest Types (DWAF), priority areas identified in Provincial Systematic Biodiversity Plans, and high irreplaceability forest patches or clusters systematically identified by DWAF. The study area is located in the '**Critically Endangered**' Kwambonambi Hygrophilous Grassland ecosystem (Threatened ecosystem code KZN 9; Figure 7).

The **Kwambonambi Hygrophilous Grasslands** ecosystem lies inland, but adjacent to the Kwambonambi Dune Forest ecosystem. It incorporates the hygrophilous grasslands behind the primary dune system as well as swamp forests, including the Richards Bay surrounds up to the lower Umfolozi Flats.

This ecosystem contains six threatened or endemic plant and animal species, including one amphibian species, *Hyperolius pickersgilli*, four millipede species, *Centrobolus fulgidus*, *Centrobolus richardi, Centrobolus rugulosus* and *Doratogonus zuluensis*; one plant species, *Kniphofia leucocephala*; and six vegetation types viz. KwaZulu-Natal Coastal Forest, KwaZulu-Natal Dune Forest, Mangrove Forest, Maputaland Wooded Grassland, Maputaland Coastal Belt and Swamp Forest.

More or less 8% of the original area of this ecosystem is protected in the Enseleni Nature Reserve, Richards Bay Game Reserve, Nhlabane Nature Reserve and isiMangaliso Wetland Park (Goodman, 2007).

This ecosystem is listed under Criterion F in the National List of Ecosystems which categorises it as priority areas for meeting explicit biodiversity targets as defined by a systematic biodiversity plan, including DAFFs systematic biodiversity plans for the Forest biome. Typically, development in 'Critically Endangered' ecosystems, especially those with large footprints, should avoid conflict with or negative impacts on threatened ecosystems.

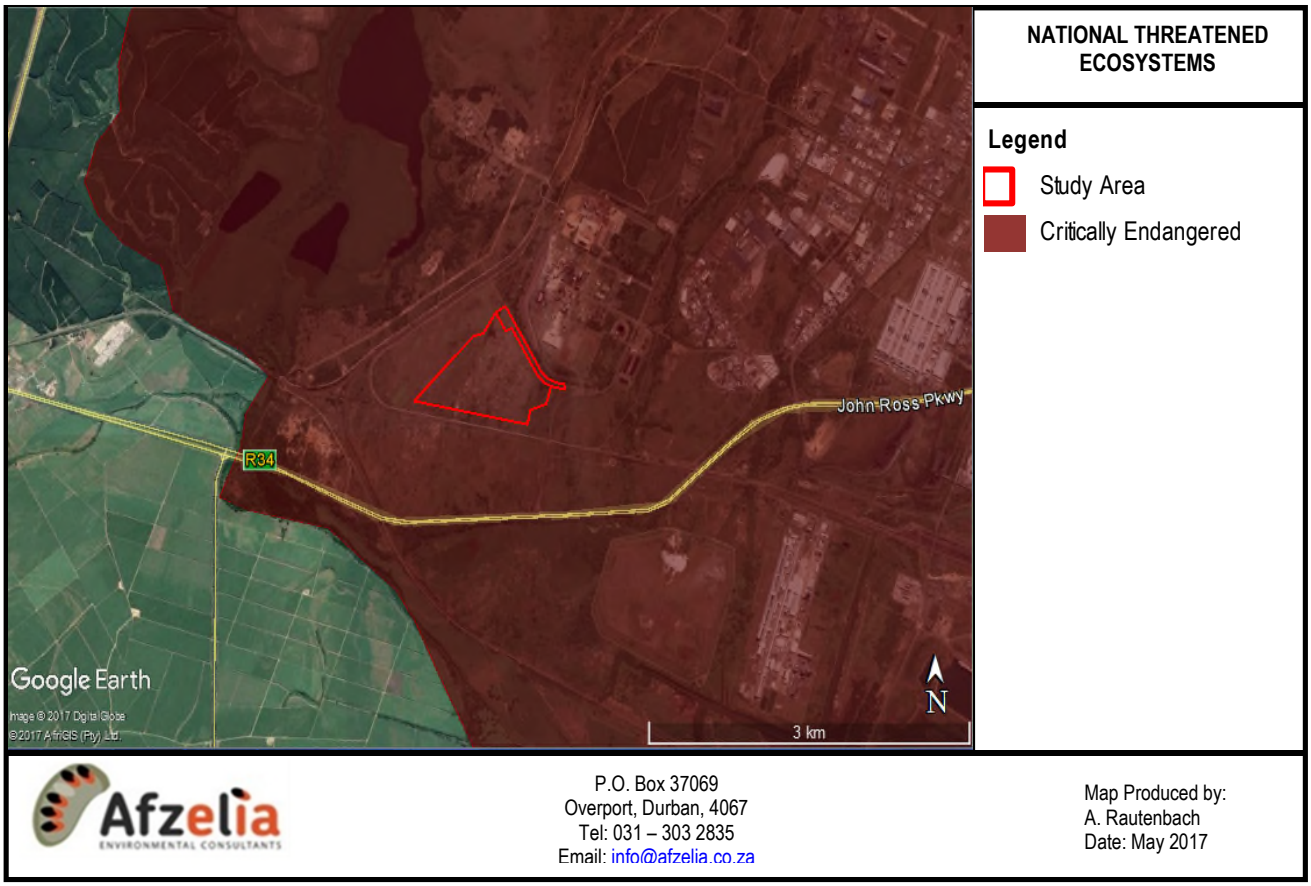

FIGURE 6. The extent of 'Critically Endangered' ecosystems in relation to the study area.

5.7.1.3 SENSITIVE AQUATIC ECOSYSTEMS

No watercourses are present in the study area. Four natural, Indian Ocean Coastal Belt wetlands with a wetland condition of AB (i.e. percentage natural cover $\geq$ 75 %, therefore in natural or good condition), and a NFEPA ranking of 2 (wetlands with the majority of its area within a sub-quaternary catchment that has sightings or breeding areas for threatened wattled cranes, grey crowned cranes and blue cranes) are present (Figure 8; Nel *et al*., 2011).

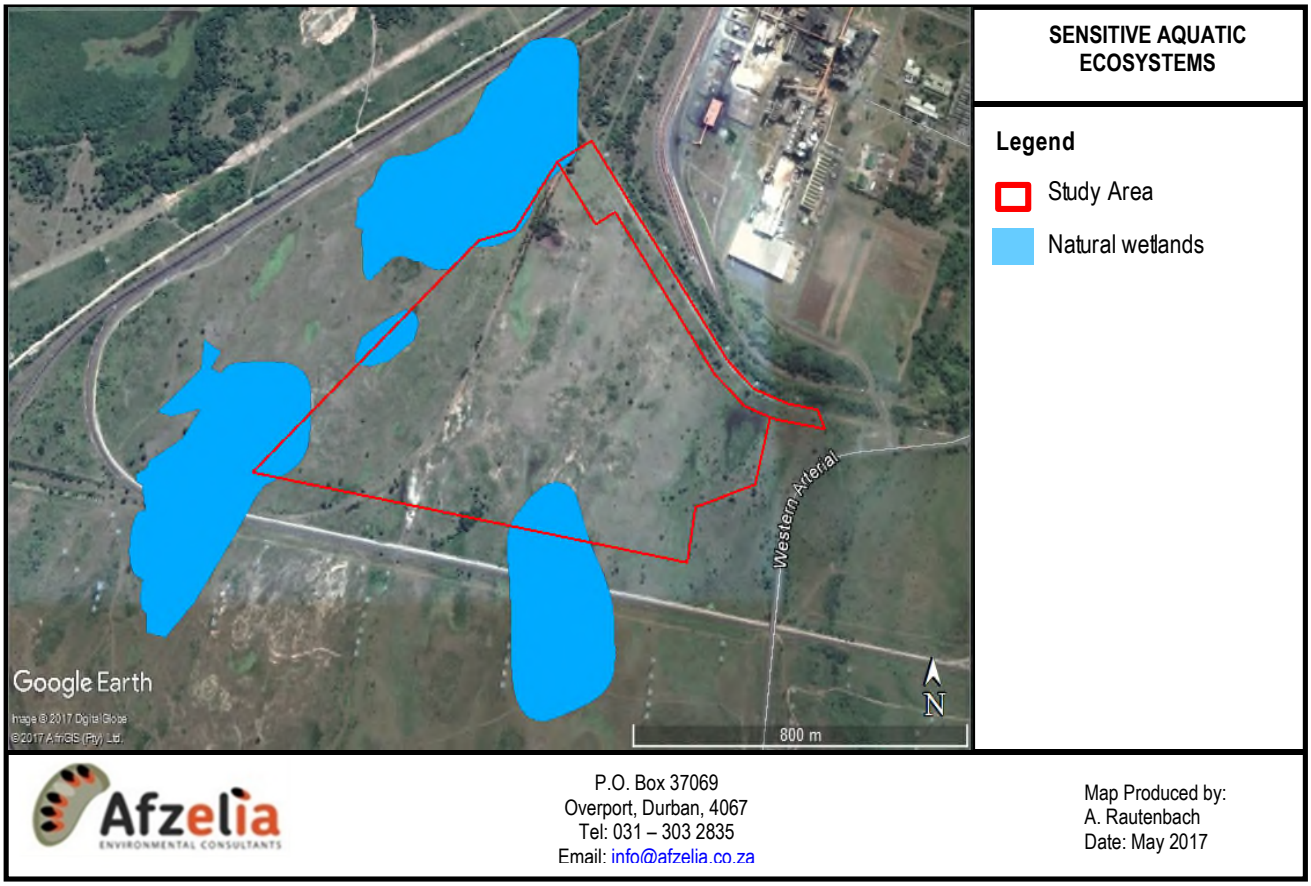

FIGURE 7. The extent of the wetland areas in relation to the study area.

5.7.2 PROVINCIAL AND DISTRICT LEVEL CONSERVATION PRIORITIES (KZNSCP, 2012 AND KZNBSP, 2014)

The provincial scale KZN Systematic Conservation Plan (KZNSCP, 2012) and the district scale UThungulu Biodiversity Sector Plan (KZNBSP, 2014) identifies and map critical biodiversity areas and ecological support areas within the Province. Biodiversity mapping covers terrestrial, aquatic and marine environs at Provincial and District scales.

It is important to note that categorical classes of CBAs and ESAs are reflected differently in the KZNSCP (2012; Table 2) and KZNBSP (2014; Table 3). The KZNSCP (2012) planning product highlights the key priority areas for biodiversity conservation as reflected against a uniform biome i.e. the marine, estuarine, freshwater and terrestrial biomes analyzed separately, while the KZNBSP (2014) is a higher order spatial planning tool which takes into consideration locally identified CBA and ESA localities, as well as incorporates priorities identified at a national level.

TABLE 2. Summary of the CBA categories used in the Kwazulu-Natal Systematic Conservation Plan (2012).

CBA 1 (Mandatory)	Areas representing the only localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved i.e. there are no alternative sites available.

CBA 2 (Mandatory)	Areas of significantly high biodiversity value. There are alternate sites within which the conservation targets can be met for the biodiversity features contained within, but not many.
CBA 3 (Optimal)	These areas are not necessarily of lower biodiversity value, but only indicate that there are more alternate options available within which the features located within can be met.
Biodiversity Areas/Other Natural Areas	Areas representing the natural and/or near natural environmental areas which still have biodiversity value, but it is preferred that development be focused within these areas.

The KZNBSP (2014) is reflected as biodiversity sector maps consisting of two main layers, namely Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).

TABLE 3. Summary of the CBA and ESA categories used in the UThungulu District Municipality: Biodiversity Sector Plan (KZNBSP, 2014).

Critical Biodiversity Areas (CBAs) – Crucial for supporting biodiversity features and ecosystem functioning and are required to meet conservation targets.	
Critical Biodiversity Areas: Irreplaceable	Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of the ecosystems.
Critical Biodiversity Areas: Optimal	Areas that represent an optimised solution to meet the required biodiversity conservation targets while avoiding areas where the risk of biodiversity loss is high. Category driven primarily by process but is also informed by expert input.
Ecological Support Areas (ESAs) – Functional but not necessarily entirely natural areas that are required to ensure persistence and maintenance of biodiversity patterns and ecological processes within the CBA areas.	
Ecological Support Areas (ESAs)	Functional but not necessarily entirely natural areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs. These areas also contribute significantly to the maintenance of ecological infrastructure.
Ecological Support Areas: Species Specific	Terrestrial modified areas that provide a support function to a threatened or protected species.

The proposed development footprint includes areas designated as a Critical Biodiversity Area (CBA type 3; KZNSCP, 2012; Figure 9A). This rating is due to the potential presence of a number of threatened invertebrates such as molluscs, millipedes and orthopterans and threatened vegetation types, i.e. Maputaland Coastal Grassland and *Ficus trichopoda* Swamp Forest.

On a district scale, almost the entire study area falls within a CBA: Irreplaceable area (Figure 9B). Land-use management objectives for these areas include limited to no biodiversity loss in order to maintain these areas in a natural state, thus the proposed land-use activities are not compatible with the aims of the land-use objectives of CBA: Irreplaceable areas (KZNBSP, 2014).

Biodiversity areas represent the natural and/or near natural environmental areas not identified as CBA areas, but still considered to be of biodiversity value.

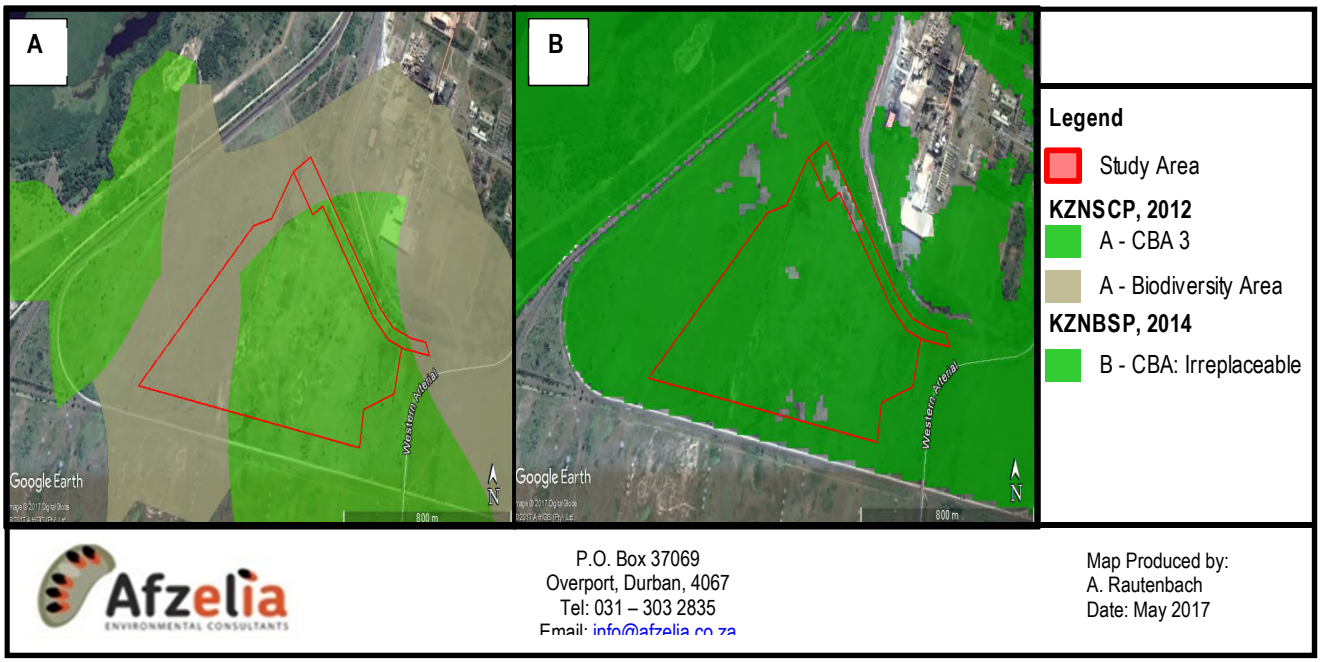

FIGURE 8: The extent of CBA areas in relation to the study area.

5.7.3 Regional Connectivity

Maintaining connectivity between natural areas is considered critical for the long term persistence of both ecosystems and species. Natural ecological corridors/linkages are considered crucial for allowing species to migrate naturally and to accommodate shifts in species ranges in response to climate change.

Due to high levels of infrastructural and agricultural development on areas surrounding the study area, connectivity between natural habitat and ecosystems has already been severely compromised, with only small fragmented pockets of natural and/or semi-natural habitat remaining in most instances. Exotic vegetation has also replaced large areas of natural habitat to a large extent. Thus, from a biodiversity perspective, connectivity is poor.

5.8 VEGETATION ASSESSMENT

5.8.1 Vegetation Types

The study area falls within the following KZN vegetation biomes and vegetation types (Table 4; Figure 10).

TABLE 4. Summary of the vegetation types that bisect the study area.

KZN VEGETATION BIOME	KZN VEGETATION TYPE	CONSERVATION STATUS
Wetland	Alluvial Wetlands: Subtropical Alluvial Vegetation: Lowveld Floodplain Grassland: Tall Reed Wetland	VU
	Freshwater Wetlands: Subtropical Freshwater Wetlands	VU
Indian Ocean Coastal Belt	Maputaland Wooded Grassland	EN

Vegetation types that historically covered the study area include **Alluvial Wetlands, Subtropical Freshwater Wetlands** and **Maputaland Wooded Grassland**. **Alluvial wetlands vegetation** covered a small area to the west of the study area. This vegetation type typically supported an intricate complex of macrophytic vegetation, marginal reed belts as well as extensive flooded grasslands, ephemeral herblands and riverine thickets. **Subtropical Freshwater Wetlands** ordinarily occurred in low lying areas and were dominated by reeds, sedges, rushes and water logged meadows dominated by grasses.

The dominant vegetation type in the study area is **Maputaland Wooded Grassland**. This vegetation type typically supported coastal sandy grasslands rich in geoxylic suffritices, dwarf shrubs, small trees and very rich herbaceous flora.

Important taxa of Maputaland Wooded Grasslands include the following species:
Geoxylic suffritices: *Parinari curatellifolia, Salacia kraussii, Ancylobotrys petersiana, Diosporys galpinii, Eugenia capensis, Syzigium cordatum.*
Gramminoids: *Diheteropogon amplectens, Themeda triandra, Aristida stipitata* subsp. *gracilifllora, Bewsia biflora, Cyperus obtusiflorus, C. tenax, Digitaria natalensis, Eustachya paspaloides, Setaria sphacealata, Sporobolus fimbriatus, S. subulatus, Urelytrum agropyroides.*
Herbs: *Chamaecrista plumose.*
Geophytic herb: *Cyrtanthus galpinii.*
Low shrubs: *Helichrysum krausii, Agathisanthemum bojeri, Crotalaria monteiroi* var. *monteiroi*
Small trees and tall shrubs: *Acridocarpus natalitius* var. *linearifolius, Dichrostachys cinerea* subsp. *nyassana, Diospyros lycioides* subsp. *sericea, Hyphaene coriacea, Terminalia sericea.*

Biogeographically important taxa:
Geoxylic suffritices: *Eugenia albanensis, Gymnosporia markwaardii.*
Graminoids: *Abildgaardia hygrophila, Cyperus natalensis.*
Herbs: *Helichrysopsis septentrionale, Oxygonum robustum, Tricliceras mossambicense.*
Tall shrubs: *Grewia microthyrsa.*
Woody climers: *Albertisia delagoensis, Cissampelos hirta.*

Endemic taxa:
Geoxylic suffritices: *Ochna* sp. nov., *Syzygium cordatum.*
Succulent herb: *Aloe* sp. nov. (Strey 5100 PRE).
Geophytic herb: *Brachystelma vahrmeijeri.*

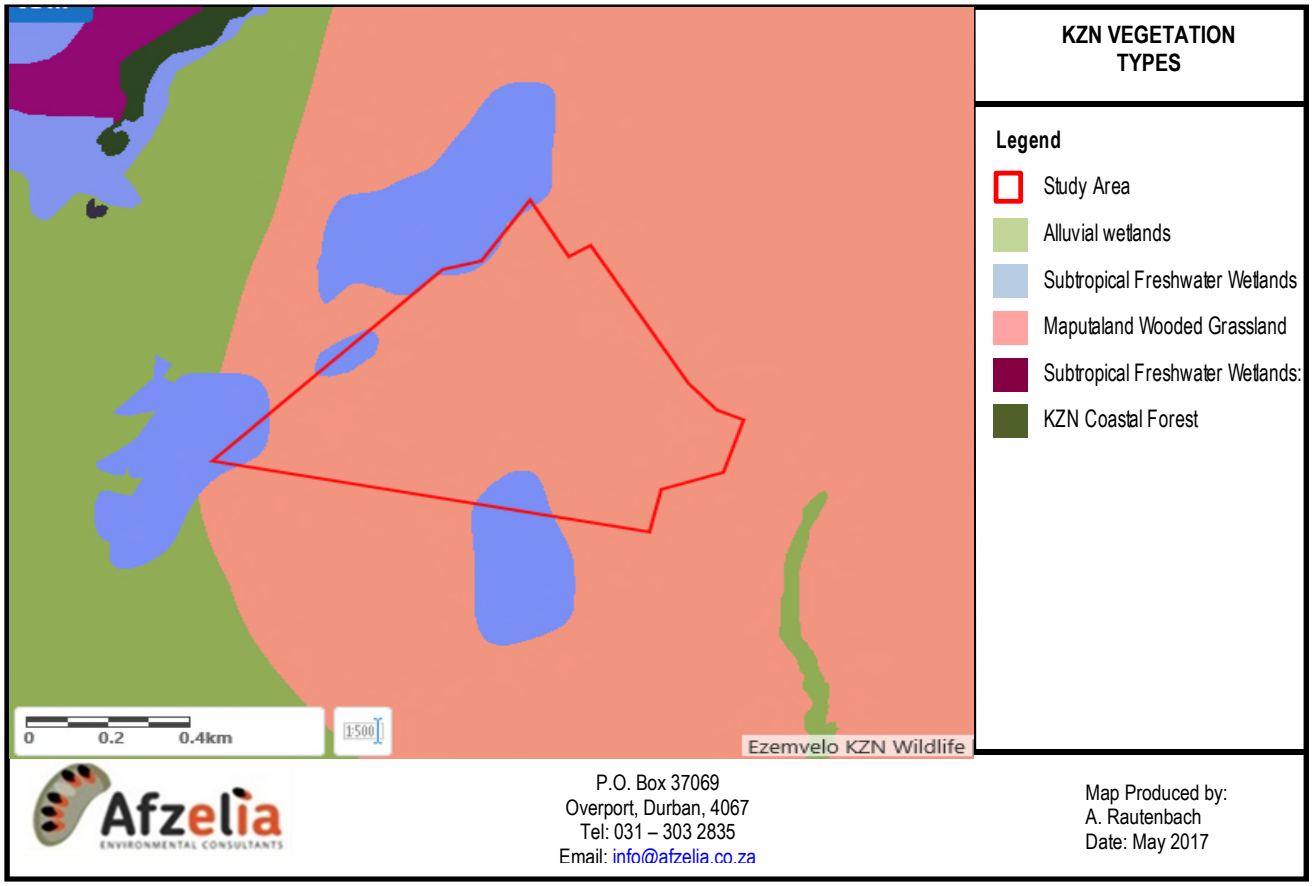

FIGURE 9. Vegetation map of the study area indicating the historical extent of the Alluvial Wetlands, Subtropical Freshwater Wetlands and the Maputaland Wooded Grasslands vegetation types in relation to the study area.

5.8.2 Flora Species of Conservation Concern

An assessment considering the presence of any flora species of conservation concern, as well as suitable habitat to support any such species was undertaken. A complete POSA Red Data List for the QDSs 2831DD was acquired from SANBI and is presented in Appendix 1.

Although the study area is in poor ecological condition, some natural vegetation is still present and the presence of Red Listed/Protected flora species should be considered. Based on geographic distribution, altitude and climate, several flora species of conservation concern (SCC) has a **Medium** to **High Probability** of occurring on the study area and is listed in Table 5.

For development implications with regards to areas where Red Listed species are present, refer to Annexure 1.

TABLE 5. POSA plant species list of plant species of conservation concern occurring in the QDS 2831DD (https://posa.sanbi.org).

SCIENTIFIC NAME	GROWTH FORMS	HABITAT	NATIONAL RED LIST CATEGORY (2009)	NEMBA (2015)	KZNEBPA (2014)	PROBABILITY OF OCCURRENCE
Crinum macowanii Baker	Geophyte	Terrestrial, Albany thicket, Grassland, Indian Ocean Coastal Belt.	Declining		Sched 8	MEDIUM
Crinum stuhlmannii Baker	Geophyte	Scattered in grassland, bushveld and on sandy soils at low altitudes, in deep sand in lowveld bushveld.	Declining		Sched 8	MEDIUM
Cyrtanthus contractus N.E.Br.	Geophyte	Terrestrial	LC		Sched 8	HIGH
* *Scadoxus membranaceus* (Baker) Friis & Nordal	Geophyte	Terrestrial	LC		Sched 8	HIGH
Scadoxus multiflorus (Martyn) Raf. subsp. *katharinae* (Baker) Friis & Nordal	Geophyte	Terrestrial	LC		Sched 8	MEDIUM
Protorhus longifolia (Bernh.) Engl.	Tree	Terrestrial	LC		Sched 8	MEDIUM
** *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro	Tree	Terrestrial	LC		Sched 8	MEDIUM
Asparagus densiflorus (Kunth) Jessop	Dwarf shrub	Terrestrial	LC		Sched 8	MEDIUM
Aloe ecklonis Salm-Dyck	Herb, succulent	Generally in heavy clay soils in grassland. Occurs in moist as well as well-drained sites, and from near sea level to very high altitudes. Often found in severely degraded and disturbed species-poor grasslands as well as in areas under heavy alien infestation.	LC		Sched 8	HIGH
A*loe marlothii* A.Berger subsp. *orientalis* Glen & D.S.Hardy	Shrub, succulent	Low altitudes, including dunes near the coast, and also prefer sandy rather than rocky soils.	LC		Sched 8	HIGH
Trachyandra asperata Kunth var. *asperata*	Geophyte, succulent	Terrestrial	LC		Sched 8	MEDIUM
Ekebergia capensis Sparrm.	Tree	Terrestrial	LC		Sched 8	HIGH
Asparagus falcatus L.	Climber	Terrestrial	LC		Sched 8	HIGH
Kniphofia leucocephala	Herb	Wetlands in low lying coastal grassland, in moist,	CR		Sched 8	MEDIUM

Baijnath		black, sandy clay soil.				
Trachyandra saltii (Baker) Oberm. var. *saltii*	Geophyte, succulent	Terrestrial	LC		Sched 8	MEDIUM
Senecio erubescens Aiton var. *erubescens*	Herb	Terrestrial	LC		Sched 8	HIGH
Monsonia praemorsa E.Mey. ex R.Knuth	Herb	Terrestrial	LC		Sched 8	HIGH

* Endemic to South-Africa

** Protected under the National Forest Act (No. 84 of 1998)

The following protected species, not on the POSA species list, also have a **High** probability of occurrence:

Flora protected by the National Forest Act (No. 84 of 1998)

- *Ficus trichopoda*

Permit authorisation from DAFF will be required to damage or destroy this species.

Flora protected under the KwaZulu-Natal Environmental Biodiversity and Protected Areas Management Bill, 2014

Additional tree species recorded in the Maputaland Wooded Grassland (Siebert *et al.,* 2011):

- *Hyphaene coriacea*
- *Trichilia emetic*a

Permit authorisation will be required from eKZNw to remove or re-locate this species.

5.8.3 Invasive Plants

Invasive alien plants (IAPs) are widely considered as a major threat to biodiversity, human livelihoods and economic development. On 1 August 2014, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations which came into effect on the 1st of October 2014 in a bid to curb the negative effects of IAPs and other alien invasive species. An updated set of Invasive Species Lists (as per the NEMBA Regulations) was published on 29 July 2016.

The Regulations call on land owners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a land owner or seller of land can result in a criminal offence punishable by a fine of up to R5 million (R10 million in the case of a second offence) and/or a period of imprisonment of up to 10 years.

IAPs are classified into four different categories and are described below:

1. Category 1a Listed Invasive Species

- Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.
- A person in control of a Category 1a Listed Invasive Species must –
    - comply with the provisions of section 73(2) of the Act;
    - immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and
    - allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.
- If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

2. Category 1b Listed Invasive Species

- Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

- A person in control of a Category 1b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.
- If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

3. Category 2 Listed Invasive Species

- Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.
- Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 listed Invasive Species without a permit.
- A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.
- If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.
- Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

4. Category 3 Listed Invasive Species

- Category 3 Listed Invasive Species are species that are listed by notice in terms of section70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.
- Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.
- If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

Several areas, specifically towards the southern site boundary are infested by alien invasive plant species such as *Lantana camara* and *Psidium guajava* (Figure 11A & B). *L. camara* is listed as a category 1b IAP and *P. guajava* as a category 3 IAP in KwaZulu-Natal Province.

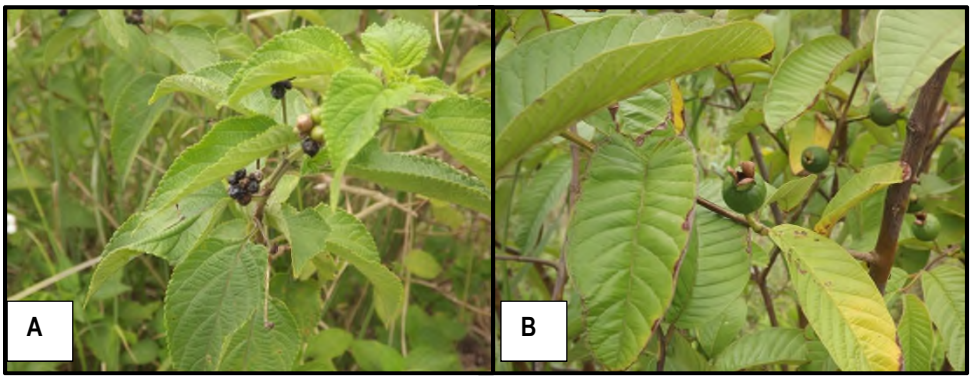

FIGURE 10. A - *L.camara*; and B - *P. guajava.*

5.9 MAMMAL ASSESSMENT

5.9.1 Mammal Habitat Assessment

The local occurrences of mammals are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and wetland/aquatic-associated vegetation cover rather than fine-scale vegetation mapping.

It should thus be reported that the study area offer three major mammal habitats, i.e. terrestrial, arboreal and wetland/aquatic. Terrestrial is by far the biggest, but is unfortunately in a bad ecological state of repair as a result of overgrazing and alien plant invasions. Similarly, wetland/aquatic habitat is in poor ecological condition, and entirely isolated, which has zoogeographical repercussions. Arboreal habitat is represented by a few scattered trees.

5.9.2 Expected and Observed Mammal Species Richness

Since all mega-mammals and many of the large and medium sized ungulates (i.e. elephants, rhino, wildebeests, buffalo, lions, spotted hyenas, Sable antelope, Roan antelope) have long since been extirpated by hunting, poaching, and to favor urban and industrial developments, they can only be found in protected areas and have, therefore, not been included in the assessment.

In addition, all feral mammal species expected to occur on the proposed site (e.g. house mice, house rats, dogs and cats) were omitted from the assessment since these cannot be considered when estimating the conservation value of the project areas. As a result of urban sprawl, hunting and poaching pressure, few of the larger mammal species are expected to be present in the study area, however, the grasslands and trees offer habitat to a variety of small mammal species such as rodents, shrews and bats.

A total of 50 mammal species potentially occur within the area (Appendix 3). It should be noted that potential occurrence is interpreted as to be possible over a period of time as a result of environmentally induced expansion and contractions of population densities and ranges which simulates migration.

The majority of the species of the resident diversity (Appendix 3) are common and widespread, all with wide habitat tolerances. The reason for their survival success lies predominantly in their remarkable reproductive success and wide habitat tolerance (viz. Natal multimammate mouse, Pygmy mouse, Woodland dormouse; Skinner & Chimimba, 2005).

Several of the bat species listed, for example the Little free-tailed bat, Angola free-tailed bat, Egyptian free-tailed bat, Egyptian slit-faced bat, Cape serotine, Banana bat and Dusky pipistrelle, shows remarkable adaptivity by expanding their distribution ranges and population numbers significantly by capitalising on the roosting and feeding opportunities offered by near-by manmade structures (Schoeman & Waddington, 2011; Schoeman, 2016; Appendix 3).

Mongooses and genets are reticent in habits and manage to persist as long as prey densities remain above the nutritional requirements (Skinner & Chimimba, 2005). Adaptive traits such as behavioral plasticity enable vervet monkeys to persist in apparently unsuitable environments, even at small spatial scales (Healy & Nijman, 2014).

Table 6 lists the mammals that were observed during a brief site visit. All the species listed are abundant and widespread.

TABLE 6. A list of mammal species observed during the brief site visit.

COMMON NAME	SCIENTIFIC NAME	OBSERVATION INDICATOR	HABITAT
Marsh mongoose	*Atelerix paludinosus*	Tracks	Wetlands
Slender mongoose	*Herpestes sanguineus*	Sighting	Grassveld/road

5.9.3 Red Listed and Protected Mammal Species

Eight Red Listed /Protected mammal species have a **Medium - High Probability** of occurring on the study area (Table 7).

African Striped Weasels are mainly found in savanna associations, although this species probably has a wide habitat tolerance, and are generally found in areas that support their main prey, small mammals. However, due to their secretive nature, this species are often overlooked and rarely encountered (Skinner & Chimimba, 2005). They are listed as 'Near Threatened'on the IUCN Red List (2016), and are protected under Schedule 3 of the KZNEBPA (2014).

Although the **Botswana Long-eared bat** and **Hairy Slit-faced bat, Lesser Woolly bat** and **Sundevall's Leaf-nosed bat** do not appear on the most recent National Red list (2016), they are protected under Schedule 3 of the KZN-EPBA (2014). Prohibited activities include hunting and killing by fumigation; with restricted activities including the damage of communal or colonial breeding or roosting sites; possession, breeding, selling, making available for sale or otherwise trade in, buying, receiving, giving, donating or accepting as a gift, or in any way acquire or dispose of, capture, collect, immobilise, kill, translocate, release, display, export, import or keeping in captivity.

Swamp Musk shrews are habitat specialists and occur in moist, swampy habitats (Skinner & Chimimba, 2005) such as the areas surrounding the wetlands on the study area, and can be a common and locally abundant species in suitable habitat. However, current population numbers are declining as a result of wetland habitat loss and degradation across its range (Taylor *et al*., 2016).

Thomas's House bat has been sparsely recorded from the eastern parts of the region and is known from only a few scattered localities in South Africa. It appears to be associated with low-lying, humid savannas of the coastal plains of Mozambique and KwaZulu-Natal, especially where rivers and wetlands occur (Monadjem *et al*., 2010).

Although **Vervet monkeys** are listed as of 'Least Concern', they appear under Appendix II of CITES. Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Vervet monkeys are also protected under Schedule 3 of the KZNEBPA (2014).

The rest of the Red Listed/Protected mammal species listed in Appendix 3 have a low probability of occurrence since the site does not offer suitable and/or sufficient habitat.

TABLE 7. Red Listed/Protected mammal species deduced to occupy the site, or to be occasional visitors.

COMMON NAME	SCIENTIFIC NAME	HABITAT	NATIONAL RED LIST CATEGORY (2016)	NEMBA (2015)	KZNEBPA (2014)	PROBABILITY OF OCCURRENCE
African Striped weasel	*Poecilogale albunucha*	Savanna with moist grassland	NT		Sched 3	HIGH
Botswana Long-eared bat	*Laephotis botswanae*	Riverine or other types of underbrush adjacent to permanent water supplies	LC		Sched 3	HIGH
Hairy Slit-faced bat	*Nycteris hispida*	Savanna, woodland, forest	LC		Sched 3	HIGH
Lesser Woolly bat	*Kerivoula lanosa*	Riparian forest, afromontane forest	LC		Sched 3	MEDIUM
Sundevall's Leaf-nosed bat	*Hipposideros caffer*	Thickets with suitable roosting sites such as caves, sinkholes, culverts	LC		Sched 3	MEDIUM
Swamp Musk shrew	*Crocidura mariquensis*	Reed beds, swamps, thick grass along river banks	NT		Sched 3	MEDIUM
Thomas's House bat	*Scotoecus albofuscus*	Low lying humid Savanna with large rivers/wetlands	NT		Sched 3	MEDIUM
* Vervet monkey	*Chlorocebus pygerythrus*	Coastal forest, suburban areas	LC		Sched 3	HIGH

***** Listed on Appendix II of CITES

5.10 HERPETOFAUNA ASSESSMENT

5.10.1 Herpetofauna Habitat Assessment

The local occurrence of reptiles are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and fossorial (underground), rather than fine scale vegetation types. It is therefore possible to deduce the presence or absence of reptile species by evaluating the habitat types within the context of global distribution ranges.

The study area offers three major reptile habitats, i.e. terrestrial, arboreal and fossorial. Terrestrial and fossorial is by far the biggest, but is unfortunately in a bad ecological state of repair as a result of alien plant invasions, trampling and overgrazing.

For frogs, suitable environmental conditions, especially breeding sites, are critically important and most species tend to be located in very specific microhabitats such as pools, ponds, streams, marshlands, rocky outcrops and open grassveld (du Preez & Carruthers, 2009). The study area offers two frog habitats, namely grassveld and aquatic. However, both these habitat types are degraded and frog species richness is expected to be low.

5.10.2 Expected and Observed Herpetofauna Species Richness

A total of 48 reptile and 38 frog species potentially occur within the area (Appendix 4). It should be noted that potential occurrence is interpreted as to be possible over a period of time as a result of environmentally induced expansion and contractions of population densities and ranges which simulates migration.

The majority of the reptile and frog species of the resident diversity is common and widespread (Appendix 4). No reptiles and frogs were observed during the site visit.

5.10.3 Red Listed and Protected Herpetofauna Species

No Red Listed/Protected reptile species are expected to be present on the study area. Red Listed/Protected frog species with a **Medium – High** probability of occurrence are discussed below:

Pickersgill's Reed frog (Table 8) is a habitat specialist occurring primarily in Indian Ocean Coastal Belt Vegetation Group 2, which is Critically Endangered and poorly protected. It requires perennial wetlands comprised of very dense reed beds at low altitudes (Raw, 1982; Armstrong, 2001; Bishop, 2004). It also requires an understory of thick vegetation, such as Snakeroot (*Persicaria attenuata*), from which males call and taller broad-leaved vegetation, including the Common Reed (*Phragmites australis*), Bulrushes (*Typha capensis*), and sedges (including *Cyperus dives, C. latifolius* and *C. papyrus*) on which to lay its eggs (Raw, 1982; Bowman, 2011; Tarrant & Armstrong, 2013). It is associated with deeper areas of water within wetland systems (20-80 cm) (Trenor, 2014). Of importance is that such sites often do not appear as being in pristine condition.

Although this species only has a Medium probability of occurrence, the study area falls well within the distributional range of potential populations and subpopulations (Tarrant & Armstrong, 2013). The loss of any site where Pickersgill reed frogs may occur will have serious implications for the total population, therefore it is critical to conduct a thorough survey to establish whether Pickersgill'reed frog occur in the wetland areas in the study area, as well as on wetland areas adjacent to the study area.

Spotted Shovel Nosed frogs (Table 8) inhabits grassland and savannah where it breeds in seasonal pans, swampy areas, and in pools near rivers. It nests in burrows in wet soil by temporary water, and tandpoles move to water to development (Mintner *et al*., 2004). These frogs are mosly fossorial and are rarely observed since they only surface after heavy rain.

The two frog species listed as 'Data Deficient' (i.e. **Striped Caco** and **Whistling Rain frog**; Appendix 4; Table 8) are not necessarily endangered. It simply means that there is insufficient information available for a proper assessment of conservation status to be made.

No other Red Listed/Protected reptile or frog species (Appendix 4) are considered to be present in the study area since the site does not offer suitable habitat.

TABLE 8. Red Listed/Protected frog species deemed present in the study area, or to be occasional visitors.

COMMON NAME	SCIENTIFIC NAME	HABITAT	RED LIST CATEGORY	NEMBA (2015)	KZNEPBA (2014)	PROBABILITY OF OCCURRENCE
Pickersgill's Reed frog	*Hyperolius pickersgilli*	Densely vegetated marshy areas in coastal bushveld and grassland	EN		CR (Sched 3)	MEDIUM

Spotted Shovel Nosed frog	*Hemisus guttatus*	Pans and marshy ground in coastal bush and grassland	VU		VU (Sched 3)	MEDIUM
Striped Caco	*Cacosternum striatum*	Variety of grassland areas	DD			HIGH
Whistling Rain frog	*Breviceps sopranus*	Variety of vegetation types in forest and savanna biomes including coastal forest and thornveld, riparian forest. Preferred soil types vary from sandy to clay loam	DD			HIGH

5.11 AVIFAUNA ASSESSMENT

5.11.1 Bird Habitat Assessment

The following bird microhabitats are present on the study area:

- Grassveld
- Inland water

GRASSVELD

Grassveld cover is low and sparse, and generally in a poor ecological state as a result of overgrazing and alien plant invasions.

INLAND WATER

This habitat is represented by small wetlands/depressions covered with duckweed, some fringed sparsely by reeds. Several areas surrounding the wetlands/depressions are trampled by watering cattle.

5.11.2 Expected and Observed Bird Species Richness

The study area falls within the distributional range of 341 bird species (Appendix 5). During a brief site visit, the presence of 11 species was confirmed (Table 9). All the species listed in Table 9 are widespread and abundant throughout their distributional range.

TABLE 9. A list of bird species observed during the brief site visit.

COMMON NAME	SCIENTIFIC NAME
Bee-eater European	*Merops apiaster*
Bee-eater White-fronted	*Merops bullockoides*
Bishop Southern Red	*Euplectes orix*
Bulbul Dark-capped	*Pycnonotus tricolor*
Canary Yellow-fronted	*Crithagra mozambicus*
Flycatcher Southern Black	*Melaenornis pammalaina*
Kingfisher Brown-hooded	*Halcyon albiventris*
Kite Yellow-billed	*Milvus aegyptius*

Swallow Lesser Striped	*Hirundo abyssinica*
Weaver Yellow	*Ploceus subaureus*
Widowbird Fan-tailed	*Euplectes axillaris*

5.11.3 Species of Conservation Concern

Several species of concervation concern have a **Medium – High probability** of occurring in the study area, or to be occasional visitors and are discussed below (Table 10).

Grey Crowned Cranes typically require mixed wetland-grassland habitats, where they nest within or on the edges of wetlands, while foraging in wetlands and nearby grasslands. Foraging takes place in short to medium height open grassland, lightly wooded savannah and agricultural fields. Although the wetlands and grasslands in the study area are in poor ecological condition, the area has been identified as a possible breeding site for Grey Crowned Cranes (Nel *et al*., 2011) and therefore the presence of this species should be considered (Table 10). Grey Crowned Cranes have a Regional and Global IUCN listing of 'Endangered', as well as a National (NEMBA, 2015) and Regional (KZNEBPA, 2014) listing of Endangered.

With the exception of the Fiscal Flycatcher and Cape White Eye, the rest of the species listed in Table 10 are protected under Schedule 3 of the KZNEPBA (2014). Schedule 3 lists protected species and provides for certain prohibited and restricted activities in respect of such species. Prohibited activities include hunting, and restricted activities including the disturbance, destruction, damage or removal of nests, the possession, breeding, selling, making available for sale or otherwise trade in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposal of, capturing, collection, immobilisation, killing, translocation, release, display, export, import or keeping and captivity of any species listed under Schedule 3.

Other noteworthy species include the near-endemic **Fiscal Flycatcher** and **Cape White Eye** (Table 10). Near-endemic species are those with their distributional range at least 70 % restricted to South Africa, Lesotho and Swaziland. It poses a special conservation responsibility to the region's conservation authorities, government, landowners and citizens. Even though these species have wide distributional ranges within the region and have a conservation ranking of 'Least Concern', and some rank among our most widespread and abundant birds (i.e. Cape White Eye, Fiscal Flycatcher), all endemic species require some vigilance (Taylor *et al*., 2015) to ensure that population numbers stay stable.

The rest of the species listed in Appendix 5 have a low probability of occurrence since the study area does not offer suitable habitat.

TABLE 10. A list of Red Listed/Protected bird species expected to occur on the study area, or to be occasional visitors.

			CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**HABITAT**	**RED LIST CATEGORY (REGIONAL /GLOBAL)**	**NEMBA (2015)**	**KZN-EBPA (2014)**	**PROBABILITY OF OCCURRENCE**
Bishop Yellow-crowned	*Euplectes afer*	Marshes and wetlands			Sched 3	HIGH
Bittern Little	*Ixobrychus minutus*	Bulrushes and reedbeds			Sched 3	MEDIUM
Buttonquail Kurrichane	*Turnix sylvaticus*	Open savanna woodland, cultivated and fallow fields			Sched 3	MEDIUM
Buzzard Steppe	*Buteo vulpinus*	Open woodland, grassland and agricultural areas			Sched 3	MEDIUM
Canary Brimstone	*Crithagra sulphuratus*	Montane schrublands to coastal forest margins			Sched 3	HIGH
Crane Grey Crowned	*Balearica regulorum*	Marshes, pans, dam margins with tall emergent vegetation	EN/EN	EN	Shed 3	LOW
Eagle Long-crested	*Lophaetus occipitalis*	Moist woodland adjacent grassland, marshes, drainage lines			Sched 3	MEDIUM
Eagle-owl Spotted	*Bubo africanus*	Tolerant to a wide variety of habitats and has adapted to suburban areas			Sched 3	MEDIUM
Egret Cattle	*Bubulcus ibis*	Open grassland and agricultural lands			Sched 3	HIGH
Egret Little	*Egretta garzetta*	Most shallow water bodies			Sched 3	MEDIUM
Egret Yellow-billed	*Egretta intermedia*	Shallow water margins and flooded wetlands			Sched 3	MEDIUM
Falcon Amur	*Falco amurensis*	Grassland, lightly wooded grassland and cropland margins			Sched 3	MEDIUM
(*) Flycatcher Fiscal	*Sigelus silens*	Open woodland, from moist to semi-arid regions				HIGH
Guineafowl Helmeted	*Numida meleagris*	Widespread from near-desert to forest margins			Sched 4	HIGH
Lapwing Black-winged	*Vanellus melanopterus*	Short grassland, from the highlands to coastal flats			Sched 3	HIGH
Owl Barn	*Tyto alba*	Open habitat (Not forest)			Sched 3	HIGH
Quailfinch African	*Ortygospiza atricollis*	Short open grassland near water			Sched 3	HIHG
Waxbill Orange-breasted	*Amandava subflava*	Moist grasslands and wetland margins			Sched 3	MEDIUM
(*) White-eye Cape	*Zosterops virens*	All wooded habitats, from sealevel to about 2770 m.				HIGH

(*) Near-endemic species

6. FINDINGS AND POTENTIAL IMPLICATIONS

The natural fauna and flora in the study area has deteriorated in species richness and environmental wellbeing as a result of overgrazing and alien plant invasions. Consequently, species richness is in a downward cycle with little prospects of improving.

The terrestrial habitat is in a poor state of ecological repair, with only a few remnants of the original vegetation remaining, therefore this area is not representative of a CBA area. However, a few wetlands, although in poor ecological condition, should be regarded as sensitive and should be safeguarded by buffer zones.

Due to the transformed nature of the area, including surrounding areas, connectivity is impaired and possible only to small undeveloped but environmentally compromised patches of natural vegetation.

The findings of the ecological scoping assessment for the proposed Richards Bay CCPP development are summarized below:

ECOLOGICAL VALUE	APPLICABILITY TO STUDY AREA
Species aspect of biodiversity	
Protected species of fauna/flora	The study area offers suitable habitat to two provincially protected trees (Section 5.8.2) as well as one tree species protected by the National Forest Act (Section 5.8.2). The study area offers suitable habitat to several provincially protected small mammal species (Appendix 3; Table 7). The presence of the provincially protected Pickersgill's reed frog and the Spotted shovel nosed frog should be considered (Table 8; Appendix 4). The presence of several provincially protected bird species should be considered (Table 10).
Threatened species	Several Red Listed plant species potentially occur in the study area (Table 5). Several Red Listed mammals potentially occur in the study area (Table 7). The presence of the Critically Endangered Pickersgill Reed frog and the Vulnerable Shovel Nosed frog should be considered. The study area falls within the distributional range of Grey Crowned Cranes. The presence/absence of this species should be confirmed.
Keystone species performing a key ecological role (e.g. key predator, primary producer)	Flora – Uncertain Fauna - None
Endemic species or species with restricted ranges	Endemic flora potentially occurs in the study area (Table 5). Several endemic birds potentially occur in the study area (Table 10).
Previously unknown species	None expected
Community and ecosystem aspects of biodiversity	
Distinct or diverse communities or ecosystems	The study area falls within a Critically Endangered ecosystem containing two Vulnerable and one Endangered vegetation type. The study area falls within a CBA: Irreplaceable area. However, terrestrial habitat is in a poor state of ecological repair.
Unique ecosystems	
Locally adapted communities or assemblages	
Communities with a high proportion of endemic species or species with restricted ranges	

Communities with a high proportion of threatened and/or declining species.	Several endemic fauna species have a high probability of occurrence.
The main uses and users of the area and its ecosystem goods and services: important ecosystem services (e.g. important water area, buffer zone), valued ecosystem goods (e.g. harvestable goods important for lives and/or livelihoods), valued cultural areas.	Harvestable resources/medicinal plants for the local community may be present. The area is currently being used for communal cattle grazing. An informal dwelling and cattle boma is present on the study area.
Landscape level aspects of biodiversity	
Key ecological processes (e.g. seed dispersal, pollination, primary production, carbon sequestration).	None thought to be present.
Areas with large congregations of species and/or breeding grounds.	None observed during the brief site visit
Importance as a link or corridor to other fragments of the same habitat, to protected or threatened or valued biodiversity areas.	The wetland areas might provide possible breeding grounds for the Grey Crowned Crane.
Importance and role in the landscape with regards to a range of spatial components or ecological processes; comprising processes tied to fixed physical features (e.g. soil or vegetation interfaces, river or sand movement corridors, upland-lowland interfaces) and flexible processes (e.g. upland-lowland gradients and macro-climatic gradients) as well as important movement or migration corridors for species.	None expected due to the isolated and degraded nature of the study area.

7. POTENTIAL ECOLOGICAL IMPACTS ASSOCIATED WITH THE RICHARDS BAY CCPP PROJECT

This section provides an overview of the potential ecological impacts the development of the Richards Bay CCPP project may have on the biodiversity of the study area. It includes an assessment of the nature and extent of potential impacts on the receiving environment during the construction and operation phases of the project.

7.1 SUMMARY OF THE POTENTIAL ECOLOGICAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION PHASE

CONSTRUCTION PHASE
1. Loss of 'Critically Endangered' ecosystems Critically Endangered ecosystems have been identified within the study area (Kwambonambi hygrophilous grassland). The Kwambonambi Hygrophilous Grassland within the study area is severely degraded by overgrazing and alien plant invasions with few natural plant species remaining. Regional connectivity is impaired as a result of extensive agricultural and industrial developments on properties adjacent to the study area. Therefore impacts on the receiving environment in its current state are expected to be low. ***2. Loss of CBA: Irreplaceable areas*** Due to the poor ecological state of the study area, this area is not considered to be representative of a CBA area. The study area is severely degraded by overgrazing and alien plant invasions with few natural plant species remaining. Regional connectivity is impaired as a result of extensive agricultural and industrial developments on properties adjacent to the study area. Therefore impacts on the receiving environment in its current state are expected to be low. ***3. Loss of Red Listed/Protected flora species***

Several Red Listed/Protected flora species potentially occur within the study area. Vegetation clearance to accommodate infrastructure may therefore result in the destruction of several Red Listed/Protected flora species. The study area offers suitable habitat to two provincially protected trees (Section 5.8.2), one tree species protected by the National Forest Act (Section 5.8.2) and Red Listed plant species (Table 5). A comprehensive flora survey will have to be undertaken to verify the presence/absence of any Red Listed/Protected flora species in the study area, and within a 200 m radius of the study area.

4. Loss of Red Listed/Protected fauna species

Several Red Listed/Protected fauna species potentially occur within the study area. Fauna species will directly be affected by the overall loss of habitat as a result of vegetation clearance during the construction phase. The study area offers suitable habitat to several threatened, provincially protected and endemic mammalian, amphibian and avian species. A comprehensive survey on available habitat and species composition of the study area will have to be undertaken to verify the presence/absence of threatened and protected fauna species. These surveys must include focal species surveys for the 'Critically Endangered' Pickersgill's Reed Frog, the 'Vulnerable' Spotted Shovel-nosed frog and the 'Endangered' Grey Crowned Cranes.

5. Construction noise

Disturbance to surrounding communities of the power plant due to operation of construction machinery at the plant site.

6. Emissions

Particulate matter emitted during construction activities can result in the deterioration of ambient air quality in the vicinity of the source, and be a nuisance to the community.

7. Soil and water contamination

Different types of effluents, solid waste and hazardous material associated with construction activities may contaminate the water and soil resources in the study area.

DESKTOP SENSITIVITY ANALYSES OF THE STUDY AREA

The study area is severely degraded by overgrazing and alien plant infestations. However, several wetland areas are present (Figure 12). Although these areas are in poor ecological condition, the 'Critically Endangered' Pickersgill's Reed Frog and the 'Vulnerable' Spotted Shovel-nosed frog may occur in these areas. Furthermore, these areas have also been identified as a possible breeding site for the 'Endangered' Grey Crowned Cranes (Nel *et al*., 2011). Therefore, these areas should be regarded as sensitive. Focal species surveys will have to be conducted in order verify the presence/absence of these species on the study area.

FIGURE 11. Wetland areas (indicated in red) should be regarded as sensitive. The rest of the site is in poor ecological condition.

IMPACT	NATURE OF THE IMPACT	EXTENT OF THE IMPACT	NO-GO AREAS
Loss of 'Critically Endangered' ecosystems	Direct impacts: • Fragmentation of 'Critically Endangered' ecosystems; • Loss of biodiversity; • Environmental degradation • Loss of habitat for Red Listed/Protected fauna/flora species. Indirect impacts: Alterations to population dynamics and biotic interactions of species.	National/Regional	No specific areas could be identified at this stage
Gaps in knowledge and recommendations for further studies	Although the study area is in poor ecological condition, some natural vegetation is still present. Subsequently, this area may also provide habitat to a number of threatened and protected fauna and flora species. Detailed fauna and flora field investigations will have to be conducted during the EIA phase to identify any Red Listed/Protected fauna and flora species in the study area.		

IMPACT	NATURE OF THE IMPACT	EXTENT OF THE IMPACT	NO-GO AREAS
Loss of CBA areas	Direct impacts: • Fragmentation of CBA areas; • Loss of biodiversity; • Environmental degradation; • Loss of habitat for Red Listed/Protected fauna/flora species. Indirect impacts: Alteration to population dynamics and biotic interactions of species.	Regional	No specific areas could be identified on this stage
Gaps in knowledge and recommendations for further studies	Although the study area is in poor ecological condition, some natural vegetation is still present. Subsequently, this area may also provide habitat to a number of threatened and protected fauna and flora species. Detailed fauna and flora field investigations will have to be conducted during the EIA phase.		
IMPACT	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Loss of Red Listed/Protected flora species	Direct impacts: • Complete destruction of Red Listed/Protected plant species; • Loss of genetic variation within a species; • Isolation and fragmentation of local populations; • Illegal collection of protected species. Indirect impacts: Negative change in the conservation status of a species.	National/Regional	No specific areas could be identified at this stage
Gaps in knowledge and recommendations for further studies	Several Red Listed/Protected flora species potentially occur in the study area. The study area offers suitable habitat to two provincially protected trees (Section 5.8.2), one tree species protected by the National Forest Act (Section 5.8.2) and Red Listed plant species (Table 5). • A comprehensive flora survey will have to be undertaken during the EIA phase to verify the presence/absence of any Red Listed/Protected flora species in the study area, and within a 200 m radius of the study area. • Reports must include the details of type and condition of plant communities. • The location and extent of all vegetation types on the study area (even if in a poor/degraded condition) must be delineated. • Transformed areas must be identified and broadly categorized, viz agriculture, infrastructure etc. • The extent of the above various areas to be indicated in hectares or square metres. • For the identified vegetation types, the conservation status and ecological condition must		

	be indicated. • Surveys must take place during the flowering season of species historically recorded on site, and or/confirmed or predicted to occur on site. • The report must evaluate whether the site contains the habiat requirements and is within range for the recolonization of species predicted to occur in the site, but which were not recorded as being present at the time of the survey. • The location and extent of all red list, protected and endemic plant populations in the study area must be mapped, or the population extent may also be determined according to habitat preference (methodology for this must be included in the report). • The conservation status and condition of the populations must be indicated.		
IMPACT	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Loss of Red Listed/Protected fauna species	Direct impacts: • Loss/displacement of species; • Inadvertent killing of slow-moving animals during earthworks; • Illegal collection and/or poaching; • Loss of genetic variation; • Isolation of local populations. Indirect impacts: • Alterations to population dynamics and biotic interactions. • Negative change of a species' conservation status.	National/Regional	Wetland margins and wetlands, including buffer zones. No other specific areas could be identified at this stage.
Gaps in knowledge and recommendations for further studies	The study area offers suitable habitat to several threatened, provincially protected and endemic mammalian, amphibian and avian species. A comprehensive survey on available habitat and species composition of the study area must be undertaken during the EIA phase to verify the presence/absence of threatened and protected fauna species. **Recommendations with regards to general field surveys** • Assessments must cover all breeding, foraging, roosting, aestivation and hibernation habitats. • Surveys must encompass the site and all adjacent properties with indigenous vegetation within a 500 m radius of the study area. • The report must differentiate between identified habitats (breeding, foraging, roosting, aestivation and hibernation). • Details on the status/condition of habitats identified during the survey. • Provide the conservation status and viability of the species utilising or are predicted to utilize these habitats. The rehabilitation potential must also be indicated, even if a species is not present. • An evaluation of whether the study area contains viable habitat for the recolonisation or re-introduction of the species predicted to occur on the study area (historically), but which were not recorded as being present during the surveys, as well as the rehabilitation potential if habitat is degraded. • The location of all sitings and the location and extent of red list, protected and endemic species populations in the study area must be mapped, or the population extent may also		

	be determined based on habitat preference (methodology for this must be included in the report). • The location and extent of all known and predicted habitats (breeding, foraging, roosting, aestivation and hibernation) in the study area must be mapped. The condition of these habitats must be clearly indicated (e.g. primary, degraded, and transformed). **Specific recommendations with regards to Avifauna specialist studies** • Focal surveys to maximise the chance of detecting Grey Crowned Cranes are required. These surveys must follow good summer rains i.e. once standing water is present and the vegetation has recovered sufficiently from winter fires to allow for the assessment of available habitat and the presence of this species. • Surveys for terrestrial birds must be conducted in summer (should winter breeding species potentially be present, a survey will be required at that time of the year), but only once the vegetation layer has recovered sufficiently from winter fires to allow for the assessment of available habitat, i.e. between October and December. • General survey techniques for detecting provincially protected and endemic species deemed present in the study area may include the following techniques: transects, point counts, mist nests and call monitoring. Distinct surveys must be carried out for diurnal versus nocturnal birds. Specific techniques must be determined by the Specialist and a clear methodology provided in the report. **Specific recommendations with regards to amphibian and reptiles:** • Amphibians and reptiles must be surveyed along transects or within plots of fixed areas. General survey methods may include active searches as well as trapping including the use of drift fences and pitfall traps. Specific techniques must be determined by the Specialist and a clear methodology provided in the report. • Diurnal and nocturnal surveys are required to provide a complete picture of the amphibian and reptile communities. • Focal surveys to maximise the chance of detecting the Critically Endangered Pickersgill Reed Frog and the Vulnerable Spotted Shovel Nosed frog are required. Monitoring techniques such as nocturnal surveys and call monitoring at the wetland areas to check for the presence of Pickersgill's reed frog and the Spotted Shovel nosed frog, as well as standard Y-shape trap arrays must be considered. The Y-shaped trap arrays will also increase the likelihood of capturing the 'Near Threatened' swamp musk shrew. Surveys should be conducted after good summer rains have fallen within the area under investigation. • Where suitable foraging and aestivation habitat occurs in the study area the nearest suitable breeding habitat must be identified. Potential dispersal connections between wetlands in the region will also need to be indicated.

IMPACT	NATURE OF THE IMPACT	EXTENT OF THE IMPACT	NO-GO AREAS
Construction noise	Noise presents diverse threats to species and ecosystems, especially on species that rely on vocal communication. Effects include, but are not limited to, altered local behavior, reduced abundance in noisy habitats, changes in vigilance and foraging behavior, and impacts on individual fitness and the structure of ecological communities (Shannon *et al*. 2015).	Local	No specific areas could be identified at this stage
Gaps in knowledge and recommendations for further	No details on existing baseline ambient noise levels are available. Under Section 1 (definitions) of the National Environmental Management Act (No. 107 of 1998), "noise, odours, dust or heat",		

studies	(subsection iiii) are all defined as 'pollution". Under Section 28 of NEMA it is the user/and or owner of land's responsibility to prevent, remediate and minimise noise pollution. The South African National Standard No. 10103 of 2008 ("Noise Thresholds"; SABS, 2008) is generally used and accepted as a compliance guideline. Therefore is is recommended that a Noise Impact Assessment be undertaken for the proposed development for each phase of the project.		
IMPACT	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Emmissions	• Dust – nuisance to surrounding communities during site-clearance phase. • Vehicle and equipment exhaust – combustion exhaust from vehicles and construction equipment can affect ambient air quality. • Air pollution negatively affects fauna and flora by the direct exposure to contaminants and a destruction of their habitats, food and water. • Climate change	National/Regiona/Local	No specific areas could be identified at this stage.
Gaps in knowledge and recommendations for further studies	No information on ambient air quality conditions is available. An Air Quality Impact assessment should be carried out to determine the air quality impacts of the proposed development for each phase of the project. Air emmissions requiring management at local and regional levels include sulphur dioxide, nitrogen oxide, nitrogen dioxide, carbon monoxide, VOCs, benzene (C_6H_6), POPS and particulate matter. Some of these primary pollutants undergo chemical transformation in the atmosphere, creating secondry pollutants such as sulphuric acid (acid deposition and ozone (O_3). When dispersed by winds, these pollutants persist long enough to pose problems in distant areas.		
IMPACT	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Soil and water contamination	• Untreated wastewater and other effluents from the construction activities may contaminate water resources in the study area; • Disposal of hazardous and non-hazardous waste may potentially cause groundwater pollution and deteriorate habitat quality on adjacent areas.	Regional/Local	No specific areas could be identified at this stage

Gaps in knowledge and recommendations for further studies	Information from the Geotechnical and Hydrological reports will be required for the impact assessments during the EIA phase.

7.2 SUMMARY OF THE POTENTIAL ECOLOGICAL IMPACTS ASSOCIATED WITH THE OPERATION PHASE

OPERATION PHASE			
General ecological impacts associated with the operation phase include but is not limited to: 1. Impacts on species caused by the permanent alterations in night time light conditions; 2. Disturbance or damage to adjacent habitats and species caused by the movement of vehicles and personnel, dust, spillage of fuels, chemicals and noise; 3. Degradation of habitat quality and adverse impacts on species due to airborne emissions from the power plant; 4. Impacts on habitats caused by alteration to drainage regimes.			
ISSUE	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Impacts on species caused by the permanent alterations in night time light conditions.	Alteration of the natural variation in diurnal and nocturnal light intensities and spectral properties has the potential to disrupt the physiology, behavior and ecology of herpetofauna (Perry *et al*. 2008) and mammal species such as bats (Stone *et al*., 2009; Gastol *et al*., 2012)	Local	No specific areas could be identified at this stage.
Gaps in knowledge and recommendations for further studies	No future studies required. Site specific layout plans will however be needed in order to identify impacts and propose mitigation measures during the EIA phase.		
ISSUE	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Disturbance or damage to adjacent habitat and species caused by the movement of vehicles and personnel, spillage of fuels, chemicals, noise.	Disturbance activities may cause fauna species to abandon the area. Air pollution harms fauna and flora as a result of exposure to contaminants and causes the destruction of their habitat, food and resources	Local	No specific areas could be identified at this stage.
Gaps in knowledge and recommendations for further studies	A detailed site layout plan will be required during the EIA phase in order to propose mitigation measures and identify impacts.		
ISSUE	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Degradation of habitat quality due to airborne emissions from the power plant operations Greenhouse gas emmissions	Air pollution harms flora and fauna through exposure to contaminants and destruction of their habitats, food and water sources.	Local/Regional	n/a

Gaps in knowledge and recommendations for further studies	No information on ambient air quality conditions is available. An Air Quality Impact assessment should be carried out to determine the air quality impacts of the proposed development for each phase of the project. Air emmissions requiring management at local and regional levels include sulphur dioxide, nitrogen oxide, nitrogen dioxide, carbon monoxide, VOCs, benzene (C6H6), POPs and particulate matter. Some of these primary pollutants undergo chemical transformation in the atmosphere, creating secondry pollutants such as sulphuric acid (acid deposition and ozone (O3). When dispersed by winds, these pollutants persist long enough to pose problems in distant areas.		
ISSUE	**NATURE OF THE IMPACT**	**EXTENT OF THE IMPACT**	**NO-GO AREAS**
Impacts on habitat caused by the alteration of drainage regimes.	• Loss of habitat of fauna and flora species • Displacement of species • Habitat fragmentation	Local/Regional	No areas could be identified at this stage.
Gaps in knowledge and recommendations for further studies	Information from the Geotechnical and Hydrological reports will be required for the impact assessments during the EIA phase.		

8. CONCLUSIONS

The natural fauna and flora of the study area has deteriorated in species richness and environmental wellbeing as a result of overgrazing and alien plant invasions. Furthermore, due to the transformed nature of the surrounding areas, connectivity is impaired and possible only to small undeveloped but environmentally compromised patches of natural vegetation. Consequently, overall species richness is in a downward cycle, with little prospect of improving.

Although terrestrial as well as the aquatic habitat (wetlands) is in a poor state of ecological repair, remnants of the original vegetation remains, thus providing possible habitat to a few Red Listed/Protected fauna and flora species with distributional ranges overlying the study area. In this case, the precautionary principle is to be applied, and further fieldwork should be conducted. By employing a focal species approach, the chances of detecting focal species will be increased.

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APPENDIX 1. List of plant species for the QDS 2831DD.

		CONSERVATION STATUS		
SCIENTIFIC NAME	GROWTH FORM	NATIONAL RED LIST CATEGORY (2009)	NEMBA (2015)	KZNEBPA (2014)
*Asystasia gangetica (*L.) T.Anderson subsp. *micrantha (*Nees) *Ensermu*	Herb	LC		
Barleria obtusa Nees	Dwarf shrub, herb, shrub	LC		
Justicia betonica L.	Dwarf shrub, herb	LC		
Justicia campylostemon (Nees) T.Anderson	Herb, shrub	LC		
Justicia protracta (Nees) T.Anderson subsp. *protracta*	Dwarf shrub, herb	LC		
*Phaulopsis imbricata (*Forssk.) Sweet subsp. *imbricata*	Herb	LC		
Thunbergia atriplicifolia E.Mey. ex Nees	Dwarf shrub, herb	LC		
Thunbergia natalensis Hook.	Dwarf shrub, herb	LC		
Thunbergia purpurata Harv. ex C.B.Clarke	Climber, herb	LC		
Ceratiosicyos laevis (Thunb.) A.Meeuse	Climber, shrub	LC		
Xylotheca kraussiana Hochst.	Shrub, tree	LC		
Achyranthes aspera L. var. *sicula* L.	Herb	Not Evaluated		
*Achyropsis avicularis (*E.Mey. ex Moq.) T.Cooke & C.H.Wright	Herb	LC		
Aerva lanata (L.) Juss. ex Schult.	Herb	LC		
Alternanthera sessilis (L.) DC.	Herb	Not Evaluated		
Amaranthus spinosus L.	Herb	Not Evaluated		
Amaranthus viridis L.	Herb	Not Evaluated		
Pupalia lappacea (L.) A.Juss. var. *lappacea*	Herb	LC		
Crinum macowanii Baker	Geophyte	Declining		Sched 8
Crinum moorei Hook.f.	Geophyte	VU	VU	Sched 7
Crinum stuhlmannii Baker	Geophyte	Declining		Sched 8
Scadoxus membranaceus (Baker) Friis & Nordal	Geophyte	LC		
*Scadoxus multiflorus (*Martyn) Raf. subsp. *katharinae* (Baker) Friis & Nordal	Geophyte	LC		
Protorhus longifolia (Bernh.) Engl.	Tree	LC		Sched 8
Schinus terebinthifolius Raddi	Shrub, tree	Not Evaluated		
Sclerocarya birrea (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro	Tree	LC		Schedule 8
Searsia dentata (Thunb.) F.A.Barkley	Shrub, tree	LC		
Searsia gueinzii (Sond.) F.A.Barkley	Shrub, tree	LC		
Searsia nebulosa (Schönland) Moffett *forma nebulosa*	Shrub, tree	Not Evaluated		
Searsia pyroides (Burch.) Moffett var. *pyroides*	[No lifeform defined]	LC		
Searsia rehmanniana (Engl.) Moffett var. *glabrata* (Sond.) Moffett	Shrub	LC		
Searsia rehmanniana (Engl.) Moffett var. *rehmanniana*	Shrub, tree	LC		

Annona senegalensis Pers. subsp. *senegalensis*	Shrub, tree	LC		
Anomodon pseudotristis (Müll.Hal.) Kindb.	Bryophyte	Not Evaluated		
Chlorophytum saundersiae (Baker) Nordal	Herb	LC		
Afrosciadium caffrum (Meisn.) P.J.D.Winter	Herb	LC		
Alepidea peduncularis A.Rich.	Herb	DDT		
Centella asiatica (L.) Urb.	Climber, herb	LC		
Pimpinella caffra (Eckl. & Zeyh.) D.Dietr.	Herb	LC		
Asclepias brevicuspis (E.Mey.) Schltr.	Herb	LC		
Asclepias flexuosa (E.Mey.) Schltr.	Herb	LC		
Aspidoglossum ovalifolium (Schltr.) Kupicha	Herb, succulent	LC		
Brachystelma sandersonii (Oliv.) N.E.Br.	Herb, succulent	VU		Sched 7
Carissa bispinosa (L.) Desf. ex Brenan	Shrub	LC		
Carissa macrocarpa (Eckl.) A.DC.	Shrub	LC		
Catharanthus roseus (L.) G.Don	Herb, shrub	Not Evaluated		
Cynanchum ellipticum (Harv.) R.A.Dyer	Climber	LC		
Gomphocarpus physocarpus E.Mey.	Herb	LC		
Oncinotis tenuiloba Stapf	Climber, shrub	LC		
Raphionacme palustris Venter & R.L.Verh.	Geophyte, herb, succulent	LC		
Rauvolfia caffra Sond.	Tree	LC		
Riocreuxia torulosa (E.Mey.) Decne. var. *torulosa*	Climber	LC		Sched 8
Sarcostemma viminale (L.) R.Br. subsp. *viminale*	Climber, succulent	LC		
Secamone alpini Schult.	Climber	LC		
Secamone filiformis (L.f.) J.H.Ross	Climber	LC		
Sisyranthus compactus N.E.Br.	Herb	LC		
Sisyranthus virgatus E.Mey.	Herb	LC		
Tabernaemontana ventricosa Hochst. ex A.DC.	Tree	LC		
Voacanga thouarsii Roem. & Schult.	Tree	LC		
Ilex mitis (L.) Radlk. var. *mitis*	Shrub, tree	Declining		Sched 8
Gonatopus angustus N.E.Br.	Geophyte, herb	LC		
Pistia stratiotes L.	Herb, hydrophyte	Not Evaluated		
Cussonia sphaerocephala Strey	Succulent, tree	LC		
Cussonia spicata Thunb.	Succulent, tree	LC		
Cussonia zuluensis Strey	Succulent, tree	LC		
Hydrocotyle bonariensis Lam.	Herb, hydrophyte	LC		
Raphia australis Oberm. & Strey	Tree	VU		Sched 7
Asparagus cooperi Baker	Dwarf shrub, shrub	LC		
Asparagus densiflorus (Kunth) Jessop	Dwarf shrub	LC		
Aloe ecklonis Salm-Dyck	Herb, succulent	LC		
Aloe marlothii A.Berger subsp. *orientalis* Glen & D.S.Hardy	Shrub, succulent	LC		
Bulbine lagopus (Thunb.) N.E.Br.	Geophyte, herb, succulent	LC		

Kniphofia laxiflora Kunth	Herb	LC		
Kniphofia littoralis Codd	Herb	NT		Sched 8
Trachyandra asperata Kunth var. *asperata*	Geophyte, succulent	LC		
Trachyandra gerrardii (Baker) Oberm.	Geophyte, succulent	LC		
Ageratum conyzoides L.	Herb	Not Evaluated		
Ambrosia artemisiifolia L.	Herb	Not Evaluated		
Arctotheca populifolia (P.J.Bergius) Norl.	Herb, succulent	LC		
Aspilia natalensis (Sond.) Wild	Herb	LC		
Berkheya rhapontica (DC.) Hutch. & Burtt Davy subsp. *rhapontica*	Herb	LC		
Berkheya speciosa (DC.) O.Hoffm. subsp. *speciosa*	Herb	LC		
Bidens pilosa L.	Herb	Not Evaluated		
Blumea dregeanoides Sch.Bip. ex A.Rich.	Herb	LC		
Brachylaena discolor DC.	Shrub, tree	LC		
Brachylaena uniflora Harv.	Tree	LC		
Chrysanthemoides monilifera (L.) Norl. subsp. *rotundata* (DC.) Norl.	Shrub, succulent	LC		
Cineraria decipiens Harv.	Herb	LC		
Cineraria deltoidea Sond.	Herb, suffrutex	LC		
Cineraria lobata L'Hér. subsp. *lobata*	Suffrutex	LC		
Conyza scabrida DC.	Shrub	LC		
Crassocephalum crepidioides (Benth.) S.Moore	Herb	LC		
Crassocephalum rubens (Juss. ex Jacq.) S.Moore var. *rubens*	Herb	LC		
Cyanthillium cinereum (L.) H.Rob. var. *cinereum*	Herb	Not Evaluated		
Denekia capensis Thunb.	Herb	LC		
Distephanus angulifolius (DC.) H.Rob. & B.Kahn	Climber, shrub	LC		
Eclipta prostrata (L.) L.	Herb	Not Evaluated		
Ethulia conyzoides L.f. subsp. *conyzoides*	Herb, shrub	Not Evaluated		
Ethulia conyzoides L.f. subsp. *kraussii* (Walp.) M.G.Gilbert & C.Jeffrey	Herb	Not Evaluated		
Galinsoga parviflora Cav.	Herb	Not Evaluated		
Gamochaeta coarctata (Willd.) Kerguélen	Herb	Not Evaluated		
Gazania rigens (L.) Gaertn. var. *uniflora* (L.f.) Roessler	Herb	LC		
Gerbera ambigua (Cass.) Sch.Bip.	Herb	LC		
Gerbera piloselloides (L.) Cass.	Herb	LC		
Gnaphalium austroafricanum Hilliard	Herb	LC		
*Helichrysum appendiculatum (*L.f.) Less.	Herb	LC		
Helichrysum aureum (Houtt.) Merr. var. *monocephalum* (DC.) Hilliard	Herb	LC		
Helichrysum candolleanum H.Buek	Herb	LC		
Helichrysum cephaloideum DC.	Herb	LC		

Helichrysum cymosum (L.) D.Don subsp. *cymosum*	Herb, shrub	LC		
Helichrysum decorum DC.	Herb	LC		
Helichrysum foetidum (L.) Moench var. *foetidum*	Herb	Not Evaluated		
Helichrysum kraussii Sch.Bip.	Shrub	LC		
Helichrysum mixtum (Kuntze) Moeser var. *mixtum*	Herb	LC		
Helichrysum nudifolium (L.) Less. var. *nudifolium*	Herb	LC		
Helichrysum ruderale Hilliard & B.L.Burtt	Herb	LC		
Helichrysum stenopterum DC.	Herb	LC		
Helichrysum umbraculigerum Less.	Herb	LC		
Hilliardiella hirsuta (DC.) H.Rob.	Herb	LC		
Lactuca indica L.	Herb	Not Evaluated		
Melanthera scandens (Schumach. & Thonn.) *Roberty subsp. dregei* (DC.) Wild	Herb	Not Evaluated		
Nidorella auriculata DC.	Herb	LC		
Nidorella linifolia DC.	Herb	LC		
Nidorella resedifolia DC. subsp. *resedifolia*	Herb	LC		
Nidorella tongensis Hilliard	Herb, succulent	EN		
Osteospermum grandidentatum DC.	Herb	LC		
Pseudognaphalium luteo-album (L.) Hilliard & B.L.Burtt	Herb			
Pseudognaphalium oligandrum (DC.) Hilliard & B.L.Burtt	Herb	LC		
Senecio deltoideus Less.	Herb, scrambler	LC		
Senecio glaberrimus DC.	Herb	LC		
Senecio latifolius DC.	Herb	LC		
Senecio ngoyanus Hilliard	Herb	VU		Sched 7
Senecio oxyriifolius DC. subsp. *oxyriifolius*	Herb, succulent	LC		
Senecio polyanthemoides Sch.Bip.	Herb	LC		
Senecio pterophorus DC.	Herb, shrub	LC		
Senecio serratuloides DC.	Herb	LC		
Senecio skirrhodon DC.	Herb, succulent	LC		
Senecio speciosus Willd.	Herb	LC		
Sonchus oleraceus L.	Herb	Not Evaluated		
Tagetes minuta L.	Herb	Not Evaluated		
Tarchonanthus parvicapitulatus P.P.J.Herman	Shrub, tree	LC		
Vernonia inhacensis G.V.Pope	Climber, scrambler, shrub	LC		
Azolla pinnata R.Br. subsp. *africana* (Desv.) R.M.K.Saunders & K.Fowler	Herb, hydrophyte	LC		
Impatiens walleriana Hook.f.	Herb	Not Evaluated		
Philonotis dregeana (Müll.Hal.) A.Jaeger	Bryophyte	Not Evaluated		
Stenochlaena tenuifolia (Desv.) T.Moore	Climber, herb	LC		
Bryum canariense Brid.	Bryophyte	Not		

		Evaluated		
Bryum dichotomum Hedw.	Bryophyte	Not Evaluated		
Rhodobryum commersonii (Schwägr.) Paris	Bryophyte	Not Evaluated		
Commiphora harveyi (Engl.) Engl.	Shrub, tree	LC		
Commiphora woodii Engl.	Tree	LC		Sched 8
Wahlenbergia abyssinica (Hochst. ex A.Rich.) Thulin subsp. *abyssinica*	Herb	LC		
Wahlenbergia undulata (L.f.) A.DC.	Herb	LC		
Boscia foetida Schinz subsp. *filipes* (Gilg) Lotter	Shrub	LC		
Cadaba natalensis Sond.	Shrub, tree	LC		
Allocassine laurifolia (Harv.) N.Robson	Climber, shrub	LC		
Elaeodendron croceum (Thunb.) DC.	Tree	LC		Sched 8
Gymnosporia arenicola Jordaan	Shrub, tree	LC		
Gymnosporia heterophylla (Eckl. & Zeyh.) Loes.	Dwarf shrub, shrub	LC		
Gymnosporia nemorosa (Eckl. & Zeyh.) Szyszyl.	Shrub, tree	LC		
Maytenus acuminata (L.f.) Loes. var. *acuminata*	Shrub, tree	LC		
Maytenus procumbens (L.f.) Loes.	Dwarf shrub, shrub, tree	LC		
Mystroxylon aethiopicum (Thunb.) Loes. *subsp. aethiopicum*	Shrub, tree	LC		
Robsonodendron eucleiforme (Eckl. & Zeyh.) R.H.Archer	Tree	LC		
Salacia gerrardii Harv. ex Sprague	Climber	LC		
Trema orientalis (L.) Blume	Shrub, tree	LC		
Ceratophyllum demersum L. var. *demersum*	Hydrophyte	LC		
Sarcocornia natalensis (Bunge ex Ung.-Sternb.) A.J.Scott var. *natalensis*	Dwarf shrub, succulent	LC		
Sarcocornia perennis (Mill.) A.J.Scott var. *perennis*	Dwarf shrub, succulent	LC		
Parinari capensis Harv. subsp. *incohata* F.White	Dwarf shrub	LC		
Gloriosa superba L.	Climber, geophyte	LC		
Leptogium cyanescens (Ach.) Körb. var. *cyanescens*	Lichen	Not Evaluated		
Combretum bracteosum (Hochst.) Engl. & Diels	Climber, shrub, tree	LC		
Combretum kraussii Hochst.	Shrub, tree	LC		
Combretum molle R.Br. ex G.Don	Tree	LC		
Aneilema aequinoctiale (P.Beauv.) Loudon	Herb	LC		
Commelina africana L. var. *lancispatha* C.B.Clarke	Herb	LC		
Commelina benghalensis L.	Herb	LC		
Commelina diffusa Burm.f. subsp. *diffusa*	Helophyte, herb	LC		
Commelina erecta L.	Herb	LC		
Cyanotis speciosa (L.f.) Hassk.	Herb, succulent	LC		
Murdannia simplex (Vahl) Brenan	Herb	LC		
Astripomoea malvacea (Klotzsch) A.Meeuse var. *malvacea*	Dwarf shrub, herb	LC		
Hewittia malabarica (L.) Suresh	Climber, herb	LC		
Ipomoea alba L.	Climber, herb	Not		

		Evaluated		
Ipomoea cairica (L.) Sweet var. *cairica*	Climber, herb, succulent	LC		
Ipomoea pes-caprae (L.) R.Br. subsp. *brasiliensis* (L.) Ooststr.	Herb	LC		

APPENDIX 2. Development implications for areas with Red Listed/Protected plant species (after Raimondo *et al.*, 2009).

Critically Endangered (CR):

Implications for development: RED LIST SPECIES: No further loss of natural habitat should be permitted as the species is on the verge of extinction. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Endangered (EN):

Implications for development: RED LIST SPECIES:

Case A: If the species has a restricted range (EOO < 2 000 km2), recommend no further loss of habitat. If range size is larger, the species is possibly long- lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003), and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Case B, C, D: No further loss of habitat should be permitted as the species is likely to go extinct in the near future if current pressures continue. All remaining subpopulations have to be conserved if this species is to survive in the long term.

Vulnerable (VU):

Implications for development: RED LIST SPECIES:

Case D: This species either constitutes less than 1 000 individuals or is known from a very restricted range. No further loss of habitat should be permitted as the species' status will immediately become either Critically Endangered or Endangered, should habitat be lost. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Case B, C: The species is approaching extinction but there are still a number of subpopulations in existence. Recommend no further loss of habitat as this will increase the extinction risk of the species.

Case A: If the species has a restricted range, EOO < 2 000 km2, recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the Protected Areas Act, and provided that the subpopulation to be destroyed does not occur (i)

within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Near Threatened (NT):

Implications for development: ORANGE LIST SPECIES:
Case D: Currently known from fewer than 10 locations, therefore preferably recommend no loss of habitat. Should loss of this species' habitat be considered, then an offset that includes conserving another viable subpopulation (in terms of the Protected Areas Act) should be implemented, provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Case B, C: The species is approaching thresholds for listing as threatened but there are still a number of subpopulations in existence and therefore there is need to minimise loss of habitat. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Case A: If the species has a restricted range, EOO < 2 000 km2, then recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant biodiversity conservation plan or (iii) on a site associated with additional ecological sensitivities.

Critically Rare:

Implications for development: ORANGE LIST SPECIES: This is a highly range-restricted species, known from single or isolated sites, and therefore no loss of habitat should be permitted as it may lead to extinction of the species. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Rare:

Implications for development: ORANGE LIST SPECIES: The species is likely to have a restricted range, or be highly habitat specific, or have small numbers of individuals, all of which makes it vulnerable to extinction should it lose habitat. Recommend no loss of habitat. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Declining:

Implications for development: ORANGE LIST SPECIES: The species is declining but the population has not yet reached a threshold of concern; limited loss of habitat may be permitted. Should the species is known to be used for traditional medicine and if individuals will not be conserved in situ, plants should be rescued and used as mother stock for medicinal plant cultivation programmes.

Data Deficient - Insufficient Information (DDD)

Implications for development: ORANGE LIST SPECIES:

Case D: This species is very poorly known, with insufficient information on its habitat, population status or distribution to assess it. However, it is highly likely to be threatened. If a Data Deficient species will be affected by a proposed activity, the subpopulation should be well surveyed and the data sent to the Threatened Species Programme. The species will be reassessed and the new status of the species, with a recommendation, will be provided within a short timeframe. The Threatened Species Programme must be informed immediately, providing details of the location, size and threats to the subpopulation.

Case T: There is uncertainty regarding the taxonomic status of this species, but it is likely to be threatened. Contact the taxonomist working on this group to resolve its taxonomic status; the species will then be reassessed by the Threatened Species Programme.

Data Deficient - Taxonomically Problematic (DDT):

Implications for development: GREEN LIST SPECIES: Implications for development: GREEN LIST SPECIES: Development is not expected to affect the conservation status of this species. Species removal may still be subject to provincial or national legislation.

APPENDIX 3. A checklist of mammal species for the QDS 2831DD.

		CONSERVATION STATUS			
COMMON NAME	SCIENTIFIC NAME	NATIONAL RED LIST CATEGORY (2016)	NEMBA (2015)	KZN-EBPA (2014)	CITES LISTING
African mole-rat	*Cryptomys hottentotus*	LC			
African striped weasel	*Poecilogale albinucha*	NT		Sched 3	
Angolan free-tailed bat	*Mops condylurus*	LC			
Banana bat	*Neoromicia nana*	LC			
Banded mongoose	*Mungos mungo*	LC		Sched 3	
Botswana long-eared bat	*Laephotis botswanae*	LC		Sched 3	
Brants'climbing mouse	*Dendromus mesomelas*	LC			
Cape serotine	*Neoromicia capensis*	LC			
Chestnut climbing mouse	*Dendromus mystacalis*	LC			
Common duiker	*Sylvicapra grimmia*	LC			
Dusky pipistrelle	*Pipistrellus hesperidus*	LC			
Egyptian free-tailed bat	*Tadarida aegyptiaca*	LC			
Egyptian slit-faced bat	*Nycteris thebaica*	LC			
Greater dwarf shrew	*Suncus lixus*	LC			
Greater red musk shrew	*Crocidura flavescens*	LC			
Green house bat	*Scotophilus viridis*	LC			
Grey climbing mouse	*Dendromus melanotis*	LC			
Hairy slit-faced bat	*Nycteris hispida*	LC		Sched 3	
Highveld gerbil	*Gerbilliscus brantsii*	LC			
Hottentot golden mole	*Amblysomus hottentotus*	LC			
Krebs's fat mouse	*Steatomys krebsii*	LC			
Laminate vlei rat	*Otomys laminatus*	NT			
Large-eared slit-faced bat	*Nycteris macrotis*	LC			
Large-spotted genet	*Genetta tigrina*	LC			
Least dwarf shrew	*Suncus infinitesimus*	LC			
Lesser dwarf shrew	*Suncus varilla*	LC			
Lesser grey-brown musk shrew	*Crocidura silacea*	LC			
Lesser red musk shrew	*Crocidura hirta*	LC			
Little free-tailed bat	*Chaerephon pumilus*	LC			
Marsh mongoose	*Atilax paludinosus*	LC			
Mauritian tomb bat	*Taphozous mauritianus*	LC			
Natal multimammate mouse	*Mastomys natalensis*	LC			
Percival's short-eared trident bat	*Cloeotis percivali*	EN		Sched 3	
Peters's epauletted fruit bat	*Epomophorus crypturus*	LC			
Pygmy mouse	*Mus minutoides*	LC			
Reddish-grey musk shrew	*Crocidura cyanea*	LC			
Sclater's forest shrew	*Myosorex sclateri*	VU		Sched 3	
Scrub hare	*Lepus saxatillis*	LC			
Slender mongoose	*Herpestes sanguineus*	LC			

Steenbok	*Raphicerus campestris*	LC			
Swamp musk shrew	*Crocidura mariquensis*	NT			
Tete veld rat	*Aethomys ineptus*	LC			
Thomas's house bat	*Scotoecus albofuscus*	NT		Sched 3	
Variegated butterfly bat	*Glauconycteris variegata*	LC		Sched 3	
Vervet monkey	*Chlorocebus pygerythrus*	LC		Sched 3	II
Vlei rat	*Otomys irroratus*	LC			
Wahlberg's epauletted fruit bat	*Epomophorus wahlbergi*	LC		Sched 3	
White-tailed mouse	*Mystromys albicaudatus*	VU		Sched 3	
Woodland dormouse	*Graphiurus murinus*	LC			
Yellow-bellied house bat	*Scotophilus dinganii*	LC		Sched 3	

APPENDIX 4. A checklist of reptile and frog species for the QDS 2831DD.

COMMON NAME	SCIENTIFIC NAME	RED LIST CATEGORY (SARCA 2014)	NEMBA (2015)	KZN-EBPA (2014)
Reptiles				
Black file snake	*Gonionotophis nyassae*	LC		
Black-headed Centipede-eater	*Aparallactus capensis*	LC		
Boomslang	*Dispholidus typus typus*	LC		
Brown house snake	*Boaedon capensis*	LC		
Brown water snake	*Lycodonomorphus rufulus*	LC		
Cape wolf snake	*Lycophidion capense capense*	LC		
Common dwarf gecko	*Lygodactylus capensis capensis*	LC		
Common file snake	*Gonionotophis capensis capensis*	LC		
Common Flap-neck Chameleon	*Chamaeleo dilepis dilepis*	LC		
Common Purple-glossed Snake	*Amblyodipsas polylepis polylepis*	LC		
Common tropical house gecko	*Hemidactylus mabouia*	LC		
Eastern coastal skink	*Trachylepis depressa*	LC		
Eastern natal green snake	*Philothamnus natalensis natalensis*	LC		
Giant legless skink	*Acontias plumbeus*	LC		
Mozambique spitting cobra	*Naja mossambica*	LC		
Nile crocodile	*Crocodylus niloticus*	VU	VU	Sched 3
Olive grass snake	*Psammophis mossambicus*	LC		
Olive house snake	*Lycodonomorphus inornatus*	LC		
Red-lipped Snake	*Crotaphopeltis hotamboeia*	LC		
Rhombic Egg-eater	*Dasypeltis scabra*	LC		
Rhombic night adder	*Causus rhombeatus*	LC		
Snouted cobra	*Naja annulifera*	LC		
South eastern green snake	*Philothamnus hoplogaster*	LC		
Southern tree agama	*Acanthocercus atricollis atricollis*	LC		
Southern twig snake	*Thelotornis capensis capensis*	LC		
Spotted bush snake	*Philothamnus semivariegatus*	LC		
Striped skink	*Trachylepis striata*	LC		
Variable hinged terrapin	*Pelusios rhodesianus*	LC		
Variable skink	*Trachylepis varia*	LC		
Variegated Slug-eater	*Duberria variegata*	LC		
Wahlberg's Snake-eyed Skink	*Panaspis wahlbergii*	LC		
Water monitor	*Varanus niloticus*	LC		Sched 3
Pondo flat gecko	*Afroedura pondolia*	LC		
Wahberg's velvet gecko	*Homopholis wahlbergii*	LC		
Spotted gecko	*Pachydactylus maculatus*	LC		

Van Son's thick-toed gecko	*Pachydactylus vansoni*	LC		
Delalande's sandveld lizard	*Nucras lalandii*	LC		
Cape grass lizard	*Chamaesaura anguina anguina*	LC		
Large-scaled grass lizard	*Chamaesaura macrolepis*	NT		
Common girdled lizard	*Cordylus vittifer*	LC		
Yellow-throated plated lizard	*Gerrhosaurus flavigularis*	LC		
Eastern long-tailed seps	*Tetradactylus africanus*	LC		
Cape skink	*Trachylepis capensis*	LC		
Rainbow skink	*Trachylepis margaritifer*	LC		
Mozambique dwarf burrowing skink	*Scelotes mossambicus*	LC		
Southern rock monitor	*varanus albigularis albigularis*	LC		Sched 3
Umlalazi dwarf chameleon	*Bradypodion caeruleogula*	EN		
Distant's ground agama	*Agama aculeata distanti*	LC		
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (SAFAP 2004)**	**NEMBA (2015)**	**KZN-EBPA (2014)**
Frogs				
African bull frog	*Pyxicephalus edulis*	LC		
Argus reed frog	*Hyperolius argus*	LC		
Banded rubber frog	*Phrynomantis bifasciatus*	LC		
Broadbanded grass frog	*Ptychadena mossambica*	LC		
Brownbacked tree frog	*Leptopelis mossambicus*	LC		
Bubbling kassina	*Kassina senegalensis*	LC		
Bush squeaker	*Arthroleptis wahlbergi*	LC		
Bushveld rain frog	*Breviceps adspersus*	LC		
Clicking stream frog	*Strongylopus grayii*	LC		
Common platanna	*Xenopus laevis*	LC		
Delalande's river frog	*Amietia delalandii*	LC		
Delicate Leaf-folding Frog	*Afrixalus delicates*	LC		
Dwarf puddle frog	*Phrynobatrachus mababiensis*	LC		
Greater Leaf-folding Frog	*Afrixalus fornasinii*	LC		
Guttural toad	*Sclerophrys gutturalis*	LC		
Mozambique rain frog	*Breviceps mossambicus*	LC		
Natal Leaf-folding Frog	*Afrixalus spinifrons*	VU		Sched 3
Natal sand frog	*Tomopterna natalensis*	LC		
Olive toad	*Sclerophrys garmani*	LC		
Painted reed frog	*Hyperolius marmoratus*	LC		
Pickersgill's reed frog	*Hyperolius pickersgilli*	EN		Sched 3
Plain grass frog	*Ptychadena anchietae*	LC		
Red toad	*Schismaderma carens*	LC		
Redlegged kassina	*Kassina maculate*	LC		
Sharp-headed Long Reed Frog	*Hyperolius microps*	LC		
Sharpnosed grass frog	*Ptychadena oxyrhynchus*	LC		

Shovel-footed Squeaker	*Arthroleptis stenodactylus*	LC		
Snoring puddle frog	*Phrynobatrachus natalensis*	LC		
Southern foam nest frog	*Chiromantis xerampelina*	LC		
Spotted Shovel-nosed Frog	*Hemisus guttatus*	VU		Sched 3
Stiped caco	*Cacosternum striatum*	DD		
Striped grass frog	*Ptychadena porosissima*	LC		
Striped stream frog	*Strongylopus fasciatus*	LC		
Tinker reed frog	*Hyperolius tuberilinguis*	LC		
Tremelo sand frog	*Tomopterna cryptotis*	LC		
Water lily frog	*Hyperolius pusillus*	LC		
Whistling rain frog	*Breviceps sopranus*	DD		
Yellowstriped reed frog	*Hyperolius semidiscus*	LC		

APPENDIX 5. A checklist of bird species for the pentads 2845_3155; 2850_3155; 2850_3200.

			CONSERVATION STATUS		
	COMMON NAME	SCIENTIFIC NAME	IUCN RED LIST REGIONAL/ GLOBAL	NEMBA (2015)	KZNEPBA (2014)
	Apalis Rudd's	*Apalis ruddi*			Sched 3
	Apalis Yellow-breasted	*Apalis flavida*			
	Apalis Bar-throated	*Apalis thoracica*			
	Avocet Pied	*Recurvirostra avosetta*			
	Barbet Black-collared	*Lybius torquatus*			
	Barbet White-eared	*Stactolaema leucotis*			
	Barbet Crested	*Trachyphonus vaillantii*			
	Batis Cape	*Batis capensis*			
	Batis Chinspot	*Batis molitor*			
	Bee-eater Blue-cheeked	*Merops persicus*			
	Bee-eater White-fronted	*Merops bullockoides*			
	Bee-eater Little	*Merops pusillus*			
	Bee-eater European	*Merops apiaster*			
	Bishop Southern Red	*Euplectes orix*			
	Bishop Yellow-crowned	*Euplectes afer*			Sched 3
	Bittern Little	*Ixobrychus minutus*			Sched 3
	Boubou Southern	*Laniarius ferrugineus*			
	Brownbul Terrestrial	*Phyllastrephus terrestris*			
	Brubru Brubru	*Nilaus afer*			
	Bulbul Dark-capped	*Pycnonotus tricolor*			
	Bunting Cinnamon-breasted	*Emberiza tahapisi*			Sched 3
	Bunting Golden-breasted	*Emberiza flaviventris*			Sched 3
	Bush-shrike Orange-breasted	*Telophorus sulfureopectus*			
	Bush-shrike Olive	*Telophorus olivaceus*			
	Bush-shrike Gorgeous	*Telophorus quadricolor*			
	Bush-shrike Grey-headed	*Malaconotus blanchoti*			
	Bustard Black-bellied	*Lissotis melanogaster*			Sched 3
	Bustard Denham's	*Neotis denhami*		VU	Sched 3/ Protected
	Buttonquail Kurrichane	*Turnix sylvaticus*			Sched 3
*	Buzzard Jackal	*Buteo rufofuscus*			Sched 3
	Buzzard Steppe	*Buteo vulpinus*			Sched 3
	Buzzard Lizard	*Kaupifalco monogrammicus*			Sched 3
	Camaroptera Green-backed	*Camaroptera brachyura*			
	Canary Cape	*Serinus canicollis*			Sched 3
	Canary Yellow-fronted	*Crithagra mozambicus*			
	Canary Brimstone	*Crithagra sulphuratus*			Sched 3
	Chat Familiar	*Cercomela familiaris*			
	Cisticola Zitting	*Cisticola juncidis*			

	Cisticola Rattling	*Cisticola chiniana*			
	Cisticola Red-faced	*Cisticola erythrops*			
	Cisticola Croaking	*Cisticola natalensis*			
	Cisticola Lazy	*Cisticola aberrans*			
	Cisticola Rufous-winged	*Cisticola galactotes*			
	Coot Red-knobbed	*Fulica cristata*			
	Cormorant White-breasted	*Phalacrocorax carbo*			
	Cormorant Reed	*Phalacrocorax africanus*			
	Cormorant Cape	*Phalacrocorax capensis*	EN/EN		
	Coucal Burchell's	*Centropus burchellii*			
	Coucal White-browed	*Centropus superciliosus*			
	Courser Bronze-winged	*Rhinoptilus chalcopterus*			
	Crake Baillon's	*Porzana pusilla*			
	Crake Black	*Amaurornis flavirostris*			
	Crane Grey Crowned	*Balearica regulorum*	EN/EN	EN	EN/ Sched 3
	Crested-flycatcher Blue-mantled	*Trochocercus cyanomelas*			
	Crombec Long-billed	*Sylvietta rufescens*			
	Crow Pied	*Corvus albus*			
	Crow Cape	*Corvus capensis*			
	Crow House	*Corvus splendens*			
	Cuckoo Red-chested	*Cuculus solitarius*			
	Cuckoo Klaas's	*Chrysococcyx klaas*			
	Cuckoo Diderick	*Chrysococcyx caprius*			
	Cuckoo Black	*Cuculus clamosus*			
	Cuckoo Jacobin	*Clamator jacobinus*			
	Cuckoo African Emerald	*Chrysococcyx cupreus*			
	Cuckoo-shrike Black	*Campephaga flava*			
	Curlew Eurasian	*Numenius arquata*	NT/NT		
	Darter African	*Anhinga rufa*			
	Dove Red-eyed	*Streptopelia semitorquata*			
	Dove Laughing	*Streptopelia senegalensis*			
	Dove Namaqua	*Oena capensis*			Sched 3
	Dove Tambourine	*Turtur tympanistria*			Sched 3
	Dove Lemon	*Aplopelia larvata*			Sched 3
	Dove Rock	*Columba livia*			
	Drongo Fork-tailed	*Dicrurus adsimilis*			
	Drongo Square-tailed	*Dicrurus ludwigii*			
	Duck Yellow-billed	*Anas undulata*			
	Duck White-faced	*Dendrocygna viduata*			
	Duck White-backed	*Thalassornis leuconotus*			Sched 3
	Duck African Black	*Anas sparsa*			Sched 3
	Duck Fulvous	*Dendrocygna bicolor*			

	Eagle Long-crested	*Lophaetus occipitalis*			Sched 3
	Eagle African Crowned	*Stephanoaetus coronatus*	VU/NT		Sched 3
	Eagle-owl Spotted	*Bubo africanus*			Sched 3
	Egret Great	*Egretta alba*			Sched 3
	Egret Little	*Egretta garzetta*			Sched 3
	Egret Yellow-billed	*Egretta intermedia*			Sched 3
	Egret Cattle	*Bubulcus ibis*			Sched 3
	Falcon Lanner	*Falco biarmicus*	VU/LC		Sched 3
	Falcon Peregrine	*Falco peregrinus*			Sched 3
	Falcon Amur	*Falco amurensis*			Sched 3
	Finfoot African	*Podica senegalensis*	VU/LC		VU/ Sched 3
	Firefinch African	*Lagonosticta rubricata*			Sched 3
	Firefinch Red-billed	*Lagonosticta senegala*			Sched 3
	Fiscal Common (Southern)	*Lanius collaris*			
	Fish-eagle African	*Haliaeetus vocifer*			
	Flamingo Greater	*Phoenicopterus ruber*	NT/LC		Sched 3
	Flamingo Lesser	*Phoenicopterus minor*	NT/NT		Sched 3
	Flufftail Buff-spotted	*Sarothrura elegans*			Sched 3
	Flycatcher Spotted	*Muscicapa striata*			
	Flycatcher African Dusky	*Muscicapa adusta*			
	Flycatcher Ashy	*Muscicapa caerulescens*			
	Flycatcher Southern Black	*Melaenornis pammelaina*			
(*)	Flycatcher Fiscal	*Sigelus silens*			
	Flycatcher Pale	*Bradornis pallidus*			
	Gannet Cape	*Morus capensis*			
	Godwit Bar-tailed	*Limosa lapponica*			
	Goose Spur-winged	*Plectropterus gambensis*			
	Goose Egyptian	*Alopochen aegyptiacus*			
	Goshawk African	*Accipiter tachiro*			Sched 3
	Grebe Little	*Tachybaptus ruficollis*			
	Greenbul Yellow-bellied	*Chlorocichla flaviventris*			
	Greenbul Sombre	*Andropadus importunus*			
	Green-pigeon African	*Treron calvus*			
	Greenshank Common	*Tringa nebularia*			
	Ground-thrush Spotted	*Zoothera guttata*			
	Guineafowl Helmeted	*Numida meleagris*			
	Guineafowl Crested	*Guttera edouardi*			Sched 3
	Gull Kelp	*Larus dominicanus*			
	Gull Grey-headed	*Larus cirrocephalus*			
	Gull Hartlaub's	*Larus hartlaubii*			
	Hamerkop Hamerkop	*Scopus umbretta*			Sched 3
	Harrier-Hawk African	*Polyboroides typus*			Sched 3

	Hawk African Cuckoo	*Aviceda cuculoides*			Sched 3
	Heron Grey	*Ardea cinerea*			Sched 3
	Heron Black-headed	*Ardea melanocephala*			Sched 3
	Heron Goliath	*Ardea goliath*			Sched 3
	Heron Purple	*Ardea purpurea*			Sched 3
	Heron Squacco	*Ardeola ralloides*			Sched 3
	Heron Green-backed	*Butorides striata*			Sched 3
	Heron Black	*Egretta ardesiaca*			Sched 3
	Hobby Eurasian	*Falco subbuteo*			
	Honeybird Brown-backed	*Prodotiscus regulus*			
	Honey-buzzard European	*Pernis apivorus*			
	Honeyguide Greater	*Indicator indicator*			
	Honeyguide Scaly-throated	*Indicator variegatus*			
	Honeyguide Lesser	*Indicator minor*			
	Hoopoe African	*Upupa africana*			
	Hornbill Trumpeter	*Bycanistes bucinator*			
	House-martin Common	*Delichon urbicum*			
	Ibis African Sacred	*Threskiornis aethiopicus*			
	Ibis Hadeda	*Bostrychia hagedash*			
	Ibis Glossy	*Plegadis falcinellus*			
	Indigobird Dusky	*Vidua funerea*			
	Indigobird Village	*Vidua chalybeata*			
	Jacana African	*Actophilornis africanus*			Sched 3
	Jacana Lesser	*Microparra capensis*	VU/LC		Sched 3
	Kingfisher Pied	*Ceryle rudis*			
	Kingfisher Giant	*Megaceryle maximus*			
	Kingfisher Malachite	*Alcedo cristata*			
	Kingfisher Mangrove	*Halcyon senegaloides*	EN/LC		VU/ Sched 3
	Kingfisher Brown-hooded	*Halcyon albiventris*			
	Kingfisher Striped	*Halcyon chelicuti*			
	Kingfisher Half-collared	*Alcedo semitorquata*	NT/LC		Sched 3
	Kite Yellow-billed	*Milvus aegyptius*			
	Kite Black-shouldered	*Elanus caeruleus*			Sched 3
	Kite Black	*Milvus migrans*			Sched 3
	Knot Red	*Calidris canutus*	LC/NT		
	Lapwing Crowned	*Vanellus coronatus*			
	Lapwing Blacksmith	*Vanellus armatus*			
	Lapwing African Wattled	*Vanellus senegallus*			
	Lapwing Black-winged	*Vanellus melanopterus*			Sched 3
	Lark Rufous-naped	*Mirafra africana*			
	Lark Sabota	*Calendulauda sabota*			
	Longclaw Cape	*Macronyx capensis*			

	Longclaw Yellow-throated	*Macronyx croceus*			
	Malkoha Green	*Ceuthmochares australis*			
	Mannikin Bronze	*Spermestes cucullatus*			
	Mannikin Red-backed	*Spermestes bicolor*			Sched 3
	Marsh-harrier African	*Circus ranivorus*			
	Martin Rock	*Hirundo fuligula*			
	Martin Sand	*Riparia riparia*			
	Martin Brown-throated	*Riparia paludicola*			
	Martin Banded	*Riparia cincta*			
	Masked-weaver Lesser	*Ploceus intermedius*			
	Masked-weaver Southern	*Ploceus velatus*			
	Moorhen Common	*Gallinula chloropus*			
	Mousebird Speckled	*Colius striatus*			
	Mousebird Red-faced	*Urocolius indicus*			
	Myna Common	*Acridotheres tristis*			
	Neddicky Neddicky	*Cisticola fulvicapilla*			
	Nicator Eastern	*Nicator gularis*			
	Night-Heron Black-crowned	*Nycticorax nycticorax*			
	Nightjar European	*Caprimulgus europaeus*			
	Nightjar Fiery-necked	*Caprimulgus pectoralis*			
	Nightjar Square-tailed	*Caprimulgus fossii*			
	Olive-pigeon African	*Columba arquatrix*			
	Openbill African	*Anastomus lamelligerus*			Sched 3
	Oriole Eurasian Golden	*Oriolus oriolus*			
	Oriole Black-headed	*Oriolus larvatus*			
	Osprey Osprey	*Pandion haliaetus*			Sched 3
	Owl Barn	*Tyto alba*			Sched 3
	Owl Marsh	*Asio capensis*			Sched 3
	Painted-snipe Greater	*Rostratula benghalensis*	NA/NT		Sched 3
	Palm-swift African	*Cypsiurus parvus*			
	Paradise-flycatcher African	*Terpsiphone viridis*			
	Pelican Great White	*Pelecanus onocrotalus*	VU/LC		
	Pelican Pink-backed	*Pelecanus rufescens*	VU/LC		
	Petronia Yellow-throated	*Petronia superciliaris*			
	Pigeon Speckled	*Columba guinea*			
	Pipit African	*Anthus cinnamomeus*			
	Plover Common Ringed	*Charadrius hiaticula*			
	Plover White-fronted	*Charadrius marginatus*			
	Plover Kittlitz's	*Charadrius pecuarius*			
	Plover Three-banded	*Charadrius tricollaris*			
	Plover Grey	*Pluvialis squatarola*			
	Plover Lesser Sand	*Charadrius mongolus*			
	Plover Greater Sand	*Charadrius leschenaultii*			

	Pochard Southern	*Netta erythrophthalma*			
	Pratincole Collared	*Glareola pratincola*			Sched 3
	Prinia Tawny-flanked	*Prinia subflava*			
	Puffback Black-backed	*Dryoscopus cubla*			
	Pygmy-Goose African	*Nettapus auritus*	VU/LC		
	Pygmy-Kingfisher African	*Ispidina picta*			
	Quail Common	*Coturnix coturnix*			
	Quailfinch African	*Ortygospiza atricollis*			Sched 3
	Quelea Red-billed	*Quelea quelea*			
	Quelea Red-headed	*Quelea erythrops*			
	Rail African	*Rallus caerulescens*			
	Reed-warbler Great	*Acrocephalus arundinaceus*			
	Reed-warbler African	*Acrocephalus baeticatus*			
SLS	Robin-chat Chorister	*Cossypha dichroa*			
	Robin-chat Red-capped	*Cossypha natalensis*			
	Robin-chat Cape	*Cossypha caffra*			
	Roller European	*Coracias garrulus*	NT/LC		
	Roller Broad-billed	*Eurystomus glaucurus*			
	Ruff Ruff	*Philomachus pugnax*			
	Rush-warbler Little	*Bradypterus baboecala*			
	Sanderling Sanderling	*Calidris alba*			
	Sandpiper Curlew	*Calidris ferruginea*	LC/NT		
	Sandpiper Common	*Actitis hypoleucos*			
	Sandpiper Marsh	*Tringa stagnatilis*			
	Sandpiper Wood	*Tringa glareola*			
	Sandpiper Terek	*Xenus cinereus*			
	Saw-wing Black (Southern race)	*Psalidoprocne holomelaena*			
	Scrub-robin White-browed	*Cercotrichas leucophrys*			
(*)	Scrub-robin Brown	*Cercotrichas signata*			
	Shoveler Cape	*Anas smithii*			
	Shrike Red-backed	*Lanius collurio*			
	Snake-eagle Brown	*Circaetus cinereus*			
	Snake-eagle Black-chested	*Circaetus pectoralis*			
	Snake-eagle Southern Banded	*Circaetus fasciolatus*	CR/NT		
	Snipe African	*Gallinago nigripennis*			Sched 3
	Sparrow House	*Passer domesticus*			
	Sparrow Southern Grey-headed	*Passer diffusus*			
	Sparrowhawk Black	*Accipiter melanoleucus*			Sched 3
	Sparrowhawk Little	*Accipiter minullus*			Sched 3
	Spoonbill African	*Platalea alba*			
	Spurfowl Swainson's	*Pternistis swainsonii*			
	Spurfowl Natal	*Pternistis natalensis*			

	Starling Wattled	*Creatophora cinerea*			
	Starling Violet-backed	*Cinnyricinclus leucogaster*			
	Starling Cape Glossy	*Lamprotornis nitens*			
	Starling Black-bellied	*Lamprotornis corruscus*			
	Starling Red-winged	*Onychognathus morio*			
	Starling Common	*Sturnus vulgaris*			
	Stilt Black-winged	*Himantopus himantopus*			
	Stint Little	*Calidris minuta*			
	Stonechat African	*Saxicola torquatus*			
	Stork Yellow-billed	*Mycteria ibis*	EN/LC		Sched 3
	Stork Woolly-necked	*Ciconia episcopus*			Sched 3
	Stork White	*Ciconia ciconia*			Sched 3
	Stork Saddle-billed	*Ephippiorhynchus senegalensis*	EN/LC		Sched 3
	Sunbird Purple-banded	*Cinnyris bifasciatus*			
	Sunbird White-bellied	*Cinnyris talatala*			
	Sunbird Grey	*Cyanomitra veroxii*			
	Sunbird Olive	*Cyanomitra olivacea*			
	Sunbird Collared	*Hedydipna collaris*			
	Sunbird Amethyst	*Chalcomitra amethystina*			
	Sunbird Scarlet-chested	*Chalcomitra senegalensis*			
	Swallow Barn	*Hirundo rustica*			
	Swallow White-throated	*Hirundo albigularis*			
	Swallow Wire-tailed	*Hirundo smithii*			
	Swallow Red-breasted	*Hirundo semirufa*			
	Swallow Lesser Striped	*Hirundo abyssinica*			
	Swallow Grey-rumped	*Pseudhirundo griseopyga*			
	Swallow Greater Striped	*Hirundo cucullata*			
	Swamphen African Purple	*Porphyrio madagascariensis*			
	Swamp-warbler Lesser	*Acrocephalus gracilirostris*			
	Swift African Black	*Apus barbatus*			
	Swift White-rumped	*Apus caffer*			
	Swift Little	*Apus affinis*			
	Tchagra Black-crowned	*Tchagra senegalus*			
	Teal Red-billed	*Anas erythrorhyncha*			
	Teal Cape	*Anas capensis*			Sched 3
	Teal Hottentot	*Anas hottentota*			
	Tern Caspian	*Sterna caspia*	VU/LC		Sched 3
	Tern Common	*Sterna hirundo*			
	Tern Sandwich	*Sterna sandvicensis*			
	Tern Lesser Crested	*Sterna bengalensis*			
	Tern Swift	*Sterna bergii*			
	Tern Little	*Sterna albifrons*			
	Tern White-winged	*Chlidonias leucopterus*			

	Tern Whiskered	*Chlidonias hybrida*			
	Tern Black	*Chlidonias niger*			
	Thick-knee Water	*Burhinus vermiculatus*			
	Thick-knee Spotted	*Burhinus capensis*			
	Thrush Kurrichane	*Turdus libonyanus*			
	Thrush Groundscraper	*Psophocichla litsipsirupa*			
	Tinkerbird Red-fronted	*Pogoniulus pusillus*			
	Tinkerbird Yellow-rumped	*Pogoniulus bilineatus*			
	Tit Southern Black	*Parus niger*			
	Tit-flycatcher Grey	*Myioparus plumbeus*			
	Trogon Narina	*Apaloderma narina*			
	Turaco Purple-crested	*Gallirex porphyreolophus*			Sched 3
	Turaco Livingstone's	*Tauraco livingstonii*			Sched 3
	Turnstone Ruddy	*Arenaria interpres*			
	Turtle-dove Cape	*Streptopelia capicola*			
	Twinspot Green	*Mandingoa nitidula*			Sched 3
	Vulture Palm-nut	*Gypohierax angolensis*			Sched 3
	Wagtail African Pied	*Motacilla aguimp*			
	Wagtail Cape	*Motacilla capensis*			
	Wagtail Yellow	*Motacilla flava*			
	Wagtail Mountain	*Motacilla clara*			
	Warbler Garden	*Sylvia borin*			
	Warbler Willow	*Phylloscopus trochilus*			
	Warbler Marsh	*Acrocephalus palustris*			
	Warbler Sedge	*Acrocephalus schoenobaenus*			
(*)	Warbler Barratt's	*Bradypterus barratti*			
	Warbler Dark-capped Yellow	*Chloropeta natalensis*			
	Wattle-eye Black-throated	*Platysteira peltata*			
	Waxbill Orange-breasted	*Amandava subflava*			Sched 3
	Waxbill Common	*Estrilda astrild*			
	Waxbill Blue	*Uraeginthus angolensis*			
	Waxbill Grey	*Estrilda perreini*			
	Weaver Spectacled	*Ploceus ocularis*			
	Weaver Village	*Ploceus cucullatus*			
	Weaver Yellow	*Ploceus subaureus*			
	Weaver Southern Brown-throated	*Ploceus xanthopterus*			
	Weaver Thick-billed	*Amblyospiza albifrons*			
	Weaver Dark-backed	*Ploceus bicolor*			
	Weaver Cape	*Ploceus capensis*			
	Whimbrel Common	*Numenius phaeopus*			
(*)	White-eye Cape	*Zosterops virens*			
	Whydah Pin-tailed	*Vidua macroura*			

	Widowbird Red-collared	*Euplectes ardens*			
	Widowbird White-winged	*Euplectes albonotatus*			
	Widowbird Fan-tailed	*Euplectes axillaris*			
	Wood-dove Emerald-spotted	*Turtur chalcospilos*			
	Woodpecker Golden-tailed	*Campethera abingoni*			
	Woodpecker Cardinal	*Dendropicos fuscescens*			
	Woodpecker Olive	*Dendropicos griseocephalus*			

(*) Near endemic

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