edtea
Department :
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

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Provincial Reference Number:	
NEAS Reference Number:	KZN / EIA /
Waste Management Licence Number (if applicable):	
Date Received by Department:	

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Submitted in terms of section 24(2) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) or for a waste management licence in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

KINDLY NOTE:

1. This form is current as of **October 2019**. It is the responsibility of the Applicant / Environmental Assessment Practitioner ("EAP") to ascertain whether subsequent versions of the form have been released by the Department.

PROJECT TITLE

Water Resource & Biodiversity Assessment for the Amaoti Housing Development

DISTRICT MUNICIPALITY

ETHEKWINI MUNICIPALITY

1. SPECIALIST INFORMATION

Specialist name:	Ecologist		
Contact person:	Andrew Husted		
Postal address:	777 Peridot Street, Jukskei Park		
Postal code:	2153	Cell:	0813191225
Telephone:		Fax:	
E-mail:	info@thebiodiversitycompany.com		
Professional affiliation(s) (if any)	SACNASP Pr Sci Nat 400213/11		

Project Consultant / EAP:	

Contact person:			
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

2. DECLARATION BY THE SPECIALIST

I, **Andrew Husted** are that --

General declaration:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist:

The Biodiversity Company

Name of company:

18/11/2020

Date:

BIODIVERSITY ASSESSMENT PROPOSED AMAOTI HOUSING DEVELOPMENT, ETHEKWINI MUNICIPALITY

KwaZulu-Natal

April 2017 (Updated April 2019) (Reviewed September 2020)

REFERENCE

REF NR: DM/0036/2016

CLIENT

K2M Environmental (Pty) Ltd

Prepared for:

K2M Environmental (Pty) Ltd
33 Mnini Road, Kloof, 3610
Tel: +27 31 764 6743
Fax: +27 31 764 2354
simitha@k2m.co.za

Prepared by:

The Biodiversity Company
420 Vale Ave. Ferndale, 2194
Cell: +27 81 319 1225
Fax: +27 86 527 1965
info@thebiodiversitycompany.com
www.thebiodiversitycompany

Report Name	BIODIVERSITY ASSESSMENT PROPOSED AMAOTI HOUSING DEVELOPMENT, ETHEKWINI MUNICIPALITY
Reference	**REF NR: DM/0036/2016**
Submitted to	**K2M Environmental (Pty) Ltd.**
Report writer	**Anita Rautenbach**
Report reviewer	**Peter Kimberg**

www.thebiodiversitycompany.com

info@thebiodiversitycompany.com

EXECUTIVE SUMMARY

The Human Settlement and Infrastructure Unit of eThekwini Metropolitan Municipality proposes to formalize and develop the Greater Amaoti area and it is estimated that the project will deliver approximately 20 000 residential units together with supporting infrastructure and social facilities on Greenfield and Brownfield land. The study area is approximately 1235.59 hectares in extent and is located on portions of Wards 52, 53, 55, 56, 57, 59 and 102 of the eThekwini Metropolitan Municipality.

The Biodiversity Company (TBC) was appointed by K2M Environmental (Pty) Ltd. to undertake an ecological assessment for the proposed development of approximately 20 000 residential units together with supporting infrastructure and social facilities on Greenfield and Brownfield land in the Greater Amaoti area. This report was compiled in partnership between TBC and Rautenbach Biodiversity Consulting.

Summary of species of conservation significance recorded from the study area:

- Flora protected under the KwaZulu-Natal Environmental Biodiversity and Protected Areas Management Bill, 2014
    - *Hypoxis hemerocallidea, Scadoxus puniceus, Protorhus longifolia, Strelitzia nicolai; Burchellia bubalina* and *Hippobromus pauciflorus* will require a permit from eKZNw to remove or re-locate;
- Flora protected under the National Forests Act
    - *Sclerocarya caffra* was present as a single street tree in the general area of the study area, but will be unaffected by the proposed development. However, its presence indicates the potential for other occurrences of this species which would require permit authorisation from DAFF to damage or destroy.
- Rare, Red Listed and Endemic flora species
    - A few depauperate examples of the Red-Listed species *Hypoxis hemerocallidea* (DECLINING) were found scattered in grassland
- Fauna species protected under the KwaZulu-Natal Environmental Biodiversity and Protected Areas Management Bill, 2014
    - The presence of several mammal (Appendix 2), reptile (Appendix 3), frog (Appendix 4) and bird species (Appendix 5).
- Fauna species protected under the CITES Appendices:
    - The presence of several mammal (Appendix 2), reptile (Appendix 3), and bird species (Appendix 5).
- Red Listed and Endemic fauna species:
    - The presence of several mammal (Appendix 2), reptile (Appendix 3), frog (Appendix 4) and bird species (Appendix 5).

Local sensitivities

From a vegetation perspective, the sensitivities relating to the proposed development are the presence of:

- *Hypoxis hemerocallidea* (Red Listed as DECLINING) and the Provincially protected *Scadoxus puniceus Protorhus longifolia, Strelitzia nicolai, Burchellia bubalina* and *Hippobromus pauciflorus* will require permits from eKZN Wildlife before they can be translocated or destroyed.
- Closed-canopy forest over certain parts of the site (especially those designated as part of the D'MOSS) would require permit authorization from DAFF if clearing was required.

From a fauna perspective, the sensitivities relating to the proposed development site are the presence of:

- The presence of several Red Listed, Protected and endemic fauna species, specifically in the grasslands and forests on the D'MOSS areas.

From a conservation planning perspective the sensitivities are:

- The siting of the proposed development in areas designated as part of the D'MOSS;
- The siting of the proposed development in a vegetation type broadly categorized as a Critically Endangered habitat, although one must concede that the area is already (for the most part) 100% transformed. Only those areas within the D'MOSS remain in a relatively natural state;
- The siting of part of the proposed development in an area where slopes can be characterised as moderate to steep and which will affect runoff and result in a potential erosion risk and contamination of down-slope habitats.

Recommendation

The highly-transformed nature of the habitats in the majority of the study area resulting from urbanization means that there should be no objections to this proposed development from a vegetation perspective. What little natural vegetation remains is highly disturbed and invaded by alien species and heavily impacted by over-grazing and over-burning in the grassland areas. This is evident from the low species diversity and almost complete absence of geophytes which have presumably been excluded by repeated/prolonged exposure to grazing and burning pressure.

Forested areas persist on the steeper slopes and are currently, for the most part, free from development activities in the form of clearing for informal settlement and utilization of resources, although activities within these areas can be seen with some chopping within the forests and numerous examples of dumping of house-hold and garden refuse were encountered. This refuse has migrated quite extensively into these areas under the influence of gravity and water.

To preserve the integrity of the D'MOSS it is recommended that these areas are excluded from the proposed development footprint and that those are buffered from the negative effects of the development by a minimum 30 m buffer.

CONDITIONS OF THIS REPORT

Even though every care is taken to ensure the accuracy of this report, ecological assessment studies are limited in scope, time and budget. Discussions and proposed mitigations are to some extent made on reasonable and informed assumptions built on bone fide information sources, as well as deductive reasoning. Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and animal migrations.

Since environmental impact studies deal with dynamic natural systems, additional information may come to light at a later stage. The assessment team can thus not accept responsibility for conclusions and mitigation measures made in good faith based on own databases or on the information provided at the time of the directive.

Although the authors exercised due care and diligence in rendering services and preparing documents, they accept no liability, and the Client, by receiving this document, indemnifies the authors against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the authors and by the use of this document.

Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety. No form of this report may be amended or extended without the prior written consent of the authors. This report should therefore be viewed and acted upon with these limitations in mind.

Table of Contents

Tables

Figures

List of Acronyms & Abbreviations

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Areas
CITES	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
GIS	Geographic Information System
ha	hectares
IBA	Important Bird Areas
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
LEMA	Limpopo Environmental Management Act (No. 7 of 2003)
LUDS	Land Use Decision Support
MAP	mean annual precipitation
masl.	Meters above sea level
mm	millimeters
NBA	National Biodiversity Assessment
NEMBA	National Environmental Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
PRECIS	National Herbarium Pretoria Computerized Information System
QDS	Quarter degree grid square
RD	Red Data
SANBI	South African Biodiversity Institute
SARCA	South African Reptile Conservation Assessment
SDF	Strategic Development Framework

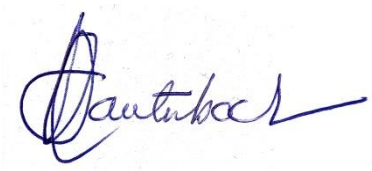
Glossary of Terms

riparian	relates to vegetation located along the banks of a watercourse/water body
pentad	five minutes of latitude by five minutes of longitude. One QDS comprise of nine pentads
QDS	The division of longitude and latitude degree square cells into smaller units
ephemeral	short-lived
direct impacts	those that take place at the same time and in the same space as the activity, e.g. clearing of vegetation
indirect impacts	occur later in time or at a different place from the activity, e.g. extraction of groundwater for irrigation leads to changes in the water table and affects distant water users.
cumulative impacts	the combined or additive effects on biodiversity or ecosystem services over time or in space. They may seem to be insignificant when seen in isolation, But collectively they have a significant effect.

Specialist Declarations

I, **Anita Rautenbach** 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 The Biodiversity Company to undertake an ecological assessment for the proposed housing development on portions of Wards 52, 53, 55, 56, 57, 59 and 102 in the eThekwini Metropolitan Municipal area;
- 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 of 2014;
- The intellectual property in this report will only be transferred to the Client (the party/company that commissioned the work) on full payment of the contract fee. Upon transfer of the intellectual property, I recognize that written consent of the Client will be required for me to release any part of this report to third parties.



Signature of the specialist:

Date: 20th April 2017

I, **Gavin McDonald** declare that –

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Date: 20th April 2017

I, **Peter Karl Kimberg** 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.
- 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;
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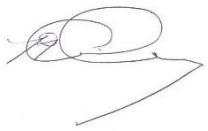

Signature of the specialist:

Date: 20th April 2017

1 INTRODUCTION

The Biodiversity Company (TBC) was appointed by K2M Environmental (Pty) Ltd. to undertake an ecological assessment for the proposed development of approximately 20 000 residential units together with supporting infrastructure and social facilities on Greenfield and Brownfield land in the Greater Amaoti area.

This report was compiled in partnership between TBC and Rautenbach Biodiversity Consulting.

The area is approximately 1235.59 ha in extent and is located on portions of Wards 52, 53, 55, 56, 57, 59 and 102 in the eThekwini Metropolitan Municipal region.

The need and desirability for the Proposed Housing Development within the Greater Amaoti area is evident in the Strategic Development Framework (SDM) and Integrated Development Plan (IDP) of the eThekwini Municipality, as it has identified the study area as an area for mega housing developments. The implementation of the housing development will assist in reducing the establishment of informal settlements.

The proposed development will also include the construction of water and sanitation infrastructure. By providing water and sanitation services to the proposed development, it will indirectly assist in reducing surface water and groundwater pollution. This will be a result of households using piped water in their daily activities instead of water from the nearby rivers and utilising proper sanitation methods.

Primarily this report focuses on the identification of ecological sensitive areas, and the reigning status of flora and fauna species occurring, or is likely to occur on the study area and surrounding areas, and whose conservation status should be considered in the decision-making process.

This assessment is conducted in accordance with the 2014 Environmental Impact Assessment (EIA) Regulations (No. R. 982-985, Department of Environmental Affairs, 4 December 2014) emanating from Chapter 5 of the National Environmental Management Act (Act No. 107 of 1998).

1.1 Scope of Work

To conduct an ecological assessment of the target area where the development of approximately 20 000 residential units, together with supporting infrastructure and social facilities is proposed, and provide a professional opinion on ecological issues pertaining to the target area to aid in future decision making regarding the proposed project.

1.2 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;
- Identify and comment on ecological sensitive areas and ecological service(s);

- Provide an inventory of the dominant flora species at the site;
- To provide a list of fauna and flora species that may occur, and to identify species of conservation importance;
- To highlight the potential impacts of the proposed development on the fauna and flora species deemed present on the study area;
- Identification of sensitive habitats within the site;
- Identify impacts upon habitat in terms of floral significance;
- Identification of conservation significant habitats around the site which might be impacted by the proposed development;
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved; and
- To identify any environmental fatal flaws or red flag issues.

1.3 Assumptions and Limitations

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

- This report deals exclusively with the defined areas and the impacts associated with the proposed development on the biodiversity and ecosystems of the area;
- The assessment concentrated on untransformed areas (natural vegetation), and transformed areas by formal and informal residential developments, mainly through brief walk-throughs or rapid drive-by surveys;
- Only a rapid assessment of the fauna that may be potentially impacted by the proposed development was conducted. Whilst species recorded during the site visits have been included in this report, this was based on site observations made during three site visits;
- The fauna field assessment was undertaken in autumn (April 2017), and therefore does not cover the seasonal variation in conditions on the study area. A more detailed assessment would require that assessments take place in all seasons of the year;
- Sampling by nature, means that not all individuals are assessed and identified. As a result, it is unlikely that all fauna species occurring on the study area would have been observed during site visits of limited duration, specifically with regards to Red Listed/Protected fauna species;
- The major constraints in any vegetation survey are the amount of time spent in the field and the season. Given time for more extensive/intensive field work it is possible that rarer and more cryptic species may be encountered. Seasonal changes affect flowering and dormancy and this affects the ability to locate or identify non-flowering species, placing increased emphasis on literature studies of the area and similar habitats and assumes that these sources of information are reliable;

- Access was limited in certain places. The highly-transformed nature of much of the area would suggest that many of the potential species from the historical area no longer exist on site;
- 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 Province at the time of the assessment;
- The baseline report was updated in April 2019. A review of the report was undertaken in September 2020 in light of comments received from the municipality, in order to address / respond to these comments; and
- Due to security reasons, no night-time surveys could be conducted.

1.4 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 Province.

Table 1: Key legislation relevant to biodiversity and conservation in KwaZulu-Natal Province

INTERNATIONAL	Convention on Biological Diversity (CBD, 1993) The Convention on Wetlands (RAMSAR Convention, 1971) The United Nations Framework Convention on Climate Change (UNFCC,1994) 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 (NEMA) (Act No. 107 of 1998) The National Environmental Management Protected Areas Act (Act No. 57 of 2003) The National Environmental Management Biodiversity Act (Act No. 10 of 2004) The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations National Environmental Management Air Quality Act (No. 39 of 2004) National Protected Areas Expansion Strategy (NPAES) Environmental Conservation Act (Act No. 73 of 1983) Natural Scientific Professions Act (Act No. 27 of 2003) National Biodiversity Framework (NBF, 2009) National Forest Act (Act No. 84 of 1998) World Heritage Convention Act (Act No. 49 of 1999) Municipal Systems Act (Act No. 32 of 2000) Alien and Invasive Species Regulations, 2014

	White Paper on Biodiversity
PROVINCIAL	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 reviews, reports and guidelines were taken into consideration:

- Lexicon of Biodiversity Planning in South Africa (2016);
- Guidelines for Biodiversity Impact Assessments in KZN (2013);
- Implementation Manual for Freshwater Ecosystem Priority Areas (Driver et al., 2011);
- Ezemvelo KZN Wildlife Strategy (2009 – 2014);
- Norms and Standards for Biodiversity Offsets – KwaZulu-Natal Province, South Africa;
- The Durban Metropolitan Open Space System (D'MOSS);
- Development Assessment Guidelines D"MOSS (2010);
- The South African Guidelines for Sustainable Drainage Systems (2012);
- Durban Systematic Conservation Assessment (McLean et al., 2016)
- Policy Principles and Guidelines for Control of Development Affecting Natural Forests (2010); and
- Grassland Ecosystem Guidelines (SANBI, 2013).

1.5 Study Area

The study area lies approximately 19 km north of Durban in KwaZulu-Natal (Figure 1). The area falls within two Quarter Degree Grid Squares (QDGS) namely 2930DB and 2931CA, but predominantly in the former and is located in the eThekwini Municipality which is 229190.6 hectares in extent. Areas remaining natural constitute some 106016.1 hectares (46.3% of municipality), while areas where no natural habitat remains constitute 122641.2 hectares (53.5% of municipality). The area earmarked for development is approximately 1235, 59 ha in extent and is located on portions of Wards 52, 53, 55, 56, 57, 59 and 102 (Figure 2).

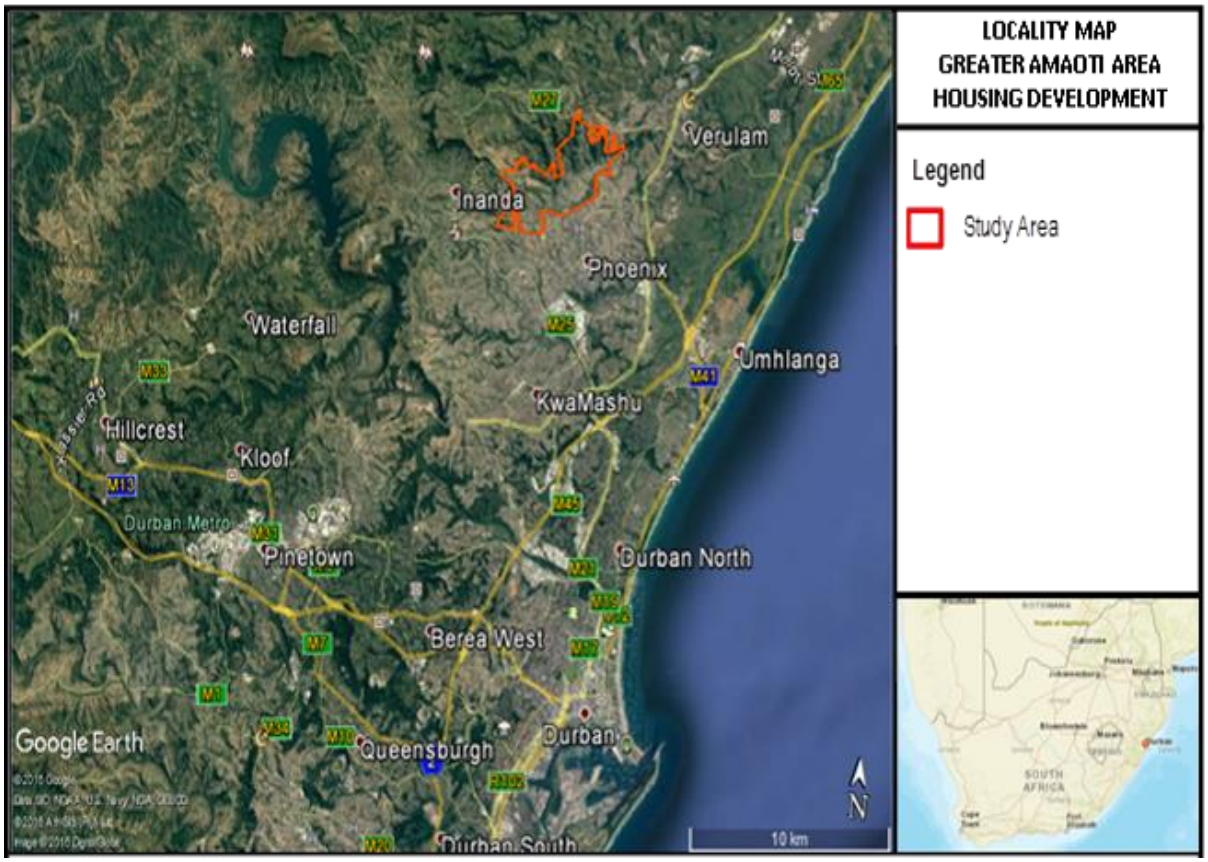

Figure 1: The location of the study area in relation to Durban in KwaZulu-Natal

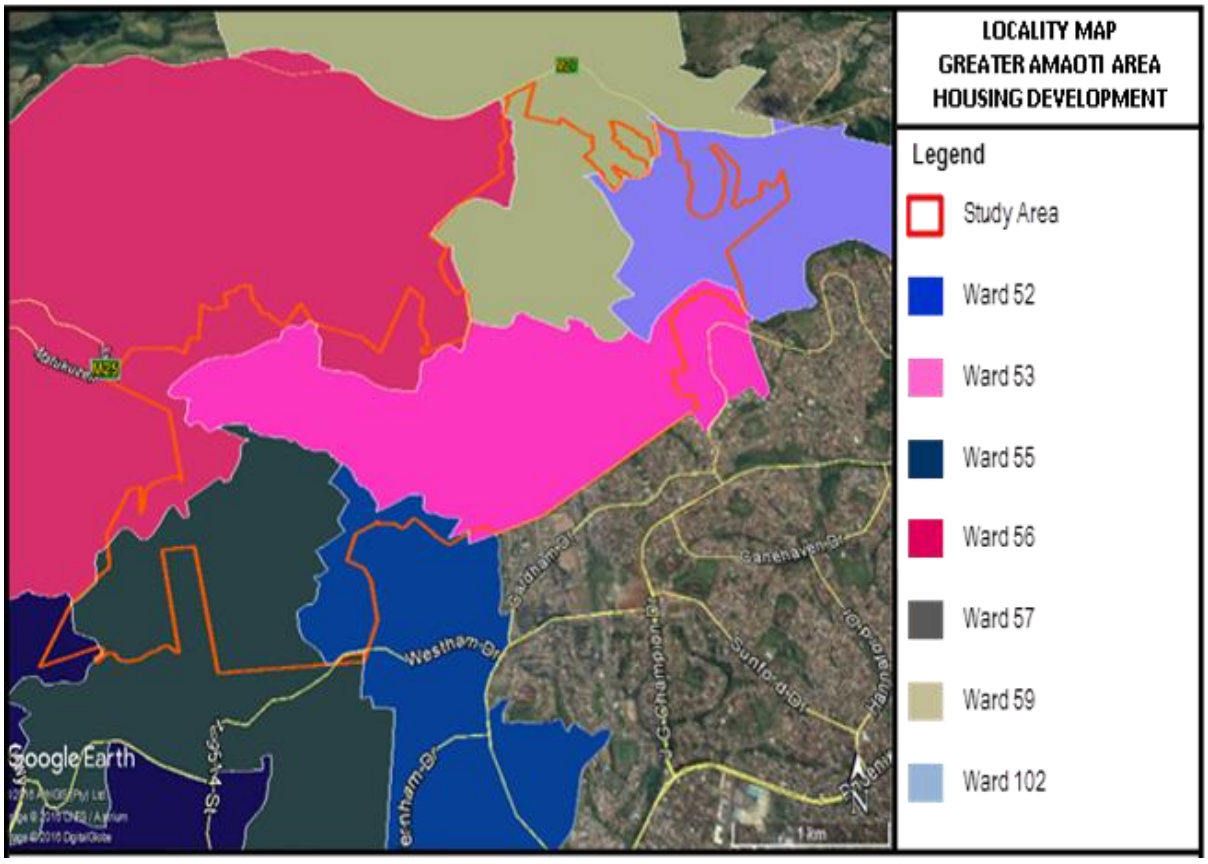

Figure 2: The extent of Wards 52, 53, 55, 56, 57, 59 and 102 in relation to the study area

1.5.1 Climate and Rainfall

The climate for the area has been derived from recorded data (en.climate-data.org and worldweatheronline.com) for Durban. The area has a humid subtropical climate, with hot and humid summers and pleasantly warm and dry winters which are snow- and frost-free.

Average summer temperatures range from around 24 °C, with average winter temperatures of approximately 17 °C. Durban has an annual rainfall of 1,009 mm, with most rains falling between November – April. Long-term climatic data has been summarized in the graph presented in Figure 3.

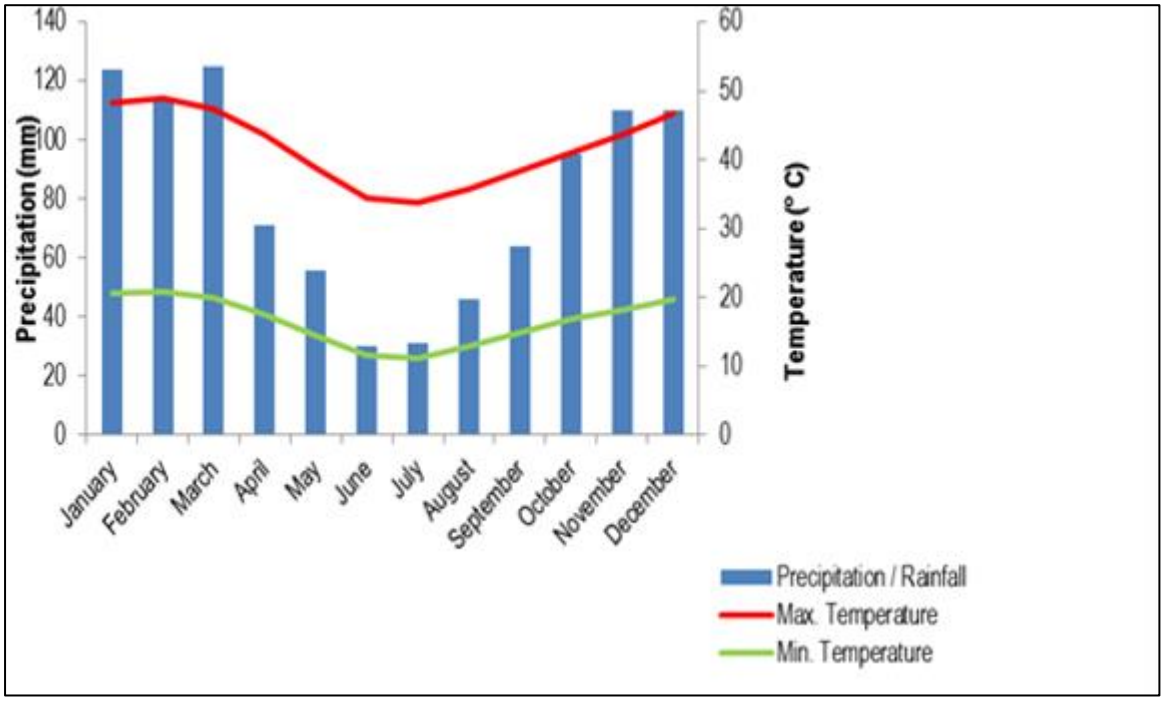

Figure 3: Average minimum and maximum temperatures and monthly rainfall for Durban (adapted from http://en/climate-data.org).

1.5.2 Topography

The general topography of the area is undulating to variably steep, with the south-eastern periphery of the study area starting at about 56 m above sea-level, rising in a north-westerly direction to a height of approximately 373 m above sea-level (Figure 4).

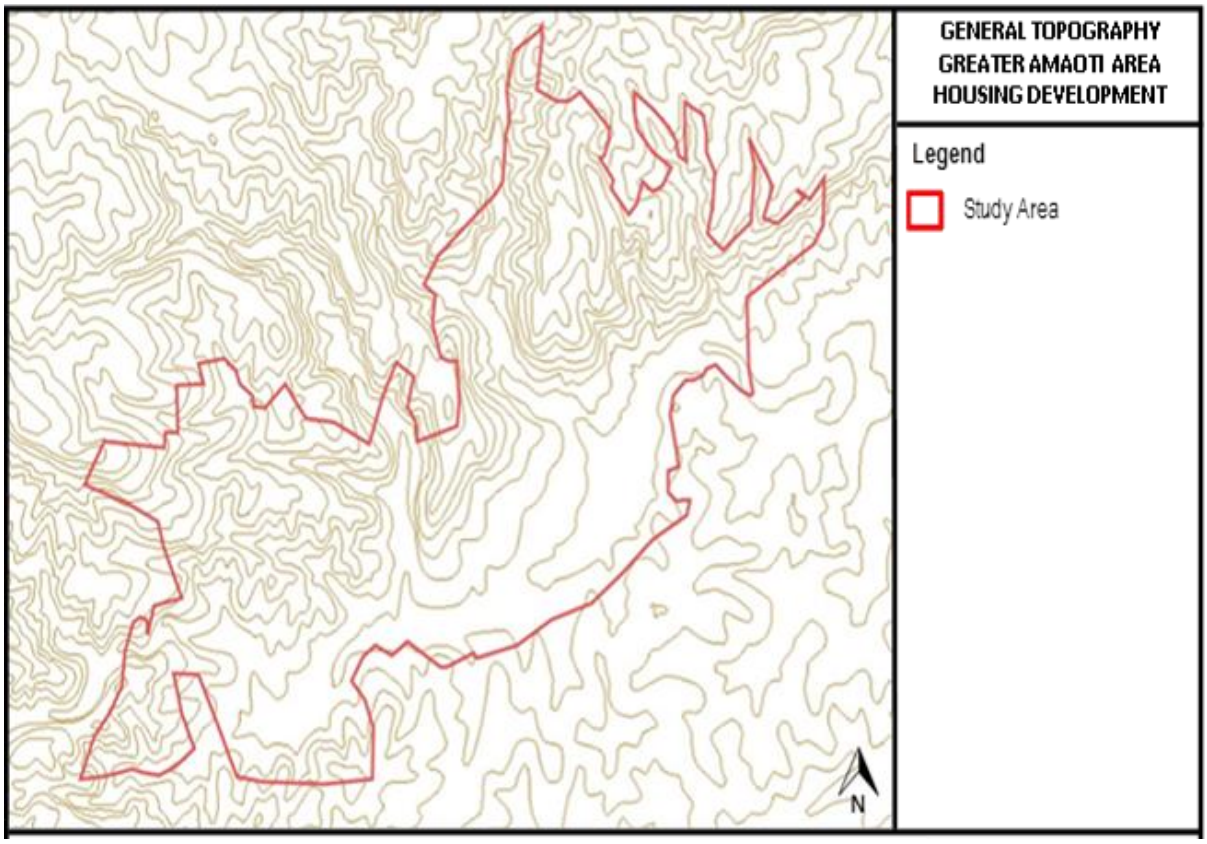

Figure 4: The general topography of the study area is undulating to variably steep as indicated by the 20 m contour intervals

1.5.3 Geology and Soils

According to the BGIS LUDS tool, the following five soil classes occur in the area (Figure 5):

- Type A: Soils with humic topsoil horizons. Favourable properties include low erodibility and high organic matter. Limitations include low base status.
- Type B: Imperfectly drained soils, often shallow and often with a plinthic horizon. Favourable properties include relative wetness which is favourable in dry areas. Limitations include possible seasonal wetness.
- Type C: Association of Classes 1 to 4: Undifferentiated structureless soils characterized by low base status, restricted soil depth, excessive or imperfect drainage and/or high erodibility.
- Type D: Lithosols - shallow soils on hard or weathering rock usually found on steep slopes. Favourable properties include the fact that they may receive water runoff from associated rock, while their limitations include restricted soil depth; associated with rockiness.
- Type E: Association of Classes 17 and 18: Structureless soils and clays. Their favourable properties include high natural fertility. Their limitations include restricted

depth, imperfect drainage, wetness, high swell-shrink potential and they may be plastic and/or sticky.

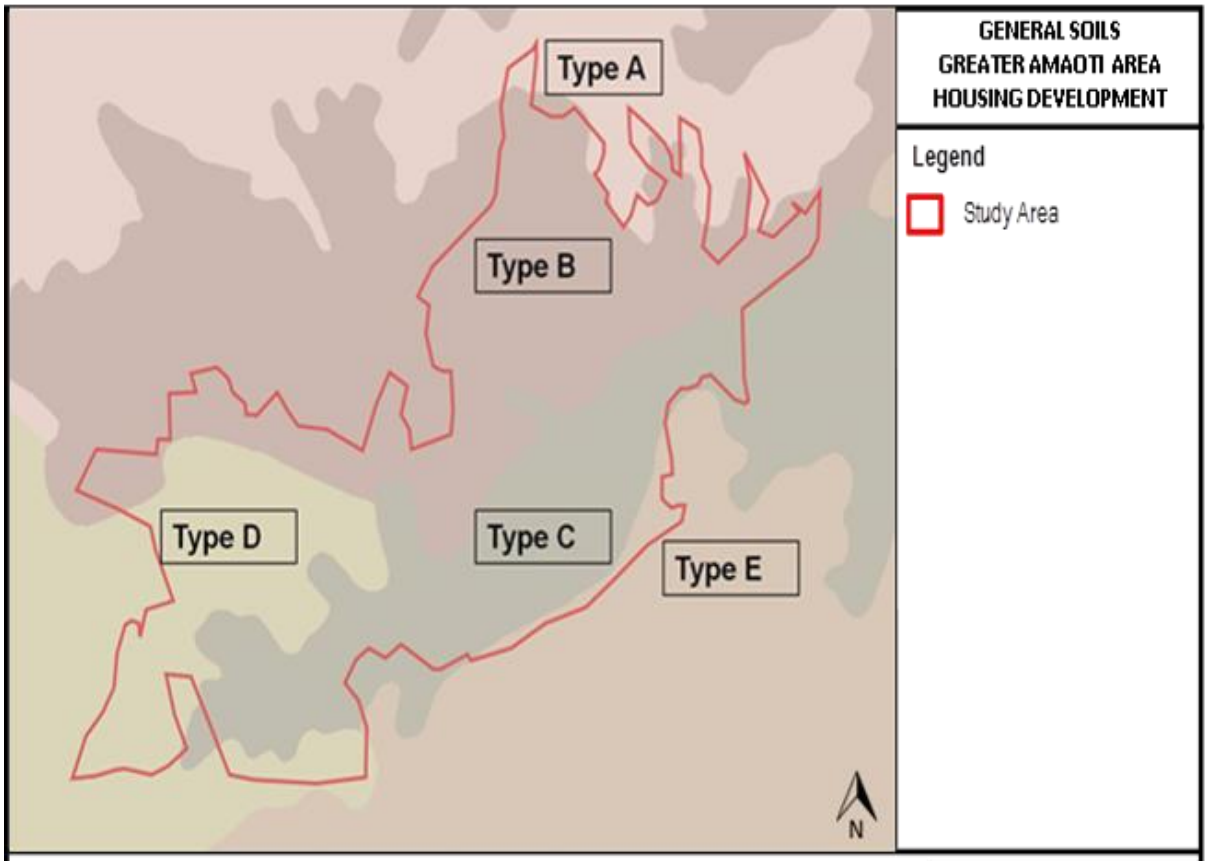

Figure 5: The distribution of the general soil classes on the study area

1.5.4 Current Land Use and Infrastructure

Currently, the study area is characterized by formal and informal settlements, with a network of various tarred and gravel roads providing access to the settlements. Housing density is high to very high with few natural/untransformed habitats remaining in the area. Several agricultural fields (subsistence farming) are present along the banks of the Ohlanga River towards the south. The ecological integrity of this river corridor has been severely compromised by littering, soil erosion and alien plant infestations amongst others. Small fragmented pockets of natural and/or semi natural habitat are present on several areas, and are generally restricted to valleys with steep slopes.

1.5.5 Water Courses and Wetlands

Within the largely undulating and mountainous landscape of the study area and surroundings, there are several, variously sized, ephemeral drainage lines in the valleys draining into the Ohlanga River. The Ohlanga River runs along the southern boundary line, with three wetland areas present on the banks of the Ohlanga River (Figure 6).

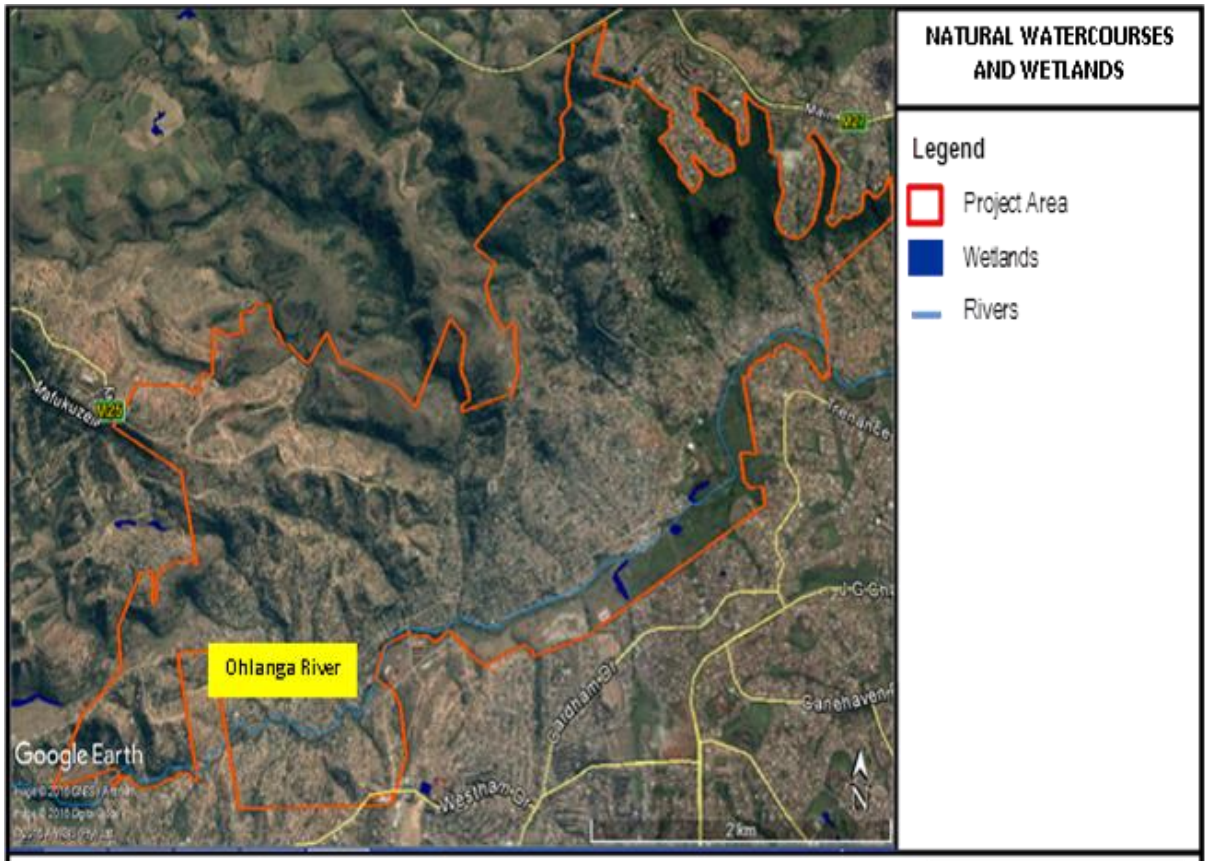

Figure 6: Wetlands and water courses associated with the proposed development

1.6 Conservation Context

The conservation importance of the study area was assessed on National (NBA, 2011) and Provincial (KZNSCP, 2012) and Municipal (KZNBSP, 2014) scales.

1.6.1 Protected Areas and Conservation Areas

Protected areas include National Parks (NBA, 2011), Formal Protected Areas (NBA, 2011), Informal Protected Areas (NPAES), NPAES Focus Areas (NPAES, 2010), National Indigenous Forest Patches (DWAF) and IBA Areas.

There are six formal land-based protected areas in the Ethekwini Municipal area, covering 999.8 hectares (0.4% of municipality) and includes Beachwood Mangroves (Provincial) Nature Reserve (77.6 ha - 0.03% of municipality), Bluff (Provincial) Nature Reserve (46 ha - 0.02% of municipality), Kenneth Stainbank (Provincial) Nature Reserve (211 ha - 0.09% of municipality), Krantzkloof (Provincial) Nature Reserve (588.4 ha - 0.26% of municipality), North Park (Provincial) Nature Reserve (42.1 ha - 0.02% of municipality) and uMhlanga Lagoon (Provincial) Nature Reserve (34.8 ha - 0.02% of municipality).

With the exception of the Trenance Park Nature Reserve in the D'MOSS designated zone (Figure 10) on Ward 102 and the Mt Moreland IBA, no National Parks, Formal Protected Areas, Informal Protected Areas (NBA, 2011), indigenous forest patches (DWAF), Provincial or Municipal protected/conservation areas are present on the study area, or near the study area.

The Mt Moreland IBA lies approximately 6.68 km to the east of the study area (Figure 7). This is the largest single roost of Barn Swallows in South Africa, with approximately 3 million swallows roosting there during the summer season. Mt Moreland is also one of only ten known locations where a population of the 'Critically Endangered' Pickersgill's reed frog (*Hyperolius pickersgilli*) is known to occur.

There are no Ramsar sites in the eThekwini Municipality.

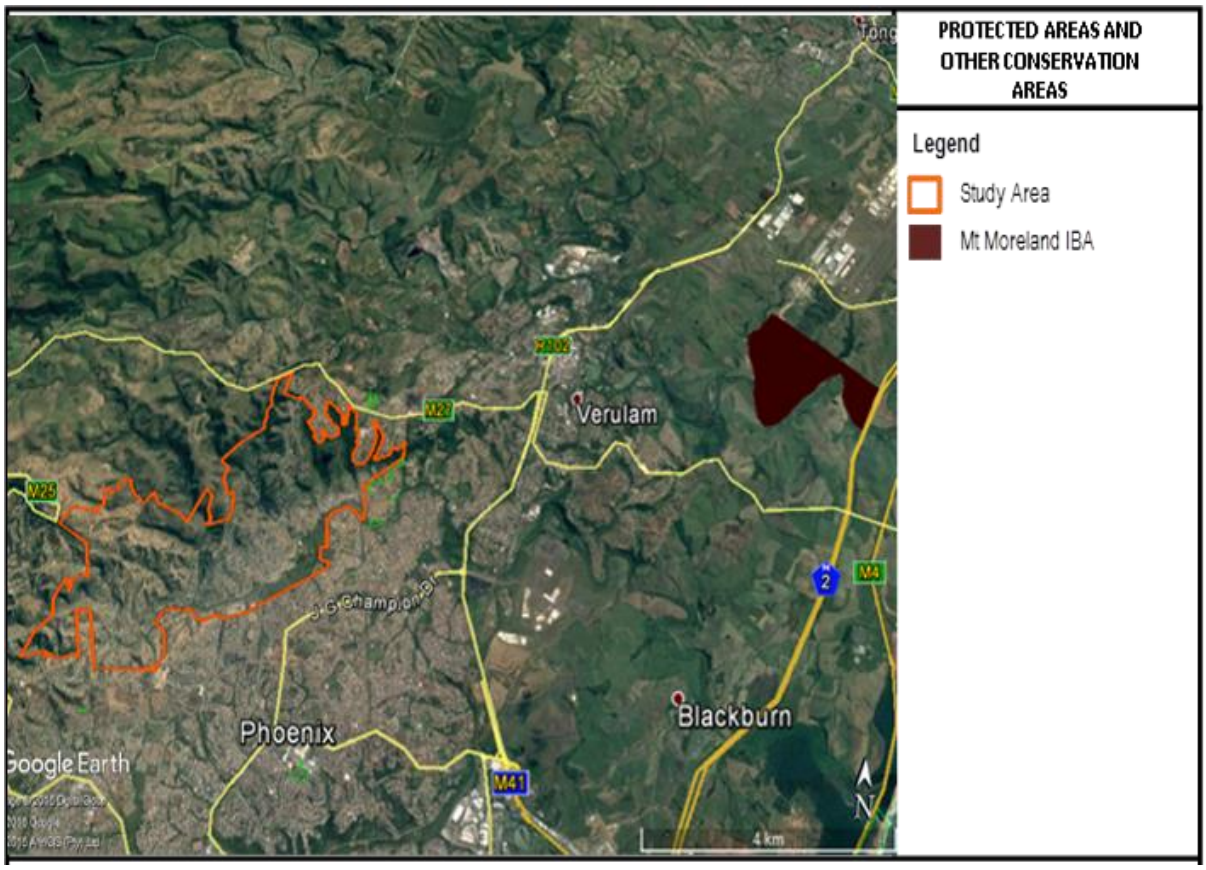

Figure 7: The Mt Moreland IBA lies approximately 6.68 km to the east of the study area

1.6.2 Nationally 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 falls within the 'Critically Endangered' Interior North Coast Grassland ecosystem (threatened ecosystem code KZN 6), with a small area on Ward 55 falling in the

'Vulnerable' KwaZulu-Natal Coastal Belt ecosystem (threatened ecosystem code CB 3; Figure 8).

The Interior North Coast Grassland ecosystem is located primarily within the KwaZulu-Natal Coastal Belt biome. Although only about 8% of the original extent of the ecosystem remains, this ecosystem is not protected despite the presence of several threatened and endemic plant of animal species.

Key biodiversity features include one amphibian species, *Hyperolius pickersgilli*; two millipede species i.e. *Centrolobus anulatus* and *Doratogonus rubipodus*; two plant species i.e. *Helichrysum woodii* and *Kniphofia pauciflora*; three reptile species i.e. *Bradypodion caeruleogula*, *B. melanocephalum* and *Scelotes inornatus*; and three vegetation types, i.e. Eastern Scarp Forest, KwaZulu-Natal Sandstone Sourveld and KwaZulu-Natal Coastal Belt (Goodman, 2007).

The KwaZulu-Natal Coastal Belt ecosystem falls within the Indian Ocean Coastal Belt biome in KwaZulu-Natal. Less than 1% of this ecosystem is protected in the Ngoye, Mbumbazi and Vernon Crookes Nature Reserves, with at least three endemic plant species occurring in this ecosystem (Mucina et al., 2006).

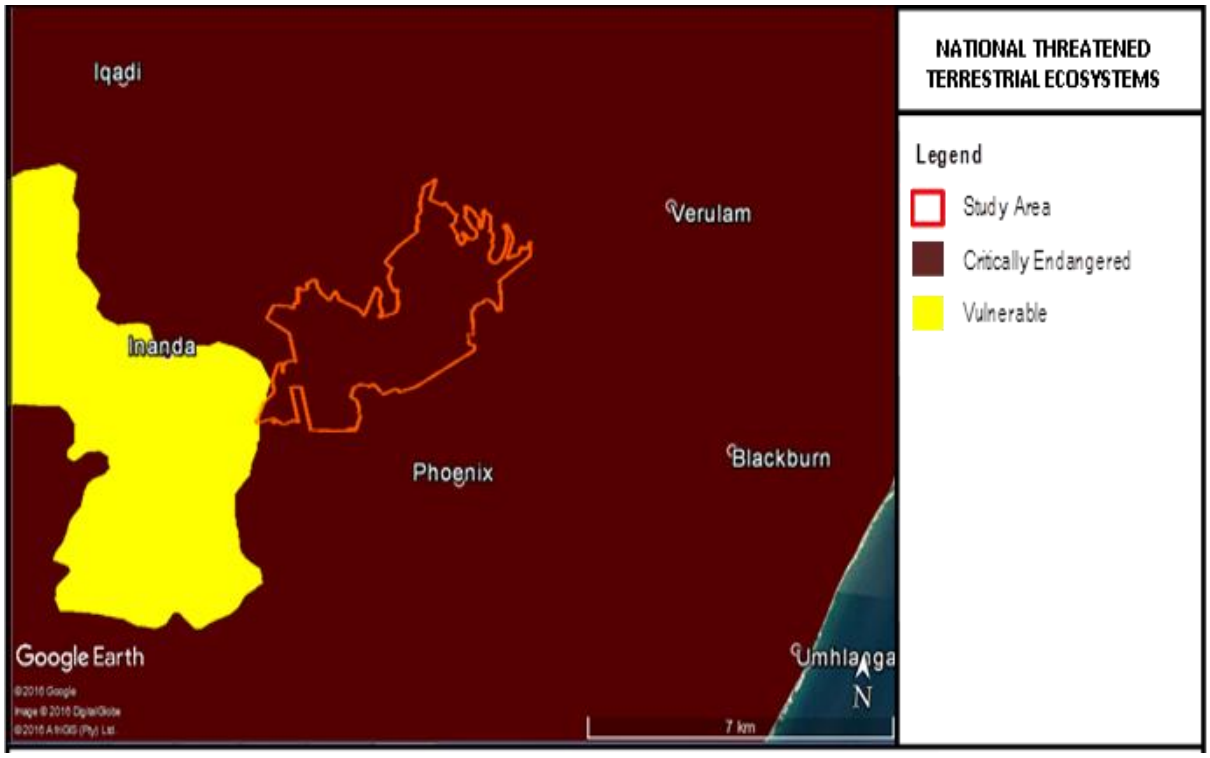

Figure 8: The extent of nationally threatened ecosystems in relation to the study area

1.6.3 Sensitive Aquatic Ecosystems

The study area falls within the Mvoti to Umzimkulu WMA (Water Management Area), and more specifically the Mvoti sub-water management area. The Mvoti sub-area comprises the catchment of the Mvoti River together with small coastal rivers between the Thukela and the Mgeni Rivers. The Mvoti subwater management area is not important in terms of fish sanctuaries, fish support areas or translocation and relocation zones for fish.

The Ohlanga River, located towards the south of the study area is classified as a Class: D river (largely modified). Three wetlands are present along the banks of the Olanga River (Figure 6). Two natural, channel valley-bottom wetlands are present to the south of the Ohlanga River, however these wetlands have been critically modified (wetland condition of Z1; Driver et al., 2011).

An unchanneled valley-bottom wetland is also present to the north of the Ohlanga River, with a wetland condition of C (moderately modified). Neither the river nor the wetlands has been identified as freshwater ecosystem priority areas. However, wetland delineations were based largely on remotely-sensed imagery and a wetland assessment will need to be undertaken for the study area (Driver et al., 2011).

1.6.4 Provincial and District Level Conservation Priorities (KZN SCP, 2012 and KZN BSP, 2014)

The provincial scale KZN Systematic Conservation Plan (KZNSCP, 2012) and the district scale 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 environments 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 analysed 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 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 arealternate 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.

Table 3: Summary of the CBA and ESA categories used in the KwaZulu-Natal Biodiversity Sector Plan (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 optimized 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 the 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 will take place predominantly within an area designated as a Critical Biodiversity Area (CBA) type 1 (KZNSCP, 2012; Figure 9). This rating is due to the potential presence of a number of invertebrates such as molluscs, millipedes and orthopterans and the potential presence of Eastern Scarp Forest, North Coast Grassland, Subtropical Freshwater Wetlands, North Coast Bushland and Subtropical Alluvial Vegetation. Furthermore, the presumed extinct taxa *Vernonella africana* and *Barleria natalensis* may once have occurred here and might still persist by some remote chance. *Gerrardanthis tomentosus* (Red Listed as Vulnerable) may well occur in the forests on the site.

On a municipal level, several CBA: Irreplaceable areas (KZNBSP, 2014) are located on sections of Wards 53, 56, 57 and 102 (Figure 9). 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).

1.6.4.1 Municipal Level Conservation Priorities

The eThekwini Municipality is responsible for managing and regulating development through land-use planning in the Durban area. Land-use planning is particularly important since the city is located in the Maputaland-Pondoland-Albany biodiversity hotspot which contains several endemic plant species.

The municipal Department of Environmental Planning and Climate protection has therefore development a unique system to control future infrastructure development and conserve

biodiversity. This system is named the Durban Metropolitan Open Space System (D'MOSS) and guides land-use development applications towards areas that have already be converted and minimises the impact of urban expansion on the remaining biodiversity in the municipality.

The D'MOSS includes a comprehensive map of important and biodiversity-sensitive areas to maintain them in a natural state. D'MOSS is incorporated into Durban's Integrated Development Plan, associated Strategic Development Framework, Regional Spatial Development Plans and the Municipal Town Planning Schemes.

Several D'MOSS areas are present on the study area. Areas such as some of the forested valleys and the Ohlanga River with associated floodplain and wetlands are currently designated as part of the D'MOSS system and still fairly unimpacted, and make a valuable contribution to the D'MOSS, since they constitute the last remaining near-natural habitats in the study area (Figure 10).

It would seem prudent to refrain from planning any development in these areas and to buffer them from the impacts of the general development to retain their integrity which has fortunately remained intact to date despite obvious pressure from informal settlement.

While the location of the study area in D'MOSS designated zones does not preclude development, it adds an additional responsibility on the development to be sensitive to the ecological and biodiversity value of the site.

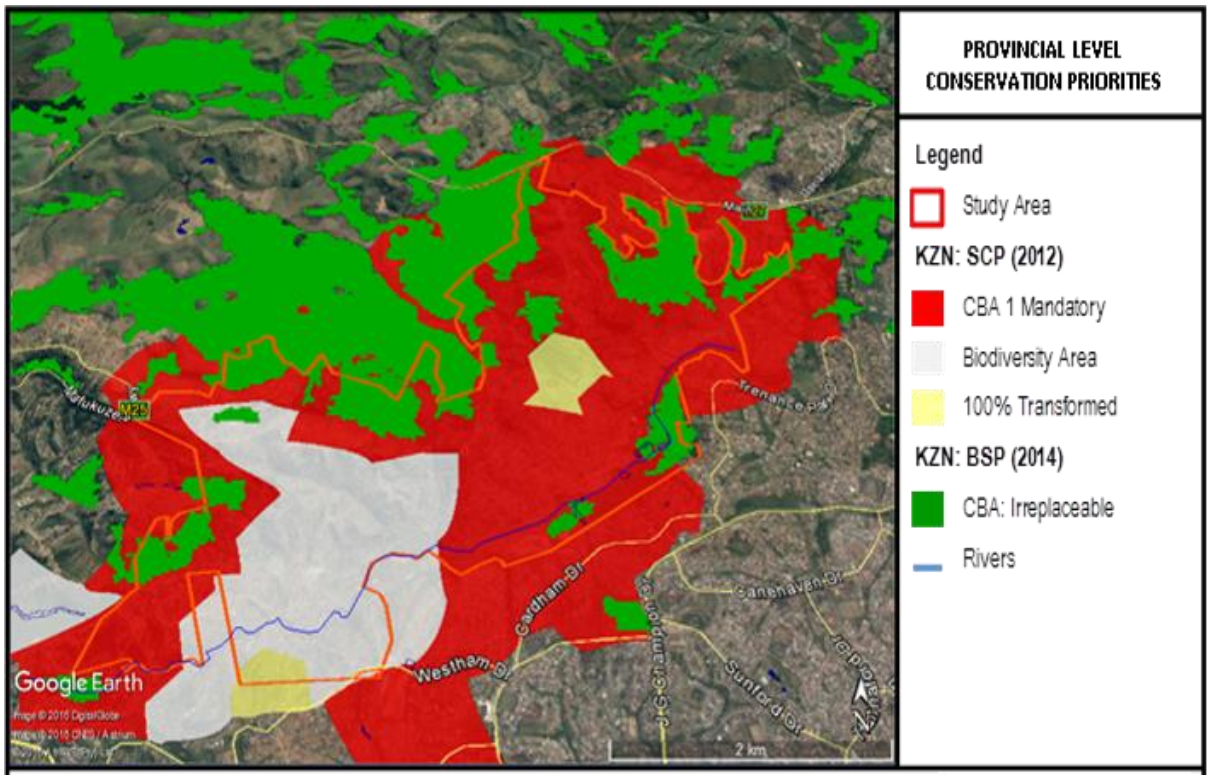

Figure 9: The extent of CBA 1 and CBA: Irreplaceable areas in relation to the study area

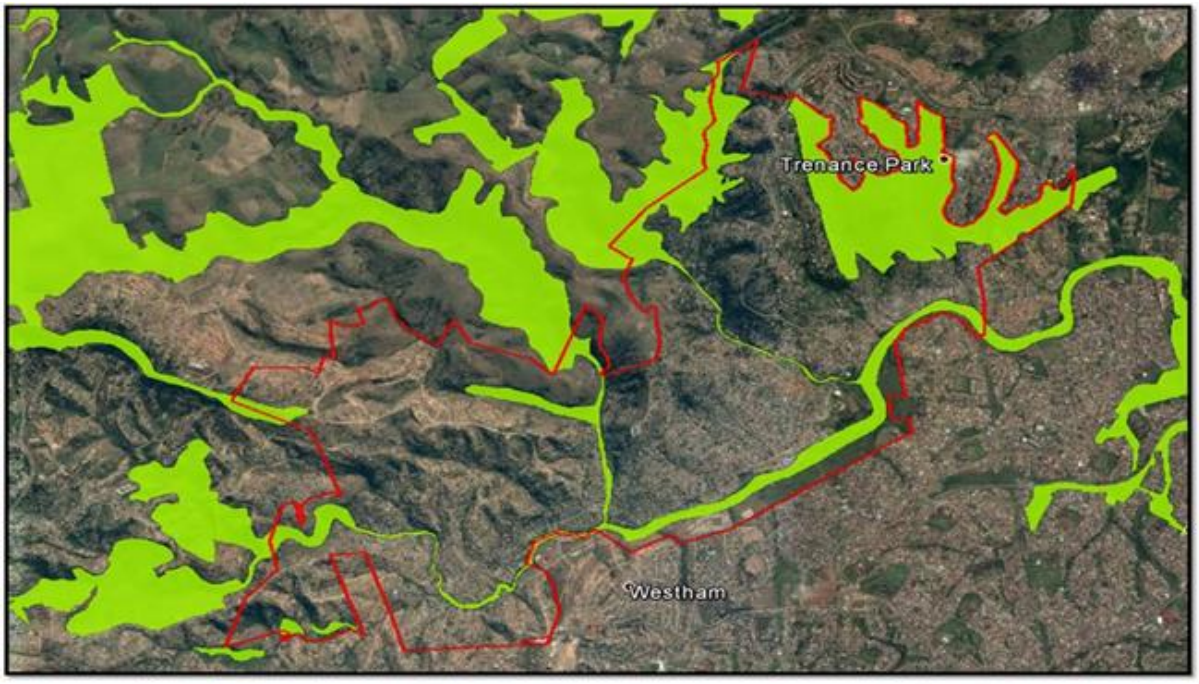

Figure 10: Google Earth view of the extent of the D'MOSS designated zones in relation to the study area

1.6.5 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 development within 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 and the few remaining natural grassland/forest habitats are therefore highly fragmented. A noticeable exception is the grassland and forested area on Ward 56 where connectivity with the adjacent D'MOSS area is generally good.

The riverine habitat (Ohlanga River) and wetland areas in general are in a poor ecological state, highly modified and generally uniform, thus from a biodiversity perspective, connectivity is poor.

2 METHODOLOGY

2.1 Collection and Review of Existing Environmental Data

A comprehensive desktop assessment was carried out to document all baseline ecological information for the study area and 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 - Important Bird Areas 2015 [vector geospatial dataset].

2.1.1 National Biodiversity Assessment (NBA, 2011)

- 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];
- National List of Threatened Ecosystems 2011 – SANBI [vector geospatial dataset].

2.1.2 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

- NFEPA fish sanctuaries 2011 – CSIR - NFEPA fish sanctuaries [vector geospatial dataset];
- NFEPA river FEPAs 2011 - CSIR. [vector geospatial dataset];
- NFEPA wetland clusters 2011 - CSIR [vector geospatial dataset];
- NFEPA wetlands 2011 - CSIR [vector geospatial dataset];
- NFEPA wetlands vegetation 2011 - CSIR [vector geospatial dataset]; and
- NFEPA rivers 2011 [vector geospatial dataset].

2.1.3 National Protected Areas Expansion Strategy (NPAES, 2010)

- 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]; and
- NPAES Protected Areas – Informal 2010 - SANParks/SANBI [vector geospatial dataset].

2.1.4 KwaZulu-Natal 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 Pre-Transformation 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].
- KwaZulu-Natal 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].

2.2 Floral Assessment

- GIS study undertaken to generate overlays for the area taking into account:
    - National vegetation type (Mucina & Rutherford, 2006) and KZN vegetation type;
    - Wetlands and watersheds; and
    - eKZN Wildlife's C-Plan and D'MOSS impacts
    - Desktop study using Google Earth to determine areas of interest and changes in vegetation.
- Ground study to determine the likely impact of the proposed development on the vegetation of the study area. This was undertaken on the 10th of April 2017.

2.3 Fauna Assessment

As many fauna species 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. Fauna distribution data were obtained from various publications and field guides as a means to ascertain which species have historically been recorded within the QDS 2931CA and 2930DB.

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 study area includes bird distribution data for the following pentads: 2935_3100; 2940_3100; 2935_3055 and 2940_3055.

During the fieldwork phase of the project, these derived lists of occurrences are audited. Fieldwork was undertaken on the 1 & 2nd of April 2017 and again on the 9th of April 2017.

2.3.1 Mammal Assessment

2.3.1.1 Literature review

Mammal distribution data were obtained from the following information 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).

2.3.1.2 Field Surveys

During site visits mammals were identified by visual sightings through random transect walks, as well as indirect evidence from tracks, scats and runways. An assessment of the status and condition of potential and available habitat for mammalian species were conducted. No trapping or mist netting was conducted, as the terms of reference do not require such intensive work.

2.3.2 Herpetofauna Assessment

2.3.2.1 Literature Review

Reptile distribution data were obtained from the following information sources:

- SARCA (sarca.adu.org);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.,* 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- FrogMAP (frogmap.adu.org.za); and
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner *et al.*, 2004).

2.3.2.2 Field Surveys

Typical reptile habitats such as rocky outcrops, trees, under logs or stones were searched for the presence of reptile species. Potential dispersal connections between habitats were investigated during random transect walks (Alexander & Marais, 2007).

Due to safety reasons, nocturnal frog surveys were not conducted. Field surveys focused on the evaluation of qualitative and quantitative habitat available for frog species deemed present in the area.

2.3.3 Avifaunal Assessment

2.3.3.1 Literature review

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, 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).

2.3.3.2 Field Surveys

Birds were identified by means of direct observation during point-count observations and playback of recorded calls. Point count observations are essentially strip transects of zero length in which the observer performs the count in a 360 degree arc around a fixed survey station. The advantage of point counts is that skulking and cryptic species are more likely to be detected (Bibby et al., 1998).

Survey stations were randomly located throughout the area to obtain representative samples of the species present in different microhabitats. Counts lasted for approximately 20 minutes. The distance between sampling points was about 50 m. Point counts were conducted from 7 - 11 a.m., when birds are most active.

2.3.4 Probability of Occurrence of Species of Conservation Concern

The occurrence of fauna species is closely dependent on broadly defined habitat types such as terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and aquatic associated vegetation cover, rather than fine scale vegetation classifications. It is thus 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 the fauna assessment involved collating vegetation characteristics, and literature relevant to the fauna of the Province and study area, to draw up lists of fauna species that may be present.

Four parameters were used to assess the probability of occurrence:

- Habitat requirements – Most species, especially Red Listed/Protected species, have very specific habitat requirements; the presence of these habitats in 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 is evaluated for the ecological functioning of Red Listed/Protected species within the study area;
- Geographic distribution of species.

The estimated probability of occurrence was presented in three categories:

- High (71–100%) would be applicable to species with a distributional range overlying the study area. A further consideration included in this category is for a species to be common, abundant and widespread.
- Medium (41-70%) pertains to species with its distributional range peripherally overlying the study area, 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. These species are generally deemed to be rare.

2.3.5 Assessment Methodology for Species of Conservation Concern

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 Conservation of Nature (IUCN), as well as the National Environmental Management Biodiversity Act, (No. 10 of 2004; hereafter referred to as NEMBA) regulations on Threatened and Protected species in South Africa. The KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill, 2014 (hereafter referred to as KZNEBPA), was used to evaluate conservation status on a Provincial scale.

It is important to note that although the category names in the NEMBA list are similar to those in the IUCN Red List, 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 stipulates how wild species are to be managed in terms of human use such as collecting, fishing, hunting, capture, transport and trade. It deals with rare and endangered species within the Province and the powers needed to protect them from exploitation and damage.

In addition to the national and regional assessments, species were also evaluated in terms of CITES agreements. CITES is an international agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

For the botanical assessment, the List of Protected tree species, Section 12 (1) (d) Schedule A (National Forest Act, No. 84 of 1998, Notice 1602 of December 2016), was included.

2.3.5.1 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;
- Habitat specialist: Species are restricted to a specialized microhabitat so that it has a very small area of occupancy (AOO), typically smaller than 20 km^2;
- 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: 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 are 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. Possess, breed, sell, make available for sale or otherwise trade in, buy, receive, give, donate or accept as a gift, or in any way acquire or dispose of, capture, collect, immobilize, poison, kill, translocate, release, display, export, import.

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.

Schedule 5 – KwaZulu-Natal Restricted Use Animal Species: Schedule 5 lists the restricted use animal species and provides for certain prohibited and restricted activities with respect to such species.

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.

CITES Appendices:

Appendices I, II and III of the Convention are lists of species afforded different levels or types of protection from over-exploitation.

Appendix I – A list of species threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial (see Article III), for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate). Article VII of the Convention provides for a number of exemptions to this general prohibition.

Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. It also includes so-called "look-alike species", i.e. species whose specimens in trade look like those of species listed for conservation reasons (see Article II, paragraph 2 of the Convention). International trade in specimens of Appendix-II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild. (See Article IV of the Convention).

Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation (see Article II, paragraph 3, of the Convention). International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates. (See Article V of the Convention).

3 RESULTS & DISCUSSION

3.1 Floral Assessment

Details on the biomes and vegetation types occurring in the project area are provided in Table 4 and Figure 11 (Scott-Shaw & Escott, 2011).

Table 4: Biomes and vegetation types occurring in the project area

BIOME	VEGETATION TYPE	VEGETATION CODE
Indian Ocean Coastal Belt	• KZN 29 : KwaZulu-Natal Coastal Belt Grassland	CB 3
	• KZN 41: KwaZulu-Natal Coastal Belt Thornveld	CB 6
Forests	• KZN 62_5: KwaZulu-Natal Coastal Forest: Southern Mesic Coastal Lowlands Forest	FOz 7
	• KZN 60_4: Eastern Scarp Forests: Southern Coastal Scarp Forest	FOz 5
Azonal Vegetation	• KZN 75_1: Alluvial Wetlands: Subtropical Alluvial Vegetation	Aza 7
	• KZN 76_1: Freshwater Wetlands: Subtropical Freshwater Wetlands	AZf 6

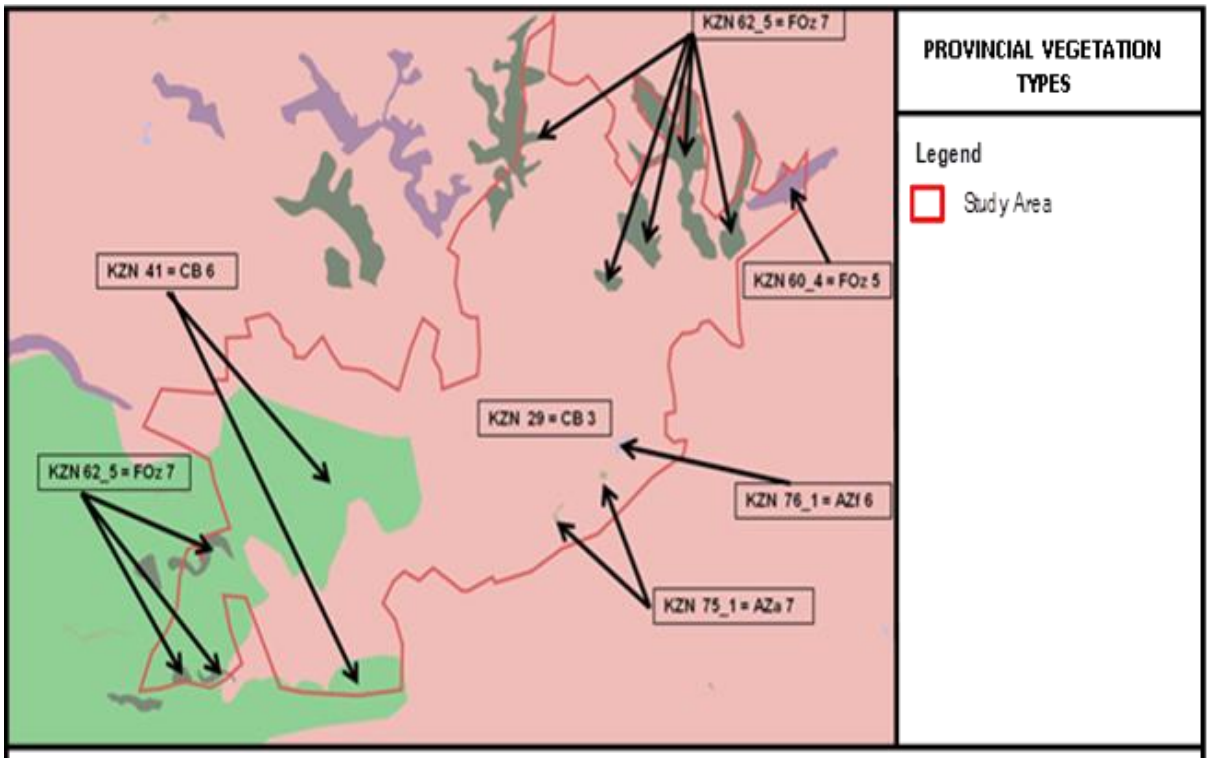

Figure 11: The study area in relation to the extent of Provincial vegetation types

3.1.1 CB 3 KwaZulu-Natal Coastal Belt Grassland

Distribution in KwaZulu-Natal Province: Long and in places broad coastal strip along the KwaZulu-Natal coast, from near Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south. Altitude ranges from about 20 to 450m.

Vegetation and Landscape Features: Highly dissected undulating coastal plains which presumably used to be covered with various types of subtropical coastal forest (the remnants of one of which are described as Northern Coastal Forest). Some primary grassland dominated by *Themeda triandra* still occurs in hilly, high-rainfall areas where pressure from natural fire and grazing regimes prevailed.

At present the KwaZulu-Natal Coastal Belt is affected by an intricate mosaic of very extensive sugarcane fields, timber plantations and coastal holiday resorts, with interspersed secondary Aristida grasslands, thickets and patches of coastal thornveld.

Geology and Soils: Ordovician Natal Group sandstone, Dwyka tillite, Ecca shale and Mapumulo gneiss (Mokolian) dominate the landscapes of the KwaZulu-Natal Coastal Belt. Weathering of old dunes has produced the red sand, called the Berea Red Sand, in places. The soils supported by the above-mentioned rocks are shallow over hard sandstones and deeper over younger, softer rocks.

Climate: Summer rainfall, but with some rainfall also in winter. High air humidity with no incidence of frost. Mean maximum and minimum monthly temperatures for Durban (airport) are 32.6°C and 5.8°C and for Port Shepstone 30.6°C and 8.8°C (both for January and July, respectively).

Important Taxa:

- Graminoids: *Aristida junciformis* subsp. *galpinii, Digitaria eriantha, Panicum maximum, Themeda triandra, Alloteropsis semialata* subsp. *eckloniana, Cymbopogon caesius, C. nardus, Eragrostis curvula, Eulalia villosa, Hyparrhenia filipendula, Melinis repens*.
- Herbs: *Berkheya speciosa* subsp. *speciosa, Cyanotis speciosa, Senecio glaberrimus, Alepidea longifolia, Centella glabrata, Cephalaria oblongifolia, Chamaecrista mimosoides, Conostomium natalense, Crotalaria lanceolata, Dissotis canescens, Eriosema squarrosum, Gerbera ambigua, Hebenstretia comosa, Helichrysum cymosum subsp. cymosum, H. pallidum, Hibiscus pedunculatus, Hybanthus capensis, Indigofera hilaris, Pentanisia prunelloides subsp. latifolia, Senecio albanensis, S. bupleuroides, S. coronatus, S. rhyncholaenus, Sisyranthus imberbis, Stachys aethiopica, S. nigricans, Vernonia galpinii, V. oligocephala*.
- Geophytic Herbs: *Bulbine asphodeloides, Disa polygonoides, Hypoxis filiformis, Ledebouria floribunda, Pachycarpus asperifolius, Schizocarphus nervosus, Tritonia disticha*.
- Low Shrubs: *Clutia pulchella, Gnidia kraussiana, Phyllanthus glaucophyllus, Tephrosia polystachya*.
- Woody Climbers: *Abrus laevigatus, Asparagus racemosus, Smilax anceps*.

- Small Trees & Tall Shrubs: *Bridelia micrantha, Phoenix reclinata, Syzygium cordatum, Acacia natalitia, Albizia adianthifolia, Antidesma venosum*.

Biogeographically Important Taxa: (Coastal belt element, southern distribution limit)

- Graminoids: *Cyperus natalensis, Eragrostis lappula*.
- Herbs: *Helichrysum longifolium, Selago tarachodes, Senecio dregeanus, Sphenostylis angustifolia*.
- Geophytic Herbs: *Kniphofia gracilis, K. littoralis, K. rooperi, Pachystigma venosum, Zeuxine africana*.
- Low Shrubs: *Helichrysum kraussii (d), Agathisanthemum bojeri, Desmodium dregeanum*.
- Megaherb: *Strelitzia nicolai*.
- Geoxylic Suffrutices: *Ancylobotrys petersiana, Eugenia albanensis, Salacia kraussii.*
- *Small Trees & Tall Shrubs: Anastrabe integerrima, Acacia nilotica* subsp*. kraussiana*.

Endemic Taxa:

- Herb: *Vernonella africana* (extinct).
- Geophytic Herb: *Kniphofia pauciflora*.
- Low Shrub: *Barleria natalensis* (extinct).

Conservation status:

ENDANGERED in general, but CRITICALLY ENDANGERED in KZN. About 50% transformed for cultivation, by urban sprawl and for road-building. Aliens include *Chromolaena odorata*, *Lantana camara*, *Melia azedarach* and *Solanum mauritianum*. Erosion is low and moderate.

3.1.2 CB 6 KwaZulu-Natal Coastal Belt Thornveld

Distribution: KwaZulu-Natal Province: From near Mandini in the north to Oribi Gorge in the south. Altitude 30 to 500m.

Vegetation and Landscape Features: Steep valley sides and hilly landscape mainly associated with drier larger river valleys in the rain shadow of the rain bearing frontal weather systems from the east coast. Bushed grassland, bushland and bushland thicket and open woodland.

Climate: Summer rainfall with some rain in winter. MAP about 740 to 940 mm. Summers are hot and humid and winters mild. Frost does not occur.

Conservation Status:

VULNERABLE. This vegetation unit grades into the SVs 6 Eastern Valley Bushveld and SVs 3 KwaZulu-Natal Hinterland Thornveld in the larger river valleys.

3.1.3 FOz 7 Northern Coastal Forest

Distribution: KwaZulu-Natal and (to a very small extent) Eastern Cape Province: Especially along the seaboards of Indian Ocean of KwaZulu-Natal Province and particularly well-developed in Maputaland. Few patches of the dune forest also occur on the Wild Coast of Transkei (Eastern Cape Province). Beyond South Africa these forests occur throughout the Mozambican seaboard as far as southern Tanzania. At low altitudes, from about 10 to 150m.

Vegetation and Landscape Features: Species-rich, tall/medium-height subtropical coastal forests occur on coastal (rolling) plains and stabilised coastal dunes. Forests of the coastal plains are dominated by *Drypetes natalensis, Englerophytum natalense, Albizia adianthifolia, Diospyros inhacaensis*. The low-tree and shrubby under-storeys are species-rich and comprise many taxa of (sub)tropical provenience. On dunes, these forests have well-developed tree, shrub and herb layers. *Mimusops caffra, Sideroxylon inerme, Dovyalis longispina, Acacia kosiensis* and *Psydrax obovata* subsp. *obovata* are the most common constituents of the tree layer.

Brachylaena discolor var*. discolor, Chrysanthemoides monilifera* subsp*. rotundata, Carissa bispinosa* subsp*. bispinosa, Euclea natalensis, E. racemosa, Eugenia capensis, Gymnosporia nemorosa, Kraussia floribunda, Peddiea africana, Strelitzia nicolai* and *Dracaena aletriformis* are frequent in the understorey.

The herb layer usually contains *Asystasia gangetica, Isoglossa woodii, Microsorum scolopendria, Zamioculcas zamiifolia* and *Oplismenus hirtellus*. Herbaceous vines and woody climbers (*Acacia kraussiana, Artabotrys monteiroae, Dalbergia armata, Landolphia kirkii, Monanthotaxis caffra, Rhoicissus tomentosa, Rhus nebulosa, Scutia myrtina, Uvaria caffra* and *Gloriosa superba*) are important structural determinants in these forests.

Geology and Soils: Well-developed sandy-loamy soils on sedimentary rocks of the Karoo Supergroup and Jurassic intrusive dolerites (in places) as well as on Holocene marine sediments. Forming stabilised sandy dune systems, mostly younger than 10 000 years and still in the process of sedimentation.

Important Taxa:

- Tall Trees: *Albizia adianthifolia, Drypetes reticulata, Mimusops caffra, Psydrax obovata* subsp. *obovata, Sideroxylon inerme, Trichilia emetica, Vepris lanceolata*.
- Small Trees: B*rachylaena discolor* subsp. *discolor, Buxus natalensis, Cavacoa aurea, Englerophytum natalense, Erythroxylum emarginatum, Eugenia capensis, Gymnosporia nemorosa, Kraussia floribunda, Peddiea africana, Rhus nebulosa, Strychnos henningsii, Acokanthera oblongifolia, Callichilia orientalis, Deinbollia oblongifolia, Dovyalis rhamnoides, Euclea natalensis, E. racemosa, Scutia myrtina, Strychnos decussata, Tapura fischeri, Teclea gerrardii, Turraea floribunda, Xylotheca kraussiana*.
- Woody Climbers: *Acacia kraussiana, Rhoicissus tomentosa, Dalbergia armata, Monanthotaxis caffra, Uvaria caffra*.
- Herbaceous Climber: *Gloriosa superba*.

- Tall Shrubs: *Carissa bispinosa* subsp. *bispinosa, Hyperacanthus amoenus, Putterlickia verrucosa*.
- Low Shrub: *Chrysanthemoides monilifera* subsp. *rotundata*.
- Soft Shrub: *Isoglossa woodii*.
- Megaherbs: *Dracaena aletriformis, Strelitzia nicolai*.
- Herbs: *Achyranthes aspera, Asystasia gangetica, Laportea peduncularis*.
- Geophytic Herb: *Microsorum scolopendria*.
- Graminoids: *Cyperus albostriatus, Oplismenus hirtellus*.

Biogeographically Important Taxa: (Maputaland endemic, Southern distribution limit)

- Tall Trees: *Celtis gomphophylla, Chrysophyllum viridifolium, Diospyros inhacaensis, Drypetes natalensis, Cola natalensis, Inhambanella henriquesii, Manilkara concolor*.
- Small Trees: *Coffea racemosa, Dovyalis longispina, Artabotrys monteiroae, Encephalartos ferox, Erythrococca berberidea, Pancovia golungensis*.
- Tall Shrubs: *Haplocoelum foliolosum* subsp. *mombasense, Landolphia kirkii*.

Endemic Taxon:

- Small Tree: *Acacia kosiensis*.

Conservation Status:

LEAST THREATENED in general, but still under threat on coastal dunes of KwaZulu-Natal (due to mining) where it is considered CRITICALLY ENDANGERED. The original extent of these forests has been diminished by agriculture (mainly sugar cane and fruit gardens), timber plantations, urban sprawl and tourism-oriented development on the KwaZulu-Natal coast. The current threats count (besides the ongoing coastal development pressures) also illegal clearing of the forest and turning it into lots for small-scale. These subtropical forests are sensitive to alien plant invasion, and invaders such as *Chromolaena odorata*, species of Pereskia and Acacia are posing serious threats.

3.1.4 FOz 5 Scarp Forest

Distribution: Eastern Cape, KwaZulu-Natal and Mpumalanga Provinces as well as in Swaziland (and possibly also in Mozambique). An archipelago of scattered patches (some of them large, such as Ongoye) spanning southern Mpumalanga (Crocodile River Gorge), the southern part of Lebombo Mountains (KwaZulu-Natal) and reaching nearly as far as Kei River Mouth on the Transkei coast.

Patches of this forest lie as far as 140 km inland (Mpumalanga), but extend increasingly closer to the sea in a southward direction—in Pondoland, and southern Transkei they occur at the coast or in deep gorges, often associated with krantzes, scarps and coastal platforms. Most of the patches occur at low altitudes between 50 and 600 m.

Vegetation and Landscape Features: Tall (15–25 m), species-rich and structurally diverse, multilayered forests, with well-developed canopy and understorey tree layers, but a poorly developed herb layer. Buttressed stems are common in the Scarp Forest. The most conspicuous trees are *Buxus macowanii, B. natalensis, Drypetes gerrardii, Englerophytum natalense, Harpephyllum caffrum, Heywoodia lucens, Memecylon natalense, Millettia grandis, Oricia bachmannii, Philenoptera sutherlandii, Rinorea angustifolia, Rothmannia globosa* and *Umtiza listeriana*.

Geology and Soils: Natal Sandstone outcrops (Msikaba Group Sandstones in Pondoland) as well as syenitic granite, rhyolite of the Jozini formation of the Lebombo group (Karoo Supergroup) and other Karoo sedimentary rocks; supporting nutrient poor, leached and shallow soils.

Important Taxa:

- Tall Trees: *Buxus natalensis, Drypetes gerrardii, Englerophytum natalense, Harpephyllum caffrum, Heywoodia lucens, Rothmannia globosa, Commiphora harveyi, C. woodii, Drypetes arguta, Manilkara discolor, Nectaropetalum capense, Nuxia congesta, Olinia emarginata, Ptaeroxylon obliquum, Pterocelastrus tricuspidatus, Vitellariopsis marginata*.
- Small Trees: *Buxus macowanii, Rinorea angustifolia, Dombeya cymosa, Encephalartos natalensis, E. villosus, Ochna natalitia, Strychnos henningsii, S. mitis*.
- Herbaceous Climbers: *Flagellaria guineensis, Thunbergia alata*.
- Tall Shrubs: *Memecylon natalense, Eugenia natalitia*.
- Low Shrub: *Stangeria eriopus*.
- Soft Shrub: *Piper capense*.
- Herbs: *Begonia dregei, B. homonyma, Streptocarpus grandis, S. johannis*.
- Geophytic Herb: *Clivia miniata*.

Biogeographically Important Taxon:

- Tall Shrub: *Pseudoscolopia polyantha* (disjunct populations also in Cape in AZa 1 Fynbos Riparian Vegetation).

Endemic Taxa:

- Tall Trees: *Millettia grandis, Oricia bachmannii, Philenoptera sutherlandii, Umtiza listeriana, Celtis mildbraedii, Colubrina nicholsonii, Cryptocarya myrtifolia, C. wyliei, Dahlgrenodendron natalense, Jubaeopsis caffra, Manilkara nicholsonii, Maytenus oleosa, Pseudosalacia streyi, Rinorea domatiosa*.
- Small Trees*: Alberta magna, Albizia suluensis, Apodytes abbottii, Canthium vanwykii, Encephalartos woodii* (extinct in the wild), *Gerrardanthus tomentosus, Rhynchocalyx lawsonioides, Tarchonanthus trilobus* var. *trilobus*.
- Woody Climber: *Podranea ricasoliana*.

- Epiphytic Herb: *Bolusiella maudiae*.
- Epiphytic Shrub: *Dermatobotrys saundersii*.
- Epiphytic Parasitic Shrubs: *Actinanthella wyliei, Helixanthera woodii*.
- Tall Shrubs: *Eugenia simii, E. verdoorniae, Gymnosporia bachmannii, Justicia bolusii, J. petiolaris* subsp. *bowiei, Oxyanthus pyriformis, Putterlickia retrospinosa*.
- Soft Shrubs: *Heterosamara galpinii, Metarungia galpinii*.
- Herbs: *Impatiens flanaganiae, Plectranthus oribiensis, P. praetermissus, Streptocarpus fasciatus, S. kentaniensis, S. lupatanus, S. porphyrostachys, S. primulifolius* subsp. *formosus*.
- Geophytic Herbs: *Clivia robusta, C. gardenii*.
- Succulent Herbs: *Plectranthus ernstii, P. hilliardiae* subsp. *australis, P. hilliardiae subsp. hilliardiae, P. oertendahlii, P. saccatus var. longitubus.*

Conservation Status:

LEAST THREATENED in protected areas, but exposed to over-exploitation elsewhere. Still most of the approximately 70 smaller scarp forests between Durban and Umtamvuna are not protected. Almost 5% has been transformed for cultivation or plantations. Aliens such as Chromolaena odorata, Solanum mauritianum, Melia azedarach, Lantana camara and Litsea sebi¬fera are of concern locally.

Collapse of traditional authorities in both Eastern Cape (especially in Transkei and in KwaZulu) has led to uncontrolled use of forests formerly protected under the authority of headmen and chiefs. Bark stripping, muthi collection, deadwood extraction, and land-claims may become other major sources of threat to the existence of some forest patches.

3.1.5 AZa 7 Subtropical Alluvial Vegetation

Distribution: Limpopo, Mpumalanga and KwaZulu-Natal Provinces and in Swaziland: Broad river alluvia and around some river-fed pans in the subtropical regions of eastern South Africa, in particular in the Lowveld, Central Bushveld and in northern KwaZulu-Natal. The most important alluvia include the Limpopo, Luvubu, Olifants, Sabie, Crocodile, Phongolo, Usutu and Mkuze Rivers. This unit is fully embedded within the Savanna Biome. Altitude ranging from 0 to 1000 m.

Vegetation and Landscape Features: Flat alluvial riverine terraces supporting an intricate complex of macrophytic vegetation (channel of flowing rivers and river-fed pans), marginal reed belts (in sheltered oxbows and along very slow-flowing water courses) as well as extensive flooded grasslands, ephemeral herblands and riverine thickets.

Geology, Soil and Hydrology: Recent alluvial deposits with deep fine-structured sandy to loamy soils (Dundee, Estcourt, Valsrivier, Sterkspruit, Oakleaf forms), waterlogged as it is often exposed to floods (especially during the rainy summer season). Salt often accumulates in the alluvial soils (due to strong evaporation).

Climate: Subtropical, seasonal summer-rainfall climate with broad range of temperature (19.3°C in western Central Bushveld and 22.0°C in Mopane) and precipitation (MAP 311 to 672 mm for Limpopo Valley and Maputaland, respectively) due to large latitudinal and longitudinal ranges.

Important Taxa:

- Riparian thickets Small Trees: *Acacia natalitia, A. robusta, Boscia foetida* subsp. *rehmanniana, Combretum erythrophyllum, Phoenix reclinata, Salix mucronata* subsp. *woodii, Ziziphus mucronata, Acacia luederitzii, A. nebrownii, A. nigrescens, A. tortilis, A. xanthophloea, Colophospermum mopane, Combretum hereroense, Philenoptera violacea, Pseudoscolopia polyantha*.
- Tall Shrubs: *Salvadora angustifolia, Commiphora glandulosa, C. pyracanthoides, Euclea divinorum, Grewia bicolor, Gymnosporia senegalensis*.
- Low Shrubs: *Justicia flava, Ocimum canum*.
- Graminoids: *Eragrostis trichophora, Panicum maximum, Setaria incrassata, Sporobolus ioclados, Chloris virgata, Dactyloctenium aegyptium, Enneapogon cenchroides, Urochloa mosambicensis*.
- Herbs: *Commelina benghalensis, Abutilon austro-africanum, Acalypha indica, Achyranthes aspera, Boerhavia erecta, Commicarpus fallacissimus, Cucumis zeyheri, Heliotropium ovalifolium, Lobelia angolensis, Oxygonum sinuatum, Pupalia lappacea, Ruellia patula*.
- Geophytic Herb: *Crinum moorei*.
- Succulent Herb: *Portulaca quadrifida*.
- Reed beds Megagraminoids: *Phragmites australis, P. mauritianus, Prionium serratum* (only along few rapids in Pondoland).
- Flooded grasslands & herb lands Megagraminoid: *Cyperus immensus*.
- Graminoids: *Cynodon dactylon, Cyperus articulatus, Echinochloa pyramidalis, Urochloa mosambicensis, Bolboschoenus glaucus, Chloris mossambicensis, C. virgata, Cyperus corymbosus, C. difformis, C. distans, C. fastigiatus, C. sexangularis, Dactyloctenium aegyptium, Hemarthria altissima, Ischaemum afrum, Paspalidium obtusifolium, Setaria sphacelata, Sporobolus consimilis, S. fimbriatus.*
- Herbs: *Alternanthera sessilis, Amaranthus praetermissus, Grammatotheca bergiana* (Pondoland), *Marsilea ephippiocarpa, Scutellaria racemosa*.
- Geophytic Herb: *Trachyandra saltii*.
- Aquatic Herbs: *Ceratophyllum muricatum, Ottelia exserta*.

Endemic Taxon:

Flooded grasslands & herblands Herb: *Crotalaria mollii*.

Conservation Status:

LEAST THREATENED in general, but considered ENDANGERED in KZN. Much of the area has been transformed for cultivation, urban development and road building. Alien species commonly occurring in this vegetation types include *Melia azedarach* and *Chromolaena odorata*.

3.1.6 AZf 6 Subtropical Freshwater Wetlands

Distribution: KwaZulu-Natal, Mpumalanga, Gauteng, North-West, Limpopo and Eastern Cape Provinces as well as in Swaziland: Wetlands embedded within the Albany Thicket Biome, the Coastal Belt from Transkei as far as Maputaland as well as those of Lowveld and the Central Bushveld regions. Altitude ranging from 0 to 1400 m.

Vegetation and Landscape Features: Flat topography supporting low beds dominated by reeds, sedges and rushes, waterlogged meadows dominated by grasses. Found typically along edges of often seasonal pools in aeolian depressions as well as fringing alluvial backwater pans or artificial dams.

Geology, Soil and Hydrology: Waterlogged, clayey soils of Champagne and Arcadia forms, containing certain levels of decaying organic matter, especially in very productive reed beds. These wetlands are underlain mostly by Cenozoic alluvium, less so by Karoo Supergroup volcanic rocks and sediments, as well as by the Cretaceous (and younger coastal) sediments of the Zululand and Maputaland Groups. Waterlogged habitats with water regularly forming columns of variable depth. The highest water levels are found in summer, during periods of maximum seasonal rainfall.

Climate: Mainly seasonal, summer rainfall (Lowveld and Central Bushveld), and to a lesser extent also non-seasonal (Albany region and the Eastern Cape and KwaZulu-Natal coastal belts) climate characterised by high precipitation. MAP spanning 454 mm (Makhado) to 963 mm (Maputaland).

Important Taxa:

- Marshes Small Trees: *Hyphaene coriacea, Phoenix reclinata*.
- Graminoids: *Chloris virgata, Cynodon dactylon, Cyperus articulatus, Dactyloctenium aegyptium, Diplachne fusca, Echinochloa pyramidalis, Fimbristylis obtusifolia, Hemarthria altissima, Imperata cylindrica, Ischaemum arcuatum, Leersia hexandra, Pycreus mundii, Sporobolus nitens, S. smutsii, Urochloa stolonifera, Bolboschoenus glaucus, Courtoisia cyperoides, Cyperus alopecuroides, C. pectinatus, Digitaria natalensis, Echinochloa stagnina, Eragrostis chapelieri, E. lappula, Eriochloa meyeriana, Fimbristylis bisumbellata, Fuirena ecklonii, Oxycaryum cubense, Paspalidium obtusifolium, Paspalum commersonii, Pycreus pelophilus, P. polystachyos, Scleria poiformis, Sporobolus consimilis*.
- Herbs: *Pentodon pentandrus, Persicaria senegalensis, Burmannia madagascariensis, Centella coriacea, Commelina diffusa, Convolvulus mauritanicus, Desmodium dregeanum, Eclipta prostrata, Epaltes gariepina, Eriocaulon abyssinicum, Ethulia conyzoides, Glinus lotoides, Hydrocotyle ranunculoides, Ludwigia adscendens subsp. diffusa, L. leptocarpa, L. octovalvis, L. palustris, Neptunia oleracea, Persicaria*

attenuata subsp. africana, P. hystricula, Rorippa madagascariensis, Sium repandum, Vahlia capensis.

- Geophytic Herbs: *Eulophia angolensis, Zeuxine africana*.
- Succulent Herb: *Salicornia pachystachya*.
- Semiparasitic Herb: *Buchnera longespicata*.
- Aquatic Herbs: *Bergia salaria, Lagarosiphon crispus*.
- Lakes & ponds Graminoid: *Eleocharis dulcis* (forming rafts).
- Aquatic Herbs: *Azolla pinnata* var. *africana, Ceratophyllum demersum, Lemna minor, Nymphaea nouchali* var. *caerulea, Pistia stratiotes, Wolffia arrhiza, Aponogeton desertorum, A. natalensis, A. rehmannii, Ceratophyllum muricatum, Marsilea macrocarpa, Najas marina* subsp. *delilei, N. pectinata, Nymphoides indica* subsp. *occidentalis, N. rautanenii, Ottelia exserta, Potamogeton crispus, P. pectinatus, P. schweinfurthii, Spirodela polyrhiza, S. punctata, Trapa natans* var. *bispinosa*.
- Carnivorous Herbs: *Utricularia gibba*.
- Geophytic Herb: *Crinum paludosum*.
- Reed & sedge beds Megagraminoids: *Cladium mariscus* subsp. *jamaicense, Cyperus papyrus, Phragmites australis, P. mauritianus, Schoenoplectus corymbosus, S. scirpoideus, Typha capensis*.
- Graminoids: *Cyperus fastigiatus, C. difformis, C. digitatus, C. latifolius, C. sexangularis, Fuirena ciliaris*.

Biogeographically Important Taxa: (all southernmost distribution limits):

- Streambanks Herb: *Floscopa glomerata, Ipomoea aquatica*.
- Geophytic Herb: *Bolbitis heudelotii*.
- Lakes & ponds Aquatic Herbs: *Brasenia schreberi, Ceratopteris cornuta, Wolffia globosa, Wolffiella welwitschii.* Herbs: *Hygrophila schulli, Limnophyton obtusifolius, Marsilea apposita, M. coromandelina, M. minuta, M. villifolia*.
- Reed & sedge beds Graminoids: *Cyperus dives, C. procerus, C. prolifer*.

Endemic Taxa:

- Marshes Graminoid: *Cyperus sensilis* (embedded within Indian Ocean Coastal Belt of KwaZulu-Natal).
- Lakes & ponds Geophytic Herbs: *Crinum campanulatum* (Albany region).
- Aquatic Herbs: *Isoetes wormaldii* (Albany region), *Wolffiella denticulata* (Maputaland).

Conservation Status:

LEAST THREATENED in general, but considered VULNERABLE in KZN. So far only about 4% has been transformed (largely for cultivation), but the pressure of local grazing and urban

sprawl will result in the demise of many subtropical freshwater habitats. Disturbance leads to invasion by alien plants such as *Lantana camara, Chromolaena discolor* and *Melia azedarach* (on the edges of wetlands) and aquatic weeds such as *Eichhornia crassipes*, *Pistia stratiotes* and *Salvinia molesta* (in water bodies).

3.2 Vegetation Communities

The majority of the site is highly transformed by human settlement and associated activities such as road construction (formal and informal) and clearing for subsistence farming and cultivated gardens. Areas with at least some natural vegetation present are indicated below and more-or-less corresponds with the D'MOSS. The following broad vegetation communities are discussed below.

3.2.1 Grasslands

The grasslands present on the site show a rather low degree of diversity, perhaps attributable to prolonged over-grazing and over-burning (Figure 12). Unpalatable grasses, particularly *Aristida junciformis*, predominate and palatable species are close-cropped and lawn-like in appearance. Geophytes are noticeably absent and those that are present (such as *Hypoxis hemerocallidea* and *Scadoxus puniceus* – both protected species) are present in small numbers and appear depauperate. The former species is usually the most persistent of the geophytes, but is showing signs of stress.

Alien species are abundant and weedy and ruderal indigenous forbs are common, both an indication of disturbance. Woody species are limited to aliens such as *Melia azedarach* and *Syzygium cumini* and early pioneers such *as Albizia adianthifolia*, *Erythrina lysistemon*, *Acacia sieberiana*, *Sclerocroton integerrimus* and their seedlings. Erosion of footpaths and informal roads has taken place and is quite severe in places (Figure 12).

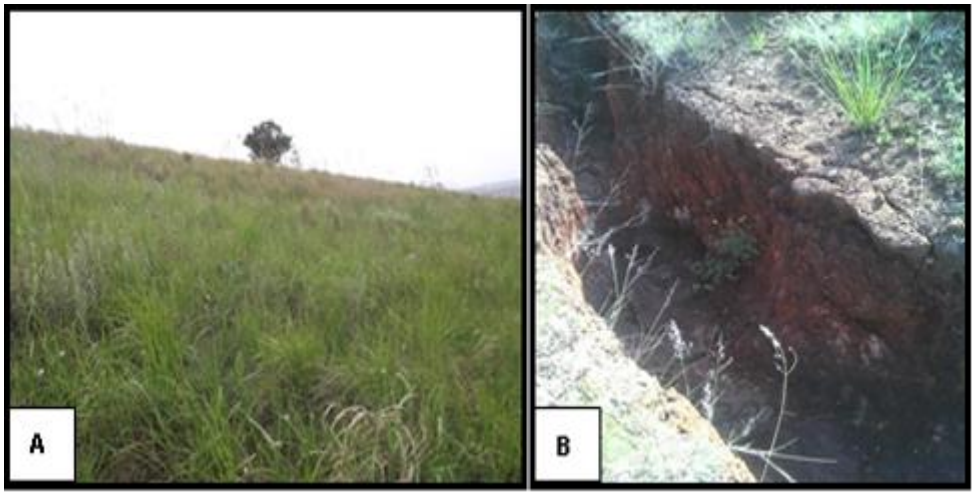

Figure 12: A - grasslands in general are species poor with few palatable grass species present. B - severe gully erosion resulting from informal roads

3.2.2 Riparian Vegetation

The riparian vegetation along the various drainage lines and the Ohlanga River has been heavily invaded by alien species almost to the exclusion of indigenous vegetation. *Tithonia diversifolia* and *Pennisetum purpureum* predominate with *Coix lacryma-jobi*, *Canna indica*, *Colocasia esculenta, Ricinus communis* and *Sesbania* sp. also abundant (Figure 13). Indigenous vegetation is limited and represented almost exclusively by the ubiquitous broad-leaved *Cyperus* species and *Typha capensis*.

Figure 13: The riparian vegetation is heavily invaded by alien plant species

3.2.3 Forests

Forests are mostly restricted to the steeper areas and falls mostly within D'MOSS-designated areas. These areas are still in a reasonable state, although alien species can be found at their edges and to a lesser degree within their borders (Figure 14).

Pioneer plant species such as *Bridelia micrantha, Searsia chirindensis, Apodytes dimidiata, Trema orientalis, Strelitzia nicolai* and *Albizia adianthifolia* are common, but there are numerous invasive and alien species associated with these such as *Melia azedarach* and *Litsea sebifera*. Other indigenous woody species included a number of *Croton sylvaticus, Tabernaemontana ventricosa, Combretum kraussii* and *Ficus burkei*, with a good under-storey of indigenous species (eg. *Rhinacanthus gracilis, Psychotria capensis, Isoglossa woodii, Cyperus albostriatus, Asystasia gangetica*) and certain alien under-storey and creeping species (eg. *Boerhavia diffusa, Mirabilis jalap, Cardiospermum grandiflorum, Anredera cordifolia*).

Figure 14: Forest areas are degraded by the dumping of domestic waste and garden refuse

3.2.4 Sub-Urban Areas

By far the largest area is the sub-urban landscape, the creation of which has led to the removal of indigenous vegetation on a vast scale as seen below (Figure 15). The network of formal and informal roads and paths and clearing for formal and informal dwellings has transformed the area. Gardens have resulted in the replacement of indigenous species with cultivated *Mangifera indica, Psidium guajava, Citrus limon, Persea americana, Zea mays, Colocasia esculenta, Cucurbita pepo, Prunus persica, Musa* hybrids and ornamentals such as *Thevetia peruviana, Bouganvillea*, *Duranta erecta* and Yucca to name a few.

Figure 15: Large scale clearance of natural vegetation has taken place to accommodate the development of formal and informal settlements

A list of indigenous plant species encountered during field visits are presented in Table 5.

Table 5: A list of indigenous plant species recorded during the survey

Abrus precatorius	*Dioscorea cotinifolia*	*Searsia chirindensis*
Acacia seedlings	*Distephanus angulifolius*	*Searsia nebulosa*
Acacia sieberiana	*Erythrina lysistemon*	*Senecio* spp.
Achyranthes aspera	*Euclea crispa*	*Senecio deltoideus*
Albizia adianthifolia	*Ficus burkei*	*Senecio glaberrimus*
Alectra sessiliflora	*Ficus lutea*	*Senecio madagascariensis*
Aloe barberae (street tree)	*Ficus sur*	*Senecio polyanthemoides*
Aneilema aequinoctiale	*Helichrysum* spp.	*Senecio tamoides*
Apodytes dimidiata	*Helichrysum cephaloideum*	*Setaria megaphylla*
Aristida juncifolia	*Helichrysum nudifolium*	*Sida dregei*
Asparagus falcatus	*Helichrysum ruderale*	*Sida rhombifolia*
Asparagus virgatus	*Hippobromus pauciflorus*	*Smilax anceps*
Asystasia gangetica	**Hypoxis hemerocallidea* (Red Listed-DECLINING)	*Stachys natalensis*
Berkheya sp.	*Isoglossa woodii*	*Strelitzia nicolai*
Berkheya bipinnatifida	*Lantana rugosa*	*Striga asiatica*
Brachylaena discolor	*Leucas lavandulifolia*	*Syzygium cordatum*
Bridelia micrantha	*Ludwigia octovalvis*	*Tabernaemontana ventricosa*
Burchellia bubalina	*Melinis repens*	*Tetraselago natalensis*
Centella asiatica	*Microglossa mespilifolia*	*Trema orientalis*
Ceratotheca triloba	*Pachycarpus* sp.	*Tricalysia lanceolata*
Chamaecrista mimosoides	*Pavetta lanceolata*	*Trimeria grandifolia*
Clausena anisate	*Phoenix reclinata*	*Triumfetta rhomboidea*
Clerodendrum glabrum	*Phragmites australis*	*Typha capensis*
Clutia hirsute	*Protorhus longifolia*	*Vangueria infausta*
Combretum kraussii	*Pseudarthria hookeri*	*Xysmalobium undulatum*
Combretum molle	*Psychotria capensis*	
Commelina africana	*Rhinacanthus gracilis*	
Croton sylvaticus	*Rhynchosia caribaea*	
Cyperus albostriatus	*Rothmannia globosa*	
Cyperus dives	**Scadoxus puniceus* – Specially Protected	

Dalbergia obovata	*Sclerocarya caffra* (street tree)	
Dalechampia natalensis	*Sclerocroton integerrimus*	

3.2.5 Alien Invasive Plant Species

The alien invasive species that were recorded in the project area, along with their relevant categories according to the NEMBA Alien and Invasive Species Regulations (2016) are listed in Table 6.

Table 6: Alien invasive plant species recorded in the project area along with their NEMBA category

CATEGORY 1b:	CATEGORY 2:	CATEGORY 3:
Ageratum spp.	*Agave* sp.	*Duranta erecta*
Anredera cordifolia	*Passiflora edulis*	*Psidium guajava*
Chromolaena odorata	*Pennisetum purpureum*	
Eucalyptus sp.	*Ricinus communis*	
Hedychium gardnerianum		
Ipomoea purpurea		
Jacaranda mimosifolia		
Lantana camara		
Litsea sebifera		
Melia azedarach		
Pereskia aculeata		
Plectranthus comosus		
Senna didymobotrya		
Sesbania punicea		
Solanum mauritianum		
Syzygium cumini		
Thevetia peruviana		
Tithonia diversifolia		
Xanthium spinosum		
Xanthium strumarium		
Canna indica		
Cardiospermum grandiflorum		
Catharanthus roseus		

Mirabilis jalapa		
Morus alba		
Callisia repens		

Category 1b Listed Invasive Species

- Listed Invasive Species which must be controlled removed or destroyed; and
- These species may also not be imported, in any way propagated or allowed to multiply, be translocated, or in any way traded or donated.

Category 2 Listed Invasive Species

- Listed Invasive Species are those species that can only be imported, propagated, traded or translocated with a permit within an area specified in the Notice or an area specified in the permit, as the case may be;
- A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit; and
- Depending on the specific species, plants in riparian-, protected- or threatened ecosystem areas may be reclassified Category 1b.

Category 3 Listed Invasive Species

- Listed Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade is however prohibited; and
- Depending on the specific species, plants in riparian-, protected- or threatened ecosystem areas may be reclassified Category 1b.

The following common weeds, cultivated species and garden ornamentals were recorded in the project area (Table 7).

Table 7: Common weeds, cultivated species and garden ornamentals recorded in the project area

Amaranthus hybridus	*Coix lacryma-jobi*	*Persea americana*
Ambrosia artemisiifolia	*Colocasia esculenta*	*Persicaria lapathifolia*
Araucaria sp.	*Conyza* spp.	*Prunus persica*
Bambusa balcooa	*Cucurbita pepo*	*Richardia brasiliensis*
Bidens pilosa	*Desmodium incanum*	*Sansevieria hyacinthoides*
Boerhavia diffusa	*Hibiscus rosa-sinensis*	*Solanum* spp.
Bougainvillea sp.	*Mangifera indica*	*Syngonium* sp.
Carica papaya	*Manihot esculenta*	*Tagetes minuta*

Citrus limon	*Mimosa pudica*	*Yucca* sp.
Cocos sp.	*Musa* hybrid	

3.2.6 Summary of species of Conservation Importance recorded in the study area

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

Hypoxis hemerocallidea (see localities later), *Scadoxus puniceus* (found at 29°40'16.43"S / 30°57'54.90"E and 29°40'16.54"S / 30°57'54.84"E), *Protorhus longifolia*, *Strelizia nicolai* (found at 29°39'12.64"S / 31°0'9.40"E); *Burchellia bubalina* (found at 29°40'14.97"S / 30°57'54.33"E) and *Hippobromus pauciflorus* (found at 29°39'14.17"S / 31°0'21.86"E) will require a permit from eKZNw to remove or re-locate.

Flora protected by the National Forests Act

Sclerocarya caffra was present as a single tree in a street in the general area of the study area, but will be unaffected by the proposed development. However, its presence indicates the potential for other occurrences of this species which would require permit authorisation from DAFF to damage or destroy.

Rare, Red Listed and Endemic species

A few examples of the Red-Listed species *Hypoxis hemerocallidea* (DECLINING) were found scattered in grassland on the site. The GPS coordinates of these locations are provided in Table 8.

Table 8: GPS locations of *H. hemerocallidae* recorded in grasslands

LATITUDE	LONGITUDE
29°40'15.79"S	30°57'50.99"E
29°40'15.33"S	30°57'54.18"E
29°40'16.42"S	30°57'57.33"E
29°40'15.59"S	30°57'59.53"E
29°40'13.03"S	30°58'0.13"E
29°40'12.89"S	30°58'0.26"E
29°40'12.87"S	30°58'0.29"E
29°40'13.95"S	30°58'3.13"E

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

3.3 Faunal Assessment

3.3.1 Mammal Assessment

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 favour 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 within the study area (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 study area.

3.3.1.1 Mammal Habitat Assessment

The occurrences of fauna species are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupiculous (rock-dwelling) and adquatic/wetland-associated habitat types, rather than fine-scale vegetation mapping. It is thus possible to deduce the presence or absence of fauna species by evaluating the habitat types within the context of global distribution ranges.

The study area offers all major habitat types. Terrestrial is by far the biggest, but generally is in a very bad ecological state of repair. Except for some D'MOSS designated zones; all areas have been severely transformed by urban sprawl, littering, alien plant invasions and soil erosion amongst others.

Aquatic / wetland habitat is present on areas along the Ohlanga River and several tributaries flowing into the Ohlanga River. The entire floodplain of the Ohlanga River is in a very poor ecological condition because of subsistence farming, alien plant invasions, litter and poor water quality. Wetland areas are similarly degraded.

Because of extensive formal and informal settlements on the study area, available fauna habitat is limited to a few isolated areas which have zoogeographical repercussions (Figure 16). Consequently, the abundance and diversity of fauna species are expected to be limited to small mammal species such as rodents, shrews and bats.

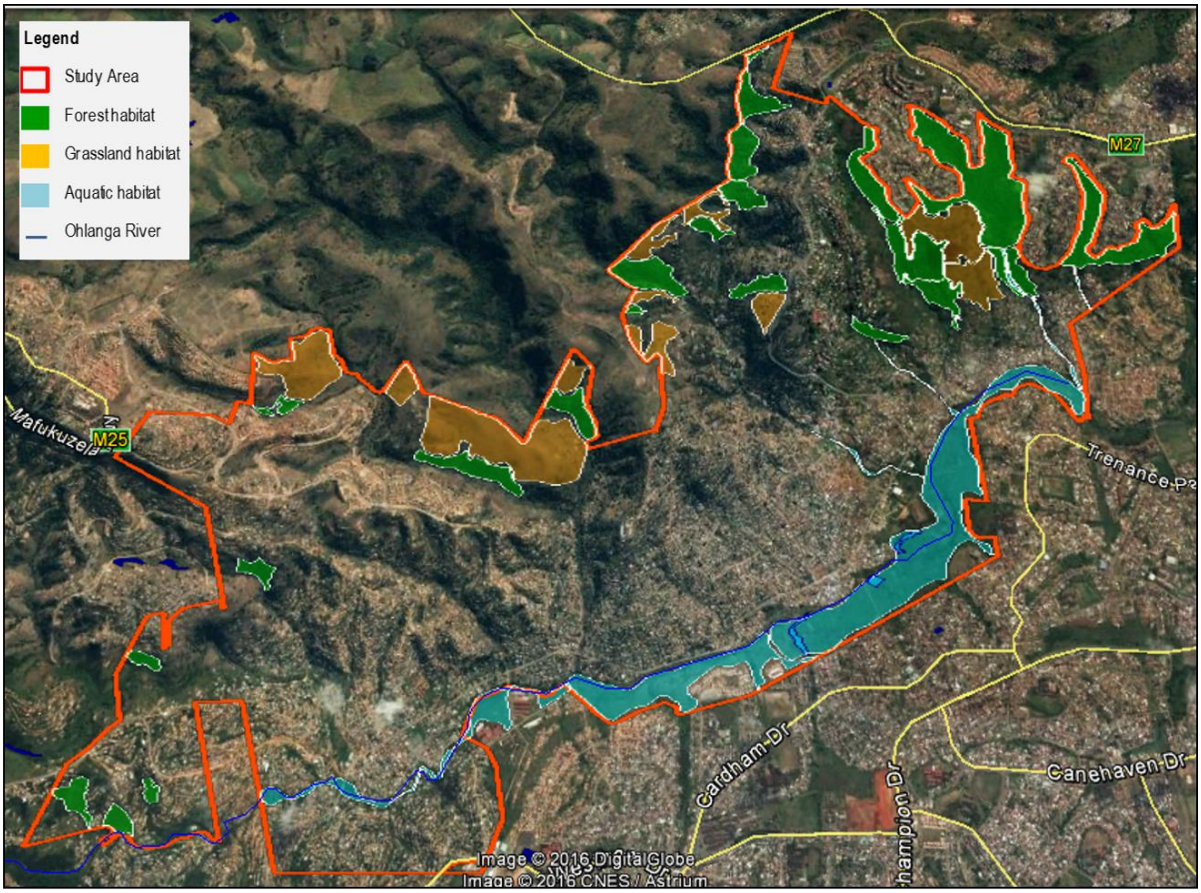

Figure 16: Google earth view of the distribution of available habitat within the study area

3.3.1.2 Expected and Observed Mammal Species Richness

The study area falls within the distributional range of 72 mammal species, (Appendix 2), with the majority of the small mammal species (i.e. rodents, shrews, bats) having a high probability of occurrence. It should be noted that potential occurrence is interpreted as to be possible over a period as a result of environmentally induced expansion and contractions of population densities and ranges which simulates migration. Because of urban sprawl, hunting and poaching pressure, few of the larger mammal species are expected to be present on this area, however several areas, specifically the grasslands and forests offer prime habitat to a variety of small mammal species such as rodents, shrews and bats.

Of the 72 mammal species expected in the area, the presence of 3 species was confirmed (Table 9). Indirect evidence from tracks and scats confirmed the presence of the Marsh mongoose. Marsh mongooses are common and abundant throughout their distributional range. Vervet monkeys were observed on Ward 59. Vervet monkeys are protected under Schedule 3 of the KZNEPBA (2014) and appear on Appendix II of CITES (Appendix 2).

Indirect evidence from numerous runways, marked with tell-tale feeding signs (grass cuttings), and fecal pellets confirmed the presence of Vlei rats in all grassland areas surveyed. It should be noted that three Vleirat species potentially occur in the area. However, to identify Vleirats to species level, data on external morphometric measurements and dental characteristics are required. Since no specimens were captured or observed, the identification is therefore limited to genus level.

Table 9: Mammal species observed during field surveys

COMMON NAME	SCIENTIFIC NAME	OBSERVATION INDICATOR	HABITAT
Marsh mongoose	*Atelerix paludinosus*	Tracks	Riparian edges
Vervet monkey	*Cercopithecus pygerythrus*	Sighting	Grassland/forest
Vlei rat	*Otomys sp.*	Fecal pellets/feeding signs/runways	Grasslands

Most of the mammal species of the resident diversity (Appendix 2) are common and widespread, all with wide habitat tolerances (i.e. rodents, many of the bat species, shrews, and others). The reason for their survival success is predominantly seated 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, Temminck's myotis, Cape serotine, Banana bat and Dusky pipistrelle (Schoeman & Waddington, 2011; Schoeman, 2016; Appendix 2), shows remarkable adaptivity by expanding their distribution ranges and population numbers significantly by capitalizing on the roosting and feeding opportunities offered by near-by manmade structures. Mongooses are reticent in habits and manage to persist as long as prey densities remain above nutritional requirements (Skinner & Chimimba, 2005).

A number of Red Listed/Protected species are recognized as possible occupants, and are discussed below.

3.3.1.3 Mammal Species of Conservation Concern

Several Red Listed / Protected mammal species are deemed present on the study area (Table 10. It should be noted that the majority of the species listed in Table 10 are rarely observed due to their secretive, solitary, and or nocturnal habits even during intensive field surveys conducted over several seasons/years.

Table 10: Red Listed / Protected mammal species deemed present on the study area, or to be occasional visitors.

Common Name	Scientific Name	Habitat	Probability of Occurrence
Laminate vlei rat	*Otomys laminatus*	Grassland in submontane as well as coastal areas	High
Dark-footed forest shrew	*Myosorex cafer*	Moist, densely vegetated habitat in mountainous areas, coastal forests.	High
Swamp musk shrew	*Crocidura mariquensis*	Reed beds, swamps and thick grass along river banks and wetlands	High
Blasius's horseshoe bat	*Rhinolophus blasii*	Caves and mine adits in savanna woodland	Medium

Swinny's horseshoe bat	*Rhinolophus swinnyi*	Caves and mines in temperate Afromontane forest or savanna woodland	Medium
Large-eared giant mastiff bat	*Otomops martiensseni*	Residential areas in Durban as well as areas bordering natural and agricultural habitats	High
Greater long-fingered bat	*Miniopterus inflatus*	Caves in savanna habitat	Medium
Damara woolly bat	*Kerivoula argentata*	Riparian forest and coastal forest in Mozambique and riparian woodland in central Mozambique	
African striped weasel	*Poecilogale albinucha*	Moist grassland areas in the savanna biome with an annual rainfall of more than 600 mm.	High
Blue duiker	*Philantomba monticola*	Forests, thickets, dense coastal bush	Low
Red duiker	*Cephalophus natalensis*	Forests, forest clumps and dense thickets	Low

Laminate vlei rats are listed as NT in the IUCN Red List of Threatened Species (2016; Appendix 2). They are endemic to South Africa, but have a patchy distribution in KwaZulu-Natal. They have been collected mostly in well-vegetated, grass-dominated wetland and plateau situations in the Coastal hinterland, Mist belt bioregions and coastal forests, occurring both sympatrically and syntopically (in the same habitat) with the more numerous *O. irroratus* (Taylor, 1998). It is quite uncommon, and population size is unknown, however, it is noted that there is a very low trapping success for this species throughout its range (Taylor & Monadjem, 2008).

Dark-footed forest shrews are reasonably common and widespread in forest habitats in KwaZulu-Natal (Taylor, 1998). They are listed as VU in the IUCN Red List of Thteatened Species (2016). One of the main threats to this species is the degradation of the forest patches it inhabits. In paper these forests are protected by South African law, but they are still being degraded as a result of human encroachment (Cassola, 2016).

Swamp musk shrews are fairly common in wetland areas of KwaZulu-Natal (Taylor, 1998). They are listed as NT in the IUCN Red List (2016), however there appear to be no major threats to this species as a whole and no direct conservation measures are in place for this species (Cassola, 2016).

Considering the possible presence of caves and similar habitat on the study area and adjacent areas the presence of, **Blasius's** and **Swinny's horseshoe bats**, and **Greater long-fingered bats** should be considered (Monadjem et al., 2010). **Blasius's horseshoe bat** and the **Greater long-fingered bat** are listed as NT in the IUCN Red List (2016), and are protected under Schedule 3 of the KZNEBPA (2014), while **Swinny's horseshoe** bat is listed as VU in the IUCN Red List and as EN in the KZNEPBA (2014).

Typically, **Large-eared giant mastiff bats** roost in hollow trees and caves, however, several small colonies in Durban were found to use the roofs of buildings as roosting sites (Adams *et al.,* 2015). The study area offers both natural (in the study area), as well as artificial roosting sites in areas adjacent to the study area and therefore they have a high probability of occurrence.

Damara woolly bats are widely distributed in East and southern Africa and although this species is rarely encountered, it is not thought to be especially uncommon. This species is generally associated with moist savanna habitats and roosting sites include deserted weaver bird nests, among clusters of leaves, on the bark of trees, and on traditional houses. Considering that several specimens have been collected from areas to the north of Durban, the presence of this species should be considered. They are listed as NT on the IUCN Red List (2016), and are protected under Schedule 3 of the KZNEBPA (2014).

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 its secretive nature, this species is often overlooked and rarely encountered (Skinner & Chimimba, 2005). They are listed as NT on the IUCN Red List (2016), and are protected under Schedule 3 of the KZNEBPA (2014).

Blue duikers occur in the higher rainfall regions of KwaZulu-Natal, up to an altitude of 1370 m in coastal or inland forests or dense bush. They commonly live in pairs and occupy a home range of approximately 0.75 ha (Skinner & Chimimba, 2005). Although they can persist in small patches of modified or degraded forest and thicket, even on the edge of urban centres, they are threatened by habitat loss and habitat fragmentation, snaring, harassment and killing by dogs and poachers. The Blue duiker is listed under Schedule 4 of the KZN-EBPA in KwaZulu-Natal, as VU in the South African Red List of Mammals (2016) and NEMBA, and appear in Appendix II of CITES.

Red duikers formerly occurred widely in coastal and riverine forests and thickets, escarpments and montane forests from south-eastern Tanzania to north-eastern KwaZulu-Natal. The Natal Red duiker is extensively hunted and is commonly sold as bush meat in local markets. They are listed as NT in the IUCN Red List (2016) and are protected under Schedule 3 of the KZNEBPA (2014).

Although Blue duikers and Red duikers have a low probability of occurrence on the study area, their possible presence should still be considered as the forest patches on Wards 56 and 102 provide sufficient and suitable habitat.

It should be noted that several other mammal species not listed as threatened (Appendix 2), are afforded provincial protection under Schedule 3 of the KZNEBPA (2014).

No other Red Data or sensitive species are deemed present on the study area, either since the area is too disturbed, falls outside the distributional ranges of some species, or does not offer suitable habitat(s).

3.3.2 Herpetofauna Assessment

The occurrence of reptiles is 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 thus possible to deduce the presence or absence of reptile species by evaluating the habitat types within the context of global distribution ranges.

Frogs are unevenly distributed in southern Africa both in terms of species diversity and population numbers. 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).

3.3.2.1 Herpetofauna Habitat Assessment

The study area offer four major reptile habitats, i.e. terrestrial, arboreal, fossorial and rupiculous. Frog micro-habitats include temporary and perennial streams, rivers and wetlands and several rocky outcrops on the study area.

Aquatic habitat is limited to several drainage lines in the valleys, the Ohlanga River and three wetland areas on the banks of the Ohlanga River (Figure 16). The Ohlanga River is in extremely poor ecological condition and heavily infested with several alien plant species. Water quality is further compromised by faecal contamination and littering.

3.3.2.2 Expected and Observed Herpetofauna Species Richness

The study area falls within the distributional range of 41 reptile and 27 frog species (frogmap.adu.org.za; sarca.adu.org.za; Appendix 3). It should be noted that potential occurrences are 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 are common and widespread. Due to degraded aquatic habitat, few frog species are expected on the study area. No reptile or frog species were observed during field surveys.

Due to safety concerns, nocturnal frog surveys were not conducted. Field surveys focused on the evaluation of qualitative and quantitative habitat available for frog species deemed present in the area.

3.3.2.3 Herpetofauna Species of Conservation Concern

The study area falls within the distributional range of the several Red Listed and/or Protected herpetofauna species (Table 11). Suitable habitats for these species are present in the same areas as those described for the mammals under Section 3.3.1.1 and Figure 16.

The **Common Flap-Neck Chameleon** is widely distributed throughout southern and eastern Africa and inhabits coastal forest, moist and dry savannah, woodland and bushy grasslands as well as rural and suburban areas. It appears to be reasonably adaptable and is probably not undergoing any population declines at present. However, this species is collected for the international pet trade and is the third most heavily exported chameleon species on the globe. Although Common flap-neck chameleons have been assessed as of LC, they are listed under Appendix II of CITES (Tolley, 2014; Appendix 3). This species has a high probability of occurring on the study area, specifically in the D'MOSS areas on Wards 56 and 102.

The **KwaZulu Dwarf Chameleon** occurs in several vegetation types including grasses, bushes, thickets, trees and roadside verges in in the Grassland, Indian Ocean Coastal Belt, Savanna and Forest biomes, and is endemic to KwaZulu-Natal. Around the Durban municipal area, they occur in severely fragmented habitat and are threatened by rapid urban expansion in an around Durban, which lies in the centre of the chameleon distribution. They are listed as VU on the SARCA Red List of Reptile species, NEMBA and the KZNEPBA and appear on Appendix II of CITES (Appendix 3). This species has a high probability of occurring on the study area, specifically in the D'MOSS areas on Wards 56 and 102.

Rock Monitors are found mainly in savannas and arid areas over a wide range of latitudes in various biomes. Although they are listed as of LC they are protected under Schedule 3 of the KZNEPBA and appear on Appendix II of CITES (Appendix 3).

Water Monitors are usually found close to, or in water, but they can also be found some distance away from water when foraging. Like the Rock Monitor, this species is widespread and common and listed as of LC in the most recent Red List. However, they are protected under Schedule 3 of the KZNEBPA and appear on Appendix II of CITES (Appendix 3).

The **Natal leaf-Folding Frog** is endemic to the Eastern Cape and KwaZulu-Natal Provinces and occurs in marshes, dams, floodplains and riverbanks. Populations in coastal KwaZulu-Natal are severely affected by the loss of wetlands as a result of urban and recreational development and direct drainage of wetlands. Other threats include pesticides and overgrazing or trampling by livestock. They are listed as VU in the most recent frog conservation assessment and as NT in the KZNEBPA (Appendix 3).

Pickersgill's Reed Frog is listed as EN in the IUCN Red List and as CE in the KZNEPBA (Appendix 3). This species is endemic to the coast of KwaZulu-Natal and is found within 15 km of the coast up to 380 masl. Populations of this species are severely fragmented due to coastal development and more than 50 % of individuals are in small and isolated patches in populations that are considered non-viable.

Spotted Shovel-Nosed Frogs are listed as VU in the IUCN Red List and KZNEBPA (Appendix 3). They are endemic to the KwaZulu-Natal and Mpumalanga Provinces where they inhabit grasslands and savannahs. Populations are severely fragmented due to habitat loss from urbanization, cultivation and invasive alien plants lowering the water table.

Table 11: Red listed and protected reptile and frog species deemed present on the study area

COMMON NAME	SCIENTIFIC NAME	HABITAT	PROBABILITY OF OCCURRENCE
REPTILES			
Common Flap-neck Chameleon	*Chamaeleo dilepis dilepis*	Wide variety of habitats in the Savanna; Grassland, Indian Ocean Coastal Belt; Azonal vegetation, Forests and Nama-Karoo Biomes	High
KwaZulu Dwarf Chameleon	*Bradypodion melanocephalum*	Coastal regions of KwaZulu-Natal from just north of Durban to Mkhambathi Nature Reserve in the south in vegetation types such as grasses,	High

		bushes, thickets, trees and roadside verges	
Rock Monitor	*Varanus albigularis albigularis*	Savannas and arid areas over a wide range of altitudes in the Savanna, Grassland, Nama-Karoo; Albany Thicket; Indian Ocean Coastal Belt and Fynbos biomes	Medium
Water monitor	*Varanus niloticus*	Usually found close to water from sea level to 1 700 m in the Savanna, Grassland, Albany Thicket, Indian Ocean Coastal Belt, Forest, Nama-Karoo and Succulent Karoo Biomes	Medium
FROGS			
Natal Leaf-folding Frog	*Afrixalus spinifrons*	Coastal Bushveld-Grassland and Moist Upland Grassland at low to intermediate altitudes from Cintsa Bay in the Eastern Cape Province to St. Lucia Village in KwaZulu-Natal.	Medium
Pickersgill's Reed Frog	*Hyperolius pickersgilli*	From Kingsburg in the south, along the coastal lowlands to St Lucia in the north in Coastal bushveld-Grassland	Low
Spotted Shovel-nosed Frog	*Hemisus guttatus*	In central and eastern KZN along the coast from Hluhluwe to Durban, in Coastal Bushveld Grassland and Natal Central Bushveld.	Medium

3.3.3 Avifaunal Assessment

Bird microhabitats include forested areas in valleys with steep slopes, grasslands, ecotones between grasslands and forests, inland water and built-up areas. It must be emphasised that birds, by virtue of their mobility, will utilize almost any area in a landscape from time to time.

3.3.3.1 Avifaunal Habitat Assessment

The following bird microhabitats are present on the study area:

Forest

The forest habitat comprises mainly of tall, evergreen tree species with multi layered vegetation below the canopy. These areas may provide habitat to several forest dwelling species such as thrushes, turacos and woodpeckers.

Grasslands

Grasslands are mostly present on Wards 56 and 102. Grass cover on these areas is extremely dense and tall. These areas may provide habitat to species such as cisticolas, larks and pipits.

Grassland / forest ecotones

The transition zone between the grassland and forest habitats comprises mainly of grass species, with several medium sized trees, shrubs and several alien invasive plant species

such as *Lantana camara*. It may provide habitat to species such as manikins, waxbills and bee-eaters.

Freshwater ecosystems

Freshwater ecosystems are represented by the Ohlanga River, as well as several ephemeral drainage lines and wetlands. The Ohlanga River and wetland areas are in poor ecological condition and species richness in this habitat is expected to be low. It may provide habitat to some species such as the Hadeda ibis, Hamerkop, Tawny Flanked Prinia and wagtails.

Built-up areas

The largest part of the study area is characterized by formal and informal housing settlements. These areas are heavily degraded and only a few habitat generalists such as house sparrows, crows, doves and the common myna are expected to occur here.

3.3.3.2 Expected and Observed Avifaunal Species Richness

Of the 297 species previously recorded in the pentads 2935_3100; 2940_3100; 2935_3055 and 2940_3055, the presence of 50 species was confirmed (Table 12). Most of the bird species listed in Table 12 are widespread and abundant.

Noteworthy observations include the following species of conservation concern:

The **African Broadbill** has a regional conservation status of VU, and is protected under Schedule 3 of the KZNEBPA (2014). This species typically utilizes under- and lower storeys of a variety of wooded vegetation types, including scarp forest, coastal, evergreen and riparian forests, Sand Forest dense savannah / woodland deciduous thickets, miombo woodland and areas with bamboo stands. It also occurs in disturbed areas with a mosaic of forest and scrub, montane forest patches, cultivation and in open, scrubby areas near villages (Taylor et al., 2015). Major threats include habitat destruction through rural and urban expansion and agriculture and have led to their disappearance from much of its former range in KwaZulu-Natal. The presence of this species was confirmed on Ward 102 in the D'MOSS area.

Jackal Buzzards and **Purple Crested Turaco's** are protected under Schedule 3 of the KZNEBPA (2014) and appear on Appendix II of CITES. Jackal Buzzards are a near endemic species and are common throughout their distributional range with a preference for hilly and mountainous regions in fynbos, Karoo, grassland, open woodland and semi-desert areas, from sea level to > 3 000 m (Hockey et al., 2005) A single Jackal Buzzard was observed flying across the D'MOSS area on Ward 102.

Purple Crested Turacos are locally common and can usually be found singly or in pairs in closed woodland, secondary forest, patches where woodland intergrades with forest, coastal forest, dense scrub and thickets. This species was present in all valleys with steep slopes and natural forest vegetation.

Other noteworthy species included the **Brimstone Canary**, **Forest Canary**, **Tambourine Dove**, **African Firefinch** and **Hamerkop**. These species are all protected provincially under Schedule 3 of the KZNEBPA (2014).

Cape Weavers and **Cape White-eyes** are near-endemic species. Endemic and near-endemic species are those with their distributional range at least 90 % and 70% respectively 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 LC 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.

Table 12: Bird species observed during field surveys

COMMON NAME	SCIENTIFIC NAME	HABITAT
Apalis, Bar-throated	*Apalis thoracica*	Forest
Bee-eater, Little	*Merops pusillus*	Grassland/Forest ecotone
Broadbill, African	*Smithornis capensis*	Forest
Boubou, Southern	*Laniarius ferrugineus*	Forest
Brownbul, Terrestrial	*Phyllastrephus terrestris*	Forest
Bulbul, Dark-capped	*Pycnonotus tricolor*	Grassland/Forest ecotone
(*) Buzzard, Jackal	*Buteo rufofuscus*	Forest
Camaroptera, Green-backed	*Camaroptera brachyura*	Forest
Canary, Brimstone	*Crithagra sulphuratus*	Grassland/Forest ecotone
SLS Canary, Forest	*Crithagra scotops*	Forest
Chat, Familiar	*Cercomela familiaris*	Built-up areas
Cisticola, Lazy	*Cisticola aberrans*	Grassland
Cisticola, Rattling	*Cisticola chiniana*	Grassland
Cisticola, Wailing	*Cisticola lais*	Grassland
Coucal, Burchell's	*Centropus burchellii*	Grassland/Forest ecotone
Crow, Pied	*Corvus albus*	Built-up areas
Dove, Laughing	*Streptopelia senegalensis*	Built-up areas
Dove, Red-eyed	*Streptopelia semitorquata*	Built-up areas
Dove, Tambourine	*Turtur tympanistria*	Forest
Drongo, Fork-tailed	*Dicrurus adsimilis*	Grassland/Forest Ecotone
Firefinch, African	*Lagonosticta rubricata*	Grassland/Forest Ecotone
Fiscal, Common (Southern)	*Lanius collaris*	Grassland/Forest ecotone
Greenbul, Sombre	*Andropadus importunus*	Forest
Hamerkop, Hamerkop	*Scopus umbretta*	Grassland
Hoopoe, African	*Upupa africana*	Grassland/Forest ecotone
Ibis, Hadeda	*Bostrychia hagedash*	Grassland/Forest ecotone
Kingfisher, Brown-hooded	*Halcyon albiventris*	Grassland/Forest ecotone

Longclaw, Cape	*Macronyx capensis*	Grassland
Mannikin, Bronze	*Spermestes cucullatus*	Grassland/Forest ecotone
Mousebird, Speckled	*Colius striatus*	Grassland/Forest ecotone
Myna, Common	*Acridotheres tristis*	Built-up area
Oriole, Eurasian Golden	*Oriolus oriolus*	Forest
Pipit, African	*Anthus cinnamomeus*	Grassland
Prinia, Tawny-flanked	*Prinia subflava*	Grassland/Forest ecotone
Robin-chat, Red-capped	*Cossypha natalensis*	Forest
Scrub-robin, White-browed	*Cercotrichas leucophrys*	Grassland/Forest ecotone
Sparrow, Cape	*Passer melanurus*	Built-up areas
Sparrow, House	*Passer domesticus*	Built-up areas
Spurfowl, Natal	*Pternistis natalensis*	Grassland
Starling, Cape Glossy	*Lamprotornis nitens*	Built-up areas
Starling, Red-winged	*Onychognathus morio*	Built-up areas
Stonechat, African	*Saxicola torquatus*	Grassland
Sunbird, Amethyst	*Chalcomitra amethystina*	Grassland/Forest ecotone
Sunbird, Olive	*Cyanomitra olivacea*	Forest; Grassland/Forest ecotone
Swallow, Barn	*Hirundo rustica*	All habitats
Tinkerbird, Yellow-rumped	*Pogoniulus bilineatus*	Forest
Turaco, Purple-crested	*Gallirex porphyreolophus*	Forest
(*) Weaver, Cape	*Ploceus capensis*	Grassland/Forest ecotone; built-up areas
(*) White-eye, Cape	*Zosterops virens*	Grassland/Forest ecotone
Woodpecker, Cardinal	*Dendropicos fuscescens*	Forest

* = Endemic

(*) = near endemic (i.e. more than 70 % of population in RSA)

SLS = endemic to South Africa, Lesotho and Swaziland

BSLS = breeding South Africa, Lesotho and Swaziland endemic

3.3.3.3 Avifaunal Species of Conservation Concern

The study area falls within the distributional range of several avifauna species of conservation concern (Table 13) and these are discussed below.

The **Bush Blackcap** has a regional conservation status of VU and is also protected under Schedule 3 of the KZNEPBA. Concerns for its conservation stem mostly from its naturally small range, restricted and fragmented habitat and low densities. Major threats to the continued existence of this species include destruction of their breeding grounds in KwaZulu-Nata and Mpumalanga, habitat loss, degradation and fragmentation resulting from urban developments, afforestation and agriculture (both commercial and subsistence; Taylor et al.,

2015). The forests in the D'MOSS areas on Wards 56 and 102 offer good habitat to this species, and it therefore has a high probability of occurrence in this area.

African Crowned Eagles have a regional conservation status of VU and is protected under Schedule 3 of the KZNEBPA (2014), and appears on Appendix II of CITES. The bulk of the regional population occurs in KwaZulu-Natal. Considering the availability of suitable habitat such as forests with large trees, the presence of this species is considered as likely (Hockey et al., 2005).

African Marsh-Harriers have a conservation status of 'Endangered' and are protected under Schedule 3 of the KZNEBPA (2014). This species is dependent on permanent wetlands, both inland and coastal, for breeding, feeding and roosting. The primary threat faced by this species is loss and degradation of sensitive wetland habitats, brought about by drainage of damming for development and/or agriculture as well as pollution. Although several wetlands are present along the Ohlanga River, these areas are degraded and probably do not offer suitable habitat for this species.

The **European Roller** is a non-breeding migrant and its entire non-breeding range falls within Africa. Within the region, the species is concentrated in the upper-middle Limpopo River drainage, the Lowveld region of Mpumalanga and Limpopo and coastal KwaZulu-Natal. The global population of European Rollers has declined at a rate approaching 30 % and thus this species has a global status of NT. Based upon its global status, the European Roller is assessed as regionally NT (Taylor et al., 2015).

Several other species deemed present in the area are protected under Schedule 3 of the KZNEBPA (2014) and/or appear under Appendix II of CITES (Table 13). Schedule 3 list prohibited acts and restrictions with regards to the hunting, catching, removal, poisoning, keeping of wild animals and selling of dead animal products listed.

Other noteworthy species deemed present on the study area include several endemic and near-endemic species such as the **Cape Grassbird**, and the **Greater** and **Double Collared Sunbirds** amongst others (Table 13).

Due to the poor ecological integrity of aquatic habitats, few or no waterbird species are expected to occur in this area.

Table 13: Bird species of conservation concern deemed present on the study area, or to be occasional visitors

COMMON NAME	SCIENTIFIC NAME	HABITAT	PROBABILITY OF OCCURRENCE
SLS Blackcap, Bush	*Lioptilus nigricapillus*	Afromontane and mist-belt forest patches, coastal forest, valley bushveld	High
Bunting, Golden-breasted	*Emberiza flaviventris*	Savannas, woodlands along rivers, tall shrubland on stony or rocky ground	Medium
Buzzard, Steppe	*Buteo vulpinus*	Open habitats including grassland, savanna and open woodland, agricultural landscapes	High

Dove, Lemon	*Aplopelia larvata*	Understorey of lowland and Afromontane evergreen forest from sea level to > 2000 m in clearings or patches with leaf litter.	High
Eagle, African Crowned	*Stephanoaetus coronatus*	Forest, dense woodland and forested gordes in savanna and grasslands; also in Eucalyptus and pine plantations	High
Eagle, Booted	*Aquila pennatus*	Mountainous country with cliffs; non-breeding migrants in diversity of non-forested habitats	Medium
Eagle, Long-crested	*Lophaetus occipitalis*	Up to 2 200 m at forest edges and in moist woodland, especially adjacent grassland, marshes or rivers; mixed farmland	High
Eagle, Verreaux's	*Aquila verreauxii*	Mountains and rocky areas with cliffs	Low
Eagle, Wahlberg's	*Aquila wahlbergi*	Well-wooded savanna; cultivated areas with tall trees	Low
Eagle-owl, Spotted	*Bubo africanus*	Cosmopolitan, from outcrops and drainage lines in western deserts to forest margins; urban environments	High
Egret, Cattle	*Bubulcus ibis*	Open grassland and agricultural lands	High
Falcon, Lanner	*Falco biarmicus*	Open grassland or woodland near cliff or electricity pylon breeding sites	High
Falcon, Peregrine	*Falco peregrinus*	Largely restricted to areas near high cliffs	Low
Firefinch, Red-billed	*Lagonosticta senegala*	Rank grass and thickets, favouring *Acacia* savanna	Low
Fish-eagle, African	*Haliaeetus vocifer*	Usually associated with large water bodies	Medium
Flufftail, Buff-spotted	*Sarothrura elegans*	Forest (especially along drainage lines), riparian thickets and well wooded gardens	High
Flufftail, Red-chested	*Sarothrura rufa*	Wide range of freshwater marshy fringes and rarely exits thick sedges, reeds and emergent growth	Low
Goshawk, African	*Accipiter tachiro*	Forest and forest margins, riparian woodland and suburbia	High
(*) Grassbird, Cape	*Sphenoeacus afer*	Rand grassland and moist fynbos dominated by restios	High
Green-pigeon, African	*Treron calvus*	Dense woodland, evergreen forests and riparian thickets	High
Harrier-Hawk, African	*Polyboroides typus*	Wide range of woodlands	Medium
Heron, Black-headed	*Ardea melanocephala*	Open grassland; often near, but not dependent on wetlands	Low
Heron, Grey	*Ardea cinerea*	Shallow water bodies, especially estuaries, shallow rivers, lakes and marshes	Low
Heron, Purple	*Ardea purpurea*	Dense vegetation, especially *Phragmites* in shallow wetlands	Low

Heron, Squacco	*Ardeola ralloides*	Freshwater shorelines with dense vegetation and flooded wetlands	Low
Hobby, Eurasian	*Falco subbuteo*	Low-altitude open woodland	Low
Kestrel, Rock	*Falco rupicolus*	Variety of habitats usually close to rocky outcrops	High
Mannikin, Red-backed	*Spermestes bicolor*	Forest margins and riparian fringing thickets	High
Marsh-harrier, African	*Circus ranivorus*	Inland and coastal wetlands and adjacent moist wetlands	Medium
Night-Heron, Black-crowned	*Nycticorax nycticorax*	Vegetated margins of water bodies	Low
Owl, Barn	*Tyto alba*	Open habitats (not forests) often associated with man-made structures	Medium
SLS Robin-chat, Chorister	*Cossypha dichroa*	Evergreen forests and adjacent well wooded gardens	High
SLS Rock-thrush, Cape	*Monticola rupestris*	Mountainous rocky slopes, cliffs and gorges, especially with scattered vegetation	High
Roller, European	*Coracias garrulus*	Open woodland	Medium
(*) Scrub-robin, Brown	*Cercotrichas signata*	From coastal dune to mistbelt forests	High
Seedeater, Streaky-headed	*Crithagra gularis*	Wide range of wooded habitats, also in fynbos	Medium
Snake-eagle, Black-chested	*Circaetus pectoralis*	From semi-deseert and desert edges to forest margins	Low
Snake-eagle, Brown	*Circaetus cinereus*	Most dry woodland habitats	Low
Sparrowhawk, Black	*Accipiter melanoleucus*	Forests, well developed woodland and alien tree plantations	Medium
Sparrowhawk, Little	*Accipiter minullus*	Forests, dense riverine woodland and wooded suburban parks and gardens	Low
SLS Sunbird, Greater Double-collared	*Cinnyris afer*	Forest margins, tall shrublands, parks and gardens	High
(*) Sunbird, Southern Double-collared	*Cinnyris chalybeus*	Forest, fynbos, Karoo shrublands and gardens	High
(*) Tchagra, Southern	*Tchagra tchagra*	Coastal bush, dune forest and coastal scarp forest margins, thorny thickets and fynbos	High
SLS Turaco, Knysna	*Tauraco corythaix*	Cool evergreen and Afromontane forests; riverine forests	Medium

Twinspot, Green	*Mandingoa nitidula*	Forest and forest edges	Medium
(*) Warbler, Barratt's	*Bradypterus barratti*	Tangled scrub, bracken and brambles along streams, also forest margins	Low
Waxbill, Orange-breasted	*Amandava subflava*	Moist grasslands and wetland margins	Medium
(*) Waxbill, Swee	*Coccopygia melanotis*	Edges of forest, plantations and gardens	High
Widowbird, Long-tailed	*Euplectes progne*	Mainly grassland, also in shrubland and cultivated areas	High
Wood-owl, African	*Strix woodfordii*	Dense woodland riparian, evergreen and coastal forest; alien forest plantations	High

* = Endemic

(*) = near endemic (i.e. more than 70 % of population in RSA)

SLS = endemic to South Africa, Lesotho and Swaziland

BSLS = breeding South Africa, Lesotho and Swaziland endemic

3.4 Summary of Biodiversity Assessment

The findings of the biodiversity assessment for the proposed Amaoti Housing development project are summarized in Table 14 below.

Table 14: Summary of the main findings of the biodiversity assessment for the proposed Amaoti housing development

ECOLOGICAL VALUE	APPLICABILITY TO STUDY AREA
Species aspect of biodiversity	
Protected species of fauna/flora	The presence of Provincially protected plant species in the D'MOSS areas on Wards 56 and 102 was confirmed during field assessments. The presence of Vervet monkeys was confirmed (Table 5; Appendix 2). The presence of a Provincially protected bird species in the D'MOSS area on Ward 102 was confirmed during field assessments.
Threatened species	Several specimens of *H. hemerocallidea* (Declining) are present in grassland on Ward 56. The presence of the African Broadbill (Vulnerable) was confirmed on Ward 102 in the D'MOSS area. The forest and grassland areas on the D'MOSS areas offer sufficient and suitable habitat for several mammal, herpetofauna and avifaunal species of conservation concern.
Keystone species performing a key ecological role (e.g. key predator, primary producer)	None
Endemic species or species with restricted ranges	Several endemic birds are present or expected to occur in the forest and grassland areas of the D'MOSS areas. Similarly, the forest and grassland areas provide sufficient habitat for several endemic reptile species (Appendix 3).
Previously unknown species	None
Community and ecosystem aspects of biodiversity	
Distinct or diverse communities or ecosystems	The largest portion of the study areas fall within the 'Critically Endangered' KZN Coastal Belt Grassland, with smaller portions on Wards 55 and 57 falling into the VU KZN Coastal Belt Thornveld.
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.	
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 local community. Several D'MOSS areas are present on the study area
Landscape level aspects of biodiversity	
Key ecological processes (e.g. seed dispersal, pollination, primary production, carbon sequestration).	Several D'MOSS areas are present on the study area and are important for climate change regulation
Areas with large congregations of species and/or breeding grounds.	None observed
Importance as a link or corridor to other fragments of the same habitat, to protected or threatened or valued biodiversity areas.	Several D'MOSS areas are present on the study area. D'MOSS plays a substantial role in climate change mitigation.
Importance and role in the landscape with regard 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.	

4 HABITAT SENSITIVITY MAP

The extent of transformation of terrestrial habitat on the study area has led to the large-scale fragmentation of habitat and loss of terrestrial ecological linkages. The remaining patches of largely untransformed grassland and forest are considered important refugia and potential linkage areas between terrestrial and aquatic environments. It is considered critical that the remaining intact natural habitat be preserved wherever possible (Figure 17).

Much of the study area is characterized by steep slopes and poses a relatively high risk of slope instability and erosion during the construction phase.

From a vegetation perspective, the sensitivities relating to the proposed development site are the presence of:

- *Hypoxis hemerocallidea* (Red Listed as DECLINING) and *Scadoxus puniceus* (KZN Specially Protected – All Amaryllidaceae) will require permits from eKZN Wildlife before they can be translocated or destroyed; and
- Closed-canopy forest over certain parts of the site (especially those designated as part of the D'MOSS) would require permit authorization from DAFF if clearing was required.

From a fauna perspective, the sensitivities relating to the proposed development site are the presence of:

- The presence of several Red Listed, Protected and endemic fauna species, specifically in the grasslands and forests on the D'MOSS areas.

From a conservation planning perspective, the sensitivities include:

- The siting of the proposed development in areas designated as part of the D'MOSS;
- The siting of the proposed development in a vegetation type broadly categorized as a Critically Endangered habitat, although one must concede that the area is already (for the most part) 100% transformed. Only those areas within the D'MOSS remain in a relatively natural state; and
- The siting of part of the proposed development in an area where slopes can be characterised as moderate to steep and which will affect runoff and result in a potential erosion risk and contamination of down-slope habitats.

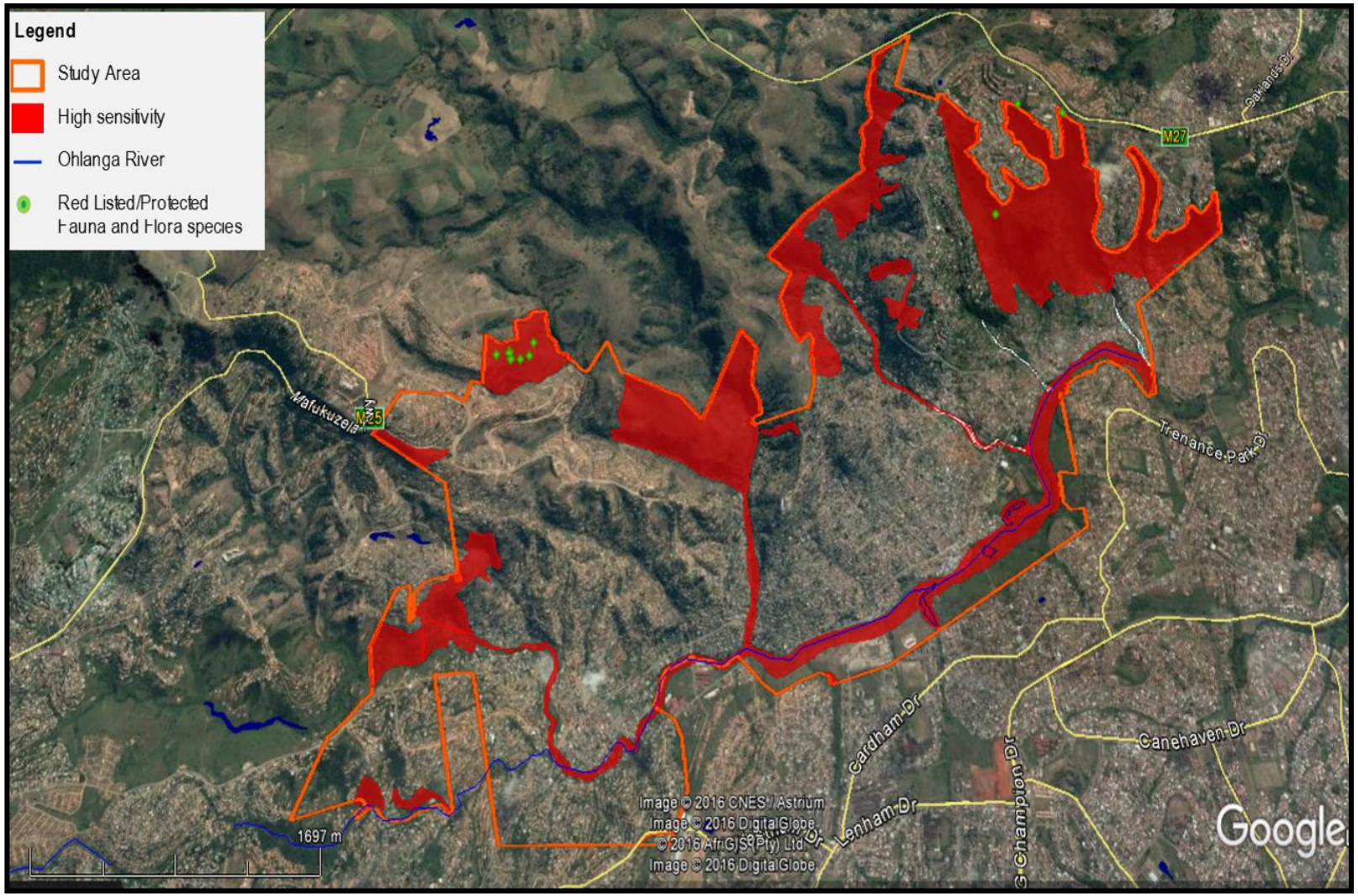

Figure 17: The extent and location of highly sensitive areas in relation to the study area is indicated in red. Development on these areas should be avoided

5 IMPACT ASSESSMENT

5.1 Identification of Potential Impacts on Biodiversity

Construction activities impact on the environment throughout the life cycle of development. These impacts occur from initial work on-site (pre-construction) through the construction and to the final demolition when a building comes to and end of its life. Even though the pre-construction and construction period is comparatively shorter in relation to the other stages of a development's life, it has diverse significant impacts on the environment. These impacts have numerous direct, indirect, short- and long-term potentially adverse effects on the landscape and nearby human communities.

The main purpose of this section is to identify the major impacts of construction activities on the environment, and to suggest possible ways to minimize the impacts. For this report, the following environmental impact categories have been identified relating to the pre-construction (P), construction (C) phases of the intended development. The listed categories are merely indicative and the proposed development may either have additional or fewer categories depending on the circumstances. It should be noted that these categories, with associated impact descriptions is not exhaustive, and more impacts may be identified at a later stage as more project specific information becomes available.

Environmental impact categories:

- Geology;
- Climate;
- Soil;
- Natural flora;
- Fauna;
- Sensitive terrestrial ecosystems;
- Surface water;
- Ground water;
- Air quality;
- Noise; and
- Artificial lighting,

5.1.1 Geology

It is anticipated that cut and fill earthworks may be required on the high relief areas on the study area to create platforms in order to build structures and/or access roads. Apart from the impact on the overlying soil, excavations into bedrock may result in unsightly scars with subsequent visual impacts. More importantly, deep or poorly planned excavations may potentially affect the stability of the surroundings, and may create naturally unstable slope

conditions. Blasting operations associated with excavations into rock have obvious environmental impacts, mainly noise pollution, dust generation, vibrations and chemical hazards.

Typical impacts on the geology of an area include the following:

- (P, C) The excavation of rocks creates a void with steep gradient or high stepped walls and can create naturally unstable slope conditions;
- (P, C) Drilling and blasting can create airblast shockwaves and flying rocks; and
- (P, C) Dust generation from earthworks.

5.1.2 Climate

The study area is bisected by several D'MOSS designated areas. From a climate adaptation perspective, the biodiversity that is protected within D'MOSS plays a vital role. The impacts of sea level rise for example can be reduced by ensuring the protection of well vegetated fore-dunes and setting coastal developments back from vulnerable areas. Increased flood events can be moderated by ensuring that wetlands and floodplains are protected and where necessary rehabilitated. Predicted increased temperatures can also be alleviated by D'MOSS as vegetated areas help to reduce temperatures.

D'MOSS also plays a substantial role in climate change mitigation. Research undertaken in 2006 found that D'MOSS stores the equivalent of 24.7±0.6 million tons of carbon dioxide. In addition, it was conservatively calculated that it sequesters between 31 000 and 36 000 tons of carbon dioxide per annum. Wetlands and forest ecosystems store the most carbon, while disturbed woodlands and alien thickets store the least. These more degraded D'MOSS areas offer restoration opportunities using poverty alleviation projects, providing benefits to biodiversity, people and the climate.

If left unchecked, climate change will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems such as an increase in the rise of sea levels, threatening coastal populations, an increase in drought and flooding frequency, an increase in frequency and magnitude of extreme weather events, changes in agricultural production and spread of disease amongst others.

Climatic conditions also have the potential to impact upon construction timeframes, increase the potential for erosion and sedimentation issues during wet weather and increase the potential for dust generation during periods of strong winds. In addition, excessive periods of rain in the region may result in flooding of the numerous drainage lines and the Ohlanga River on the study area.

Ecological impacts associated with climate change include the following:

- (P, C) Loss of ecological support areas;
- (P, C) Increase in temperature;
- (P, C) Water scarcity and hotter temperatures will make it more difficult to re-establish vegetation cover; and
- (P, C) Extreme weather events delay construction.

5.1.3 Soil

Soil morphology is strongly related to bedrock type and terrain morphology Soil classification systems can provide useful information regarding the susceptibility to erosion of different soil types, soil fertility, and nutrient status or drainage regimes. Knowledge of these characteristics is essential in order to minimize impacts such as erosion by concentrated stormwater runoff, compaction and contamination by infiltrating runoff or leachate.

The impact of construction on soils relates mainly to the excavation and stockpiling of the soil profile during infrastructure developments and the restoration to the modified or levelled terrain during rehabilitation. Other impacts on in situ and stockpiled soil include erosion by concentrating storm water runoff, compaction and contamination by infiltrating runoff or leachate. Unless soils are correctly restored and prepared, this can become a long-lived impact that does not support future sustainable development.

Soil removal creates permanent impacts that can be mitigated through restoration of soil cover, although the significance of the impact remains high. This is most apparent in steep rocky slopes where there is a thin soil cover of limited aerial extent.

Common impacts associated with soils may include:

- (P, C) Disturbance or burial of soils because of the construction of access roads, infrastructure or stockpiles;
- (P, C) Degradation of soil characteristics during medium to long-term stockpiling;
- (P, C) Chemical spillages contaminate the soil profile;
- (P, C) Concentrated storm runoff from the infrastructure areas is erosive, causing sheet, rill and donga erosion features;
- (P, C) Inadequate topsoil restoration or creation of unnatural surface topography or slope form which could impact lower or adjacent slopes due to increased runoff velocity;
- (P, C) Erosion of restored topsoil due to inadequate erosion control measures; and
- (P, C) Low productivity of rehabilitated soils due to inadequate soil fertility or high erosion rates.

5.1.4 Indigenous Flora

Land clearing to accommodate housing infrastructure and access roads will cause fragmentation of vegetation resulting in alterations in fluxes of radiation, wind, nutrients and water. These in turn can have significant effects on the biota within the remnant areas, especially at or near the edge between the remnant and the remaining natural vegetation (Saunders et al., 1991).

Isolated plant populations can experience loss of genetic variation, decreased population differentiation and may also reduce the ability of populations to adapt to changing environments (Culley et al., 2007).

Land clearing will also result in the loss of Red Listed / Protected species, disturbance of indigenous vegetation types, and an increase in dust and polluted runoff as a result of

vegetation clearance. The inadequate control of alien species can result in the establishment of populations or seed sources that threaten adjacent areas.

Several Red Listed / Protected plant species are present on the study area. Removal of protected flora species will result in a further decline of subpopulations on National and Provincial scales and may ultimately affect the conservation status of individual species.

Based on the assumption that all vegetation will be removed from certain areas on the study area, mitigation measures such as the implementation of protective buffer zones surrounding Red listed and protected species must be considered, since the translocation of subpopulations, specifically trees, is an unacceptable conservation measure as it is expensive and rarely successful (Driver et al., 2009).

Common impacts related to vegetation clearance and removal may include the following:

- (P, C) Loss of Red Listed / Protected species;
- (P, C) Loss of genetic variation within a species;
- (P, C) Illegal collection of protected species;
- (P, C) Negative change in the threat status of a species;
- (P, C) Disturbance of indigenous vegetation types and negative impacts of dust or polluted runoff beyond the construction area boundaries;
- (P, C) Fragmentation of habitats or isolation of small areas that results in degradation or changes in populations reliant on movement or interchange between habitats or scattered populations;
- (P, C) Cumulative impact of illegal collecting or land use can degrade areas and reduce the viability of adjacent areas; and
- (P, C) Inadequate control of alien species can result in establishment of populations or seed sources that threaten adjacent areas.

5.1.5 Fauna

The removal of natural vegetation to accommodate infrastructure will drastically reduce the habitat available for fauna species and reduce animal populations.

Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors or other locally important features. Developments such as roads often create significant barriers to migration of some species and traffic road kill can compound the effects of habitat reduction or population isolation significantly.

The D'MOSS designated zones are important refugia for several Red Listed and protected fauna species and provide movement corridors between areas of natural habitat.

Although it is assumed that most faunal species will move to different areas because of disturbance, many Red Listed / Protected fauna species have very specific habitat requirements, and the complete destruction of their habitats will result in displacement to less optimal habitats, or ultimately may result in their complete demise. This will result in a decline

in species numbers which may ultimately affect the conservation status of specific species on global, national and provincial scales.

Common impacts of construction related activities on fauna may include the following:

- (P, C) Loss of Red Listed/Protected fauna species;
- (P, C) Loss of local fauna populations;
- (P, C) Loss of genetic variation within species;
- (P, C) Isolation of local populations;
- (P, C) Disturbance of remnant terrestrial wild mammal, avian, amphibian and insect fauna through physical habitat destruction, noise, traffic and movement of people;
- (P, C) Large developments can threaten migration routes or flight paths. Cumulative impact of illegal collecting, road kills or power line related deaths reduce population viability in the long-term.
- (P, C) Inadvertent killing of slow-moving animals during earthworks;
- (P, C) Potential increase in feral animals and impact on indigenous fauna e.g. cats, rats;
- (P, C) Illegal hunting or disturbance;
- (P, C) Disturbance during breeding season can precipitate long-term cumulative effect on populations;
- (P, C) Potential permanent change in habitats due to inadequate monitoring and degradation of rehabilitated areas due to inadequate maintenance.

5.1.6 Noise

Many aspects of construction activities lead to an increase in noise levels over the ambient environmental levels. This can be temporarily enhanced or the regional impact increased in any direction under the influence of specific climatic factors such as wind direction, cloud cover and temperature inversion layers.

The impacts of noise levels can be both physical and psychological at the high end of the spectrum, but more commonly impact on communication or create psychological effects at the lower end of the spectrum. The negative community response even to relatively low noise levels is one of the most common environmental considerations.

The repetitive operation of machinery creates a range of noise levels. Although of low intensity these have an impact due to long periods of operation. Machinery such as compressors, generators, metal workshop tools such as angle grinders, pneumatic drills and jackhammers also create high noise levels.

Noise pollution is a strong environmental force that may alter key ecological processes and services and may directly or indirectly impact innumerable species and species interactions (Francis et al. 2009; Francis et al., 2012), i.e. raptors may avoid noisy areas since it disturbs their foraging efficiency.

Noise presents diverse threats to species and ecosystems, especially on species that rely on vocal communication. Effects include, but are not limited to, altered vocal behaviour, reduced abundance in noisy habitats, changes in vigilance and foraging behaviour, and impacts on individual fitness and the structure ecological communities (Shannon *et al*., 2015).

5.1.7 Artificial Lighting

Alteration of the natural variation in diurnal and nocturnal light intensities and spectral properties has the potential to disrupt the physiology, behaviour and ecology of herpetofauna (Perry *et al*. 2008) and mammal species such as bats (Stone *et al*., 2009; Gastol *et al*., 2012).

5.2 Assessment of Significance

Impacts associated with the pre-construction (P) and construction (C) phases were assessed in terms of the following criteria (Guideline Documentation on EIA Regulation; Department of Environmental Affairs and Tourism, 2014):

- The nature, a description of what causes the effect, what will be affected and how it will be affected.
- The extent, whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).

The duration, wherein it will be indicated whether:

- The lifetime of the impact will be of a very short duration (0 - 1 years) – assigned a score of 1;
- The lifetime of the impact will be of a short duration (2 - 5 years) - assigned a score of 2;
- Medium-term (5 - 15 years) – assigned a score of 3;
- Long-term (> 15 years) - assigned a score of 4; or
- Permanent - assigned a score of 5.

The magnitude, quantified on a scale from 0 - 10, where a score is assigned:

- Zero (0) is small and will have no effect on the environment;
- Two (2) is minor and will not result in an impact on processes;
- Four (4) is low and will cause a slight impact on processes;
- Six (6) is moderate and will result in processes continuing but in a modified way;
- Eight (8) is high (processes are altered to the extent that they temporarily cease);
- Ten (10) is very high and results in complete destruction of patterns and permanent cessation of processes.

The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:

- Assigned a score of 1 - 5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely);
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

The significance is calculated by combining the criteria in the following formula:

S = (E+D+M) P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
- 30 - 60 points: Medium (i.e. where the impact could influence the decision to develop the area unless it is effectively mitigated);
- >60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Table 15: A summary of potential environmental impacts with associated significance scoring with and without mitigation are listed below. Highly significant impacts are highlighted in red, Medium significant impacts in orange and Low significant impacts in yellow

IMPACT DESCRIPTION	EXTENT	DURATION	MAGNITUDE	PROBABILITY	SIGNIFICANCE (WITHOUT MITIGATION)	SIGNIFICANCE (WITH MITIGATION)
GEOLOGY						
The excavation of rocks creates a void with steep gradient or high stepped walls and can create naturally unstable slope conditions	1	5	8	4	56	7
Drilling and blasting can create airblast shockwaves and flying rocks	1	1	6	3	47	21
Dust generation from earthworks	3	2	6	4	60	21
CLIMATE						
Loss of ecological support areas	4	5	10	2	38	38
Increase in temperature	4	5	10	3	57	57
Water scarcity and hotter temperatures will make it more difficult to reestablish vegetation cover	1	5	10	4	**64**	**64**
Extreme weather events delay construction	1	5	10	5	**80**	**80**
SOIL						
Disturbance or burial of soils as a result of the construction of access roads, infrastructure or stockpiles	1	2	8	4	44	18
Degradation of soil characteristics during medium to long-term stockpiling	1	2	8	5	55	21
Chemical spillages contaminate the soil profile	1	2	6	4	36	8
Concentrated storm runoff from the infrastructure areas is erosive, causing sheet, rill and donga erosion features	1	2	6	4	36	18
Inadequate topsoil restoration or creation of unnatural surface topography or slope form which could impact lower or adjacent slopes due to increased runoff velocity;	1	5	6	4	48	12
Erosion of restored topsoil due to inadequate erosion control measures;	1	5	8	4	56	12

Low productivity of rehabilitated soils due to inadequate soil fertility or high erosion rates.	1	5	8	4	56	18
INDIGENOUS FLORA						
Loss of Red Listed/Protected species	5	5	10	4	**80**	28
Loss of genetic variation within a species	4	5	6	4	49	22
Illegal collection of protected species	1	2	8	4	44	10
Negative change in the threat status of a species	5	5	8	4	**72**	4
Disturbance of indigenous vegetation types and negative impacts of dust or polluted runoff beyond the project area boundaries.	1	5	8	4	56	21
Fragmentation of habitats or isolation of small areas that results in degradation or changes in populations reliant on movement or interchange between habitats or scattered populations.	3	5	8	4	**68**	42
Cumulative impact of illegal collecting or land use during long-term or life of development can degrade areas and reduce the viability of adjacent areas.	3	5	10	5	**90**	**76**
Inadequate control of alien species can result in establishment of populations or seed sources that threaten adjacent areas.	3	5	10	4	**72**	27
FAUNA						
Loss of Red Listed/Protected fauna species	3	5	8	4	64	3
Loss of local fauna populations	2	5	6	4	54	33
Loss of genetic variation within species	3	5	6	4	64	24
Isolation of local populations	2	5	8	4	60	27
Disturbance of remnant terrestrial wild mammal, avian, amphibian and insect fauna through physical habitat destruction, noise, traffic and movement of people	2	5	6	5	**78**	**78**
Large developments can threaten migration routes or flight paths. Cumulative impact of illegal collecting, road kills or power line related deaths reduce population viability in the long-term	2	5	6	4	52	52
Inadvertent killing of slow-moving animals during earthworks	1	2	6	4	36	12
Potential increase in feral animals and impact on indigenous fauna e.g. cats, rats	2	5	6	4	52	52
Illegal hunting or disturbance	2	2	6	4	40	18

Disturbance during breeding season can precipitate long-term cumulative effect on populations	2	5	6	4	52	33
Potential permanent change in habitats due to inadequate monitoring and degradation of rehabilitated areas due to inadequate maintenance.	2	5	8	4	60	40
SENSITIVE TERRESTRIAL ECOSYSTEMS						
Loss of ecological functionality	4	5	10	5	**95**	6
Loss of biodiversity	5	5	10	5	**100**	27
Environmental degradation	5	5	10	5	**100**	18
Loss of habitat for fauna and flora species	5	5	10	5	**100**	33
Alteration of population dynamics and biotic interactions of species	5	5	10	5	**100**	33
Loss of refuge areas for climate protection sensitive species and corridors that allow these species to migrate to refuge areas as the temperature and rainfall change	5	5	10	5	**100**	27
SURFACE WATER						
Permanent impact on catchment by capturing surface runoff and/or diverting drainage systems. Degradation of stream channels through long-term reduced runoff and periodic discharge of very high volumes destabilizes the system	3	5	8	4	**64**	18
Altered storm water runoff response due to large impervious areas and concentrated runoff in drainage systems	3	5	8	4	**64**	10
Loss of habitat for fauna and flora species	2	5	8	5	**75**	33
Displacement of fauna species	2	5	6	4	52	33
Storm water runoff and drainage						
Increased erosion, dust generation and potential chemical contaminants reduce surface water quality or result in discharge that exceeds the maximum concentrations permitted by the National Water Act	2	5	8	4	60	10
Vehicle wash bays and workshop facilities produce petrochemical and solvent which contaminated surface runoff;	2	2	8	4	46	16
Sanitary conveniences, fuel depots or storage facilities of potentially polluting substances can contaminate surface water.	2	2	8	4	46	12

Permanent impact on catchment by capturing surface runoff and/or diverting drainage systems. Degradation of stream channels through long-term reduced runoff and periodic discharge of very high volumes destabilizes the system	4	5	8	4	**68**	24
Altered storm water runoff response due to large impervious areas and concentrated runoff in drainage systems	3	5	8	4	**64**	12
NOISE						
Noise from construction machinery disrupting fauna movement and may cause displacement	2	2	6	4	40	40
ARTIFICIAL LIGHTING						
Disruption of the physiological and behavioral patterns of fauna species	2	2	6	4	40	24

5.3 Potential Mitigation Measures

Mitigation is shown relative to the Pre-Construction (P) and Construction (C) phases. In the absence of site-specific project information, the following general mitigation measures are proposed:

Geology

- (P) Geotechnical investigations must be undertaken to identify unstable rock conditions, and slopes that require support in the short-, medium- and long-term.
- (P, C) Plan any new access roads taking contour lines into consideration to minimize cutting and filling operations.
- (P, C) Restrict zones of disturbance and plan excavations carefully.
- (P, C) Optimal fragmentation blast design and correct explosives will reduce fly rock. No blasting on very overcast days.

Soil

- (P) Adequate characterization of the natural soil catena through detailed mapping, soil classification and profile descriptions are necessary to provide background data required for restoration of ecological gradients and surface drainage characteristics.
- (P, C) Design of contour banks or terraces intended to slow or divert surface runoff and reduce soil erosion requires calculation based on slope gradient, soil type and rainfall conditions.
- (C) Topsoil, leaf and plant litter as well as subsoil removed during the construction of roads and building platforms must be stockpiled separately in low heaps, less than 1.5 m high. Microbial activity, seed viability and soil fertility are adversely affected by long periods of stockpiling when high temperatures can be generated in thick deposits, therefore the topsoil should be restored as soon as possible. An alternative is to aerate the stockpiled topsoil regularly (as a minimum every six months). Vegetate with a grass mix natural to the area to control erosion. Do not use these stockpiles as storm water control features.
- (C) Stockpiling of material on hilly locations are to be avoided, unless appropriate erosion control and management measures are implemented
- (C) Storm water diversion and erosion control contour berms are required to separate clean and contaminated water systems around the infrastructure areas.
- (P, C) In the case of petrochemical spillages, the spill should be collected immediately and stored in a designated area until it can be disposed of at a registered facility.
- (C) Roads should be routed to avoid water bodies and wildlife habitat where possible, and should be designed to avoid sharp turns to minimize the risk of spills and accidents.

- (P, C) Route placement should consider the final use of roads with respect to either enhancing or continued access by the public following closure.
- (P, C) Scarify roads and stockpile areas to a depth of 500mm and infrastructure areas and restore topsoil cover;
- (C) Implement irrigation and soil conservation measures.
- (C) Coordinate work schedules, if more than one contractor is working on a site, so that there are no delays in construction activities resulting in disturbed land remaining un-stabilised.

Sedimentation control

- (P, C) Site-specific plans for site erosion and sediment control should be developed and implemented. Measures that should be considered during the construction and operational phases include:
- (P, C) Determining site erosion potential and identifying water bodies at risk;
- (P, C) Establishing to the extent possible buffer zones of at least 100 m around water bodies that are at risk of sedimentation;
- (P, C) Revegetation and maintaining vegetated buffer zones adjacent to any water body for erosion control;
- (C) Diverting site drainage away from cleared, graded, or excavated areas;
- (P, C) Using and maintaining sediment barriers or sediment traps to prevent or control sedimentation;
- (P, C) Monitoring and maintaining the measures once they are in place to ensure they are effective.

Flora

- (P) Prior to vegetation clearance, the entire site and the 500 m of adjoining areas must be scanned for the presence of Red Listed/Protected flora species.
- (P, C) Where feasible, buffer zones must be implemented and maintained on areas surrounding Red Listed/Protected plant species. Guidelines as described by SANBI should be followed (Driver et al., 2009).
- (C) Clearing of vegetation in preparation for construction should be carried out in such a way that:
- The area cleared is minimized;
- (C) Buffer zones of natural vegetative cover of at least 100 m are retained wherever possible between cleared areas and adjacent bodies of water;
- (C) The timing between clearing of an area and subsequent development is minimized.
- (C) Where feasible, vegetation from cleared areas may be replanted in nearby habitats for future relocation.

- (P, C) The removal of vegetation will result in the disturbance of soil surfaces. The exposed soil surfaces will potentially be open to invasion by alien plant species. Therefore, a detailed alien invasive species management plan will have to be implemented and maintained.
- (P, C) Effective air pollution control measures are to be implemented to reduce the spread of impacts.

Fauna

- (P) Prior to construction and vegetation clearance a suitably qualified Zoologist should closely examine the project area for the presence of any animal burrows, rock crevices, under logs/stumps and in trees, and relocate any affected animals in appropriate habitat away from the study area;
- (P) No more than two weeks in advance of vegetation clearance that will commence during the breeding season (1 September – 1 March) a qualified Zoologist must conduct a pre-construction survey of all potential special-status bird nesting habitat in the vicinity of the study area, and on the study areas. If pre-construction surveys indicate that no nests of special-status birds are present or that nests are inactive or potential habitat is unoccupied, no further mitigation is required;
- (P) If active nests are found, avoidance procedures must be implemented on a case-by-case basis. Avoidance procedures may include the implementation of buffer zones, relocation of birds, or seasonal avoidance. If buffers are created, a no disturbance zone muse created around active nests during the breeding season by a suitably qualified Zoologist;
- (P, C) During vegetation clearance, methods should be employed to minimize potential harm to fauna species. Clearing must take place in a phased and slow manner, commencing from the interior of the study area progressing outwards towards the boundary to maximize potential for mobile species to move to adjacent areas;
- (P, C) Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery;
- (P, C) Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by a suitably qualified ECO trained in the handling and relocation of animals;
- (P, C) All storm water structures should be designed so as to block amphibian and reptile access to the road surface;
- (P, C) Areas beyond the development footprint should be expressly off limits to construction personnel and construction vehicles and this should be communicated to them; and
- (P, C) Control vermin and reduce poaching through staff education and law enforcement

- (P, C) Institute a regular monitoring program to remove road kill carcasses from the road to mitigate impacts on wildlife scavengers.

Specific mitigation measures for bats

Mitigation measures to offset the loss of roosts are detailed below:

Trees:

- (P) All retained trees will be subject to assessment by means of walk-through surveys for the location of potential bat roosts prior to the commencement of vegetation clearance and construction. This will be done by a bat specialist and/or the Bat Interest Group of KwaZulu-Natal (hereafter referred to as BIG). A bat box scheme must be erected in suitable locations within close proximity to those trees scheduled for removal that have the potential to support roosting bats. Bat boxes must match existing roosts as closely in terms of size, height and aspect as possible.
- (P) A variety of box types must be provided and the types to be used and their locations for erection will depend on the species and must be decided by a bat specialist and/or BIG and erected under their supervision. These works must be done a minimum of 6 months in advance of planned tree felling to allow bats to become accustomed to new roosting opportunities in the area.
- (P) Immediately prior to felling, trees should be examined for the presence of bats or bat activity. This survey could be carried out by a suitable bat specialist or member/s of the BIG. Where bats are still present within an identified roost, it will be necessary to undertake exclusion procedures. The bat specialist/BIG member will advise on the steps necessary for exclusion and the likely time period. If a tree containing a confirmed bat roost must be felled outside the optimum time period, a bat specialist must remove any bats to safety.

Tree felling procedures

- (P) In order to ensure the optimum warning for bats in any unconfirmed bat roosts that may be present, the trees should be pushed lightly two or three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. The tree should then be pushed to the ground slowly and should be left intact on the ground for at least 24 hours to allow any bats within the tree to escape.

Post-development site maintenance and population monitoring

- Consideration should be given to the maintenance requirements of the bat boxes. A design life, including essential maintenance, of about 10 years would be appropriate for bat boxes, as this would be comparable to the life span of tree roosts that bat boxes mimic. This life span can be achieved with good quality wooden boxes.
- A monitoring plan should be put in place to assess whether the bat populations has responded favourably to the mitigation. If consistent methods (i.e. passive acoustic monitoring) are used pre- and post-development, it will be easier to compare trends.

Sensitive Terrestrial Ecosystems

Exclusion of the D'MOSS areas from the development footprint. Refer to Section 12 for Management Guidelines related to forests and grasslands.

Surface Water

- (P, C) A comprehensive surface runoff and storm water management plan, indicating how all surface runoff generated as a result of the development will be managed prior to entering any natural drainage system, and subsequently released to simulate natural hydrological conditions; and
- (P, C) Optimize residue stockpile and deposit slope length and gradient to reduce erosional effect of storm runoff.

Noise

- (P, C) Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure.
- (P, C) Blasting should not be carried out under very overcast conditions or low level cloud cover as this increases the noise and vibration transmission. This impact can be reduced through selection of explosives, sequencing the blasts, deflection by structures and timing of the blast to coincide with periods of high activity or increased ambient noise levels. Drilling and blasting contractors must monitor the blast noise, shock and vibration felt at the boundary of the mine.
- (P, C) To reduce low intensity noise levels, work areas need to be effectively screened to reduce or deflect noise. Engineering controls such as modifications to equipment or work areas to make it quieter, the acquisition of equipment designed to emit low noise and vibration, creation of noise barriers, proper maintenance of tools and equipment must be considered.

Artificial Lighting

- (P, C) Outside lighting should be designed to minimize impacts on fauna;
- (P, C) All outside lighting should be directed into the proposed development as opposed to away from the development, and also not in the direction of sensitive areas, including sensitive areas on neighbouring properties; and
- (P, C) Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.

5.4 Cumulative Impacts

Climate change and biodiversity loss are among the most important environmental challenges we face today. Both are complex and cross-cutting issues, which affect nearly all human activity. There are clear links between climate change and biodiversity and include the following examples:

- Supporting biodiversity delivers clear carbon benefits by enhancing the natural environment's ability to absorb and store carbon via soil and plant matter. Evidence

suggests that healthy natural habitats such as soil, wetlands, and forests can sequester significant amounts of carbon. Damaging the biodiversity or physical environment of these areas can release the stored carbon, even indirectly, contributing to climate change, as well as reducing biodiversity; and

- Biodiversity and the natural environment provide services that increase our resilience to the impacts of climate change and disasters. For example, well-functioning green spaces can regulate storm water flow, reducing the risk of flooding. Green spaces and vegetation also have a cooling effect and reduce the impact of heat waves in cities, lessening the urban heat island effect. Plants stabilise soil, reducing the risk of landslides and erosion (in fact, it is deforestation that can contribute to mudslides)

The relationship between biodiversity and climate change goes both ways — the effects of a changing climate such as an increase in frequency and magnitude of extreme events such as floods, droughts and heatwaves can already be felt in the Durban region, and are already having an impact on biodiversity and ecosystem service provision. It is predicted that, in the future, climate change will be the single biggest driver of biodiversity loss next to land-use change.

Climate change affects biodiversity because species tend to evolve to a specific range of environmental factors such as temperature, moisture, etc. As these factors alter due to climate change, species need to migrate to stay in their optimum environment.

Some species are more adaptive, but, for others, a changing environment is a threat to their ability to survive and therefore increases extinction rates and reduces biodiversity. The ability of species to respond to this climate-enforced migration is also limited by human activity, which has changed land-use and fragmented habitats.

When roads, urban areas and agricultural land stand in their way, many species will find it almost impossible to migrate across the landscape. There is therefore a need to facilitate this natural adaptation process by, for example, creating migration corridors of natural habitats and reducing fragmentation.

The Durban Metropolitan Open Space System (D'MOSS) plays a substantial role in the mitigation of climate change and biodiversity conservation, therefore the preclusion of the D'MOSS areas on the study area from the development footprint is critical in effectively mitigation the cumulative effects of climate change and biodiversity loss in the Ethekwini Municipality.

6 MANAGEMENT GUIDELINES FOR GRASSLANDS AND FORESTS

Development Assessment Guidelines have been developed by eThekwini Municipality's Environmental Planning & Climate Change Protection branch (eThekwini Municipality, 2010) and include guidelines for development potentially affecting indigenous grassland and forest ecosystems within the Municipality. These are summarised below.

- Development guidelines for grasslands:
- Development on the grasslands in the D'MOSS areas is to be avoided wherever possible.

- Any development must be set back at least 25 m from the edge of the grassland. This buffer should be used for indigenous gardening, especially using nutrient loving plants where possible.
- French Drains must not be located within 25 m of the edge of these grassland types. This is to prevent nutrient enrichment that could alter the functionality and composition of these grassland ecosystems.

Development guidelines for natural forests:

- Development within a forested area is not supported.
- Generally a minimum development buffer of 40 m must be maintained from the forest canopy drip line. The size of the buffer may be increased or decreased depending on the forest size, its ecological functionality and the form of proposed development.
- The buffer area must be managed as an ecotone area, i.e. an area of transition from one ecosystem to another (grassland/forest ecotone). This ecotone is often more diverse as it can contain elements from both ecosystems and allows for development-associated impacts to be absorbed before impacting on the forest.

The principles and guidelines outlined in the document Policy Principles and Guidelines for Control of Development Affecting Natural Forests (Department of Agriculture, Forestry and Fisheries, 2010) is also relevant to forests on the study area and includes the following guidelines:

- Natural forests may not be destroyed save for “exceptional circumstances”;
- In terms of the National Forest Act, all forests are protected and no trees (dead or alive) may be cut, damaged or removed without a license from DAFF (or a delegated authority);
- Forests must be managed to conserve biological diversity, ecosystems and habitats;
- Maintaining natural forests in a good state and the rehabilitation of degraded forests must be promoted’;
- The levels of environmental significance, conservation value, functional value (ecosystem goods and services), sensitivity or threatened ecosystem status must be taken into account in all decisions affecting natural forests, with priority given to the protection of forest types and forest patches listed as threatened ecosystems;
- The impacts of the proposed land use or development on any natural forests must be comprehensively investigated, including impacts on the buffer areas, the forest fauna and flora, and the forest ecosystem and dynamics;
- Land owners are accountable for managing potential impacts and activities that may affect natural forests;
- Potential impacts of development or land use change must be considered pro-actively as early in the proposed activity’s planning stages as practicable;

- Any decisions on land use or development that will affect natural forests must be taken with the utmost care (the precautionary principle) and with due consideration for keeping the dynamic forest processes intact;
- Preventing disturbance to forest ecosystems, fauna and flora;
- The most sensitive parts of forests have to be avoided;
- Keeping forest margins and surrounding mosaics of habitats in place as far as possible (inter alia through sufficient buffer zones, corridors and protected areas);
- Natural corridors linking forests and other habitats must be retained as far as possible;
- Not allowing disturbance caused by poor land management to be used as a motivating factor for land use change that transforms natural forest;
- Where environmental authorization is given for development, strict conditions must be set for appropriate mitigation measures, subject to an approved environmental management plan, to be overseen by an appropriately qualified environmental manager, and to be monitored by the relevant government bodies;
- Under the NEMA: EIA regulations, a basic assessment is required for the removal of natural vegetation above 3 hectares (this threshold falls away for listed threatened ecosystems);
- Building structures must be placed outside the forest with a sufficient buffer area to keep the forest margin intact (buffer usually more than 20 m);
- Environmental assessments must consider the national and provincial conservation importance and planning for the forest types and individual forest patches involved;
- The appropriate levels and types of access and use of natural forests must be in keeping with the environmental potential, sensitivity and carrying capacity of the various forests;
- Due consideration must be given to the minimum width of corridors and buffer zones and the minimum size requirements of natural habitats to enable fully functional ecosystems to be retained;
- Retaining or promoting controlled public access to forests must be a prime consideration;
- The ecotones and vegetation types surrounding forest patches must be kept intact as a vital part of maintaining the forest habitat and its fauna and flora; and
- Invader plant species often populate disturbed forest and must never be an excuse for allowing land use change or development that could be detrimental to a forest.

7 CONCLUSIONS

The highly-transformed nature of the habitats in the majority of the study area resulting from urbanization means that there should be no objections to this proposed development from an ecological perspective. What little natural vegetation remains is highly disturbed and invaded by alien species, and few fauna species are able to persist in this environment.

Forested areas and some grasslands persist on the steeper slopes, mostly in the D'MOSS areas and are currently, for the most part, free from development activities in the form of clearing for informal settlement and utilization of resources, although activities such as firewood collection and the illegal dumping of household and garden refuse were evident in several places.

These remaining patches of largely untransformed areas are considered important refugia and potential linkage areas between terrestrial and aquatic environments and it is therefore critical that these remaining natural habitats be preserved wherever possible. To preserve the integrity of the D'MOSS and minimize the impact of the development on the environment, it is recommended that these areas are excluded from the proposed development footprint and that these are buffered from the negative effects of the development by a minimum 30m buffer.

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APPENDIX 1. 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 2: A checklist of mammal species for QDSS 2931CA AND 2930DBA

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (2016)**	**NEMBA (2015)**	**KZNEBPA (2014)**	**CITES LISTING**
Hottentot golden mole	*Amblysomus hottentotus*				
Rock hyrax	*Procavia capensis*				
Scrub hare	*Lepus saxatillis*				
Natal red rock rabbit	*Pronolagus crassicaudatus*			Sched 3	
African mole-rat	*Cryptomys hottentotus*				
Cape porcupine	*Hystrix africaeaustralis*				
Greater canerat	*Tryonomys swinderianus*				
Woodland dormouse	*Graphiurus murinus*				
Single-striped grass mouse	*Lemniscomys rosalia*				
Four-striped grass mouse	*Rhabdomys pumilio*				
Woodland thicket rat	*Grammomys dolichurus*				
Pygmy mouse	*Mus munitoides*				
Natal multimammate mouse	*Mastomys natalensis*				
Tete veld rat	*Aethomys ineptus*				
Namaqua rock mouse	*Michaelamys namaquensis*				
* Laminate vlei rat	*Otomys laminatus*	NT			
Angoni vlei rat	*Otomys angoniensis*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (2016)**	**NEMBA (2015)**	**KZNEBPA (2014)**	**CITES LISTING**
Vlei rat	*Otomys irroratus*				
Grey climbing mouse	*Dendromus melanotis*				
Brant's climbing mouse	*Dendromus mesomelas*				
Chestnut climbing mouse	*Dendromus mystacalis*				
Greater galago	*Otolemur crassicaudatus*			Sched 3	
Vervet monkey	*Cercopithecus pygerythrus*		II	Sched 3	
Dark-footed forest shrew	*Myosorex cafer*	VU			
Forest shrew	*Myosorex varius*				
Lesser dwarf shrew	*Suncus varilla*				
Least dwarf shrew	*Suncus infinitesimus*				
Swamp musk shrew	*Crocidura mariquensis*	NT			
Reddish-grey musk shrew	*Crocidura cyanea*				
Lesser grey-brown musk shrew	*Crocidura silacea*				
Greater red musk shrew	*Crocidura flavescens*				
Lesser red musk shrew	*Crocidura hirta*				
Wahlberg's epauletted fruit bat	*Epomophorus wahlbergi*				
Sundevall's leaf-nosed bat	*Hipposideros caffer*			Sched 3	
Blasius's horseshoe bat	*Rhinolophus blasii*	NT		Sched 3	
Geoffroy's horseshoe bat	*Rhinolophus clivosus*			Sched 3	

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (2016)**	**NEMBA (2015)**	**KZNEBPA (2014)**	**CITES LISTING**
Bushveld horseshoe bat	*Rhinolophus simulator*				
Swinny's horseshoe bat	*Rhinolophus swinnyi*	VU		EN	
Mauritian tomb bat	*Taphozous mauritianus*				
Egyptian slitfaced bat	*Nycteris thebaica*				
Little free-tailed bat	*Chaerephon pumilus*				
Angolan free-tailed bat	*Mops condylurus*				
Large-eared giant mastiff bat	*Otomops martiensseni*			VU	
Egyptian free-tailed bat	*Tadarida aegyptiaca*				
Lesser long-fingered bat	*Miniopterus fraterculus*			Sched 3	
Greater long-fingered bat	*Miniopterus inflatus*	NT		Sched 3	
Natal long-fingered bat	*Miniopterus natalensis*				
Long-tailed serotine	*Eptesicus hottentotus*			Sched 3	
Anchieta's pipistrelle	*Hypsugo pipistrelle*				
Damara woolly bat	*Kerivoula argentata*	NT		Sched 3	
Lesser woolly bat	*Kerivoula lanosa*			Sched 3	
Botswana woolly bat	*Kerivoula botswanae*			Sched 3	
Rufous myotis	*Myotis bocagii*			Sched 3	
Temminck's myotis	*Myotis tricolor*			Sched 3	
Welwitsch's myotis	*Myotis welwitschii*			Sched 3	

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (2016)**	**NEMBA (2015)**	**KZNEBPA (2014)**	**CITES LISTING**
Cape serotine	*Neoromicia capensis*				
Banana bat	*Neotomicia nana*				
Dusky pipistrelle	*Pipistrellus hesperidus*				
Yellow-bellied house bat	*Scotophilus dinganii*				
Large-spotted genet	*Genetta tigrina*				
Large grey mongoose	*Herpestes ichneumon*				
Slender mongoose	*Galerella sanguinea*				
White-tailed mongoose	*Ichneumia albicauda*				
Marsh mongoose	*Atilax paludinosus*				
Banded mongoose	*Mungos mungo*			Sched 3	
Dwarf mongoose	*Helogale parvula*			Sched 3	
African striped weasel	*Poecilogale albinucha*	NT		Sched 3	
Blue duiker	*Philantomba monticola*	VU	VU	VU	II
Red duiker	*Cephalophus natalensis*	NT		Sched 3	
Common duiker	*Sylvicapra grimmia*				

APPENDIX 3. A checklist of reptile species for the QDS 2931CA and 2930DB

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (SARCA 2014)**	**NEMBA (2015)**	**KZNEBPA (2014)**	**CITES LISTING**
* Aurora House Snake	*Lamprophis aurora*	LC			
(*) Bibron's Blind Snake	*Afrotyphlops bibronii*	LC			
Bibron's Stiletto Snake	*Atractaspis bibronii*	LC			
Black File Snake	*Gonionotophis nyassae*	LC			
Black Mamba	*Dendroaspis polylepis*	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 Flap-neck Chameleon	*Chamaeleo dilepis dilepis*	LC			II
(*) Common Girdled Lizard	*Cordylus vittifer*	LC			
Common Purple-glossed Snake	*Amblyodipsas polylepis polylepis*	LC			
Common Tropical House Gecko	*Hemidactylus mabouia*	LC			
* Dusky-bellied Water Snake	*Lycodonomorphus laevissimus*	LC			
Eastern Coastal Skink	*Trachylepis depressa*	LC			
Eastern Natal Green Snake	*Philothamnus natalensis natalensis*	LC			
Giant Legless Skink	*Acontias plumbeus*	LC			
** KwaZulu Dwarf Chameleon	*Bradypodion melanocephalum*	VU	VU	VU	II
(*) Mozambique Dwarf Burrowing Skink	*Scelotes mossambicus*	LC			

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (SARCA 2014)**	**NEMBA (2015)**	**KZNEBPA (2014)**	**CITES LISTING**
Mozambique Spitting Cobra	*Naja mossambica*	LC			
* Olive House Snake	*Lycodonomorphus inornatus*	LC			
Peters' Thread Snake	*Leptotyphlops scutifrons scutifrons*	LC			
* Pondo Flat Gecko	*Afroedura pondolia*	LC			
Red-lipped Snake	*Crotaphopeltis hotamboeia*	LC			
Rhombic Night Adder	*Causus rhombeatus*	LC			
Rock Monitor	*Varanus albigularis albigularis*	LC		Sched 3	II
Water monitor	*varanus niloticus*	LC		Sched 3	II
Short-snouted Grass Snake	*Psammophis brevirostris*	LC			
South Eastern Green Snake	*Philothamnus hoplogaster*	LC			
* Southern Brown Egg-eater	*Dasypeltis inornata*	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 Skink	*Trachylepis varia*	LC			
Wahlberg's Snake-eyed Skink	*Panaspis wahlbergii*	LC			
Western Natal Green Snake	*Philothamnus natalensis natalensis*	LC			
Yellow-bellied Hinged Terrapin	*Pelusios castanoides*	LC			
Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*	LC			

APPENDIX 4. A checklist of frog species for the QDSs 2931CA and 2930DB

		CONSERVATION STATUS		
COMMON NAME	**SCIENTIFIC NAME**	**RED LIST CATEGORY (SAFAP 2004)**	**NEMBA (2015)**	**KZNEBPA (2014)**
Argus Reed Frog	*Hyperolius argus*	LC		
Bronze Caco	*Cacosternum nanum*	LC		
Bubbling Kassina	*Kassina senegalensis*	LC		
* Bush Squeaker	*Arthroleptis wahlbergi*	LC		
Bushveld Rain Frog	*Breviceps adspersus*	LC		
Common Platanna	*Xenopus laevis*	LC		
Delalande's River Frog	*Amietia delalandii*	LC		
Delicate Leaf-folding Frog	*Afrixalus delicatus*	LC		
Dwarf Puddle Frog	*Phrynobatrachus mababiensis*	LC		
** Forest Tree Frog	*Leptopelis natalensis*	LC		
Greater Leaf-folding Frog	*Afrixalus fornasinii*	LC		
Guttural Toad	*Sclerophrys gutturalis*	LC		
Mozambique Rain Frog	*Breviceps mossambicus*	LC		
* Natal Ghost Frog	*Hadromophryne natalensis*	LC		
* Natal Leaf-folding Frog	*Afrixalus spinifrons*	VU		NT
Natal Sand Frog	*Tomopterna natalensis*	LC		
Painted Reed Frog	*Hyperolius marmoratus*	LC		
** Pickersgill's Reed Frog	*Hyperolius pickersgilli*	EN		CR
Raucous Toad	*Sclerophrys capensis*	LC		
Red Toad	*Schismaderma carens*	LC		
Sharpnosed Grass Frog	*Ptychadena oxyrhynchus*	LC		
Snoring Puddle Frog	*Phrynobatrachus natalensis*	LC		
* Spotted Shovel-nosed Frog	*Hemisus guttatus*	VU		VU
Striped Stream Frog	*Strongylopus fasciatus*	LC		
Tinker Reed Frog	*Hyperolius tuberilinguis*	LC		
Water Lily Frog	*Hyperolius pusillus*	LC		
* Yellowstriped Reed Frog	*Hyperolius semidiscus*	LC		

APPENDIX 1. A checklist of bird species for the pentads 2935_3100; 2940_3100; 2935_3055 and 2940_3055

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Apalis, Bar-throated	*Apalis thoracica*				
Apalis, Yellow-breasted	*Apalis flavida*				
Barbet, Acacia Pied	*Tricholaema leucomelas*				
Barbet, Black-collared	*Lybius torquatus*				
Barbet, Crested	*Trachyphonus vaillantii*				
Barbet, White-eared	*Stactolaema leucotis*				
Batis, Cape	*Batis capensis*				
Batis, Chinspot	*Batis molitor*				
Bee-eater, Blue-cheeked	*Merops persicus*				
Bee-eater, European	*Merops apiaster*				
Bee-eater, Little	*Merops pusillus*				
Bee-eater, White-fronted	*Merops bullockoides*				
Bishop, Southern Red	*Euplectes orix*				
Bittern, Little	*Ixobrychus minutus*			Sched 3	
SLS Blackcap, Bush	*Lioptilus nigricapillus*	VU/NT		Sched 3	
Bokmakierie, Bokmakierie	*Telophorus zeylonus*				
Broadbill, African	*Smithornis capensis*	VU/LC		Sched 3	
Boubou, Southern	*Laniarius ferrugineus*				
Brownbul, Terrestrial	*Phyllastrephus terrestris*				
Brubru, Brubru	*Nilaus afer*				
Bulbul, Dark-capped	*Pycnonotus tricolor*				
Bunting, Golden-breasted	*Emberiza flaviventris*			Sched 3	
Bush-shrike, Gorgeous	*Telophorus quadricolor*				
Bush-shrike, Grey-headed	*Malaconotus blanchoti*				
Bush-shrike, Olive	*Telophorus olivaceus*				
Bush-shrike, Orange-breasted	*Chlorophoneus sulfereopectus*				
Buttonquail, Kurrichane	*Turnix sylvaticus*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
(*) Buzzard, Jackal	*Buteo rufofuscus*			Sched 3	II
Buzzard, Steppe	*Buteo vulpinus*			Sched 3	
Camaroptera, Green-backed	*Camaroptera brachyura*				
Canary, Brimstone	*Crithagra sulphuratus*			Sched 3	
Canary, Cape	*Serinus canicollis*				
SLS Canary, Forest	*Crithagra scotops*			Sched 3	
Canary, Yellow-fronted	*Crithagra mozambicus*				
Chat, Buff-streaked	*Oenanthe bifasciata*				
Chat, Familiar	*Cercomela familiaris*				
Cisticola, Croaking	*Cisticola natalensis*				
Cisticola, Lazy	*Cisticola aberrans*				
Cisticola, Levaillant's	*Cisticola tinniens*				
Cisticola, Pale-crowned	*Cisticola cinnamomeus*				
Cisticola, Rattling	*Cisticola chiniana*				
Cisticola, Red-faced	*Cisticola erythrops*				
Cisticola, Rufous-winged	*Cisticola galactotes*				
Cisticola, Wailing	*Cisticola lais*				
Cisticola, Wing-snapping	*Cisticola ayresii*				
Cisticola, Zitting	*Cisticola juncidis*				
Cliff-chat, Mocking	*Thamnolaea cinnamomeiventris*				
Coucal, Burchell's	*Centropus burchellii*	VU/LC			
Crake, Black	*Amaurornis flavirostris*				
Crane, Grey Crowned	*Balearica regulorum*				II
Crested-flycatcher, Blue-mantled	*Trochocercus cyanomelas*				
Crombec, Long-billed	*Sylvietta rufescens*				
Crow, Cape	*Corvus capensis*				
Crow, House	*Corvus splendens*				
Crow, Pied	*Corvus albus*				

		CONSERVATION STATUS			
COMMON NAME	SCIENTIFIC NAME	RD REGIONAL/GLOBAL	NEMBA (2015)	KZNEPBA (2014)	CITES
Cuckoo, African	*Cuculus gularis*				
Cuckoo, African Emerald	*Chrysococcyx cupreus*				
Cuckoo, Black	*Cuculus clamosus*				
Cuckoo, Common	*Cuculus canorus*				
Cuckoo, Diderick	*Chrysococcyx caprius*				
Cuckoo, Klaas's	*Chrysococcyx klaas*				
Cuckoo, Red-chested	*Cuculus solitarius*				
Cuckoo-shrike, Black	*Campephaga flava*				
Cuckoo-shrike, Grey	*Coracina caesia*				
Dove, Laughing	*Streptopelia senegalensis*				
Dove, Lemon	*Aplopelia larvata*			Sched 3	
Dove, Namaqua	*Oena capensis*			Sched 3	
Dove, Red-eyed	*Streptopelia semitorquata*				
Dove, Rock	*Columba livia*				
Dove, Tambourine	*Turtur tympanistria*			Sched 3	
Drongo, Fork-tailed	*Dicrurus adsimilis*				
Drongo, Square-tailed	*Dicrurus ludwigii*				
Eagle, African Crowned	*Stephanoaetus coronatus*	VU/NT		Sched 3	II
Eagle, Booted	*Aquila pennatus*			Sched 3	
Eagle, Long-crested	*Lophaetus occipitalis*			Sched 3	
Eagle, Martial	*Polemaetus bellicosus*	EN/VU	EN	Sched 3	II
Eagle, Verreaux's	*Aquila verreauxii*			Sched 3	II
Eagle, Wahlberg's	*Aquila wahlbergi*			Sched 3	II
Eagle-owl, Spotted	*Bubo africanus*			Sched 3	II
Egret, Cattle	*Bubulcus ibis*			Sched 3	
Falcon, Lanner	*Falco biarmicus*			Sched 3	
Falcon, Peregrine	*Falco peregrinus*			Sched 3	
Firefinch, African	*Lagonosticta rubricata*			Sched 3	
Firefinch, Red-billed	*Lagonosticta senegala*			Sched 3	

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Fiscal, Common (Southern)	*Lanius collaris*				
Fish-eagle, African	*Haliaeetus vocifer*			Sched 3	II
Flufftail, Buff-spotted	*Sarothrura elegans*			sched 3	
Flufftail, Red-chested	*Sarothrura rufa*			Sched 3	
Flycatcher, African Dusky	*Muscicapa adusta*				
Flycatcher, Ashy	*Muscicapa caerulescens*				
(*) Flycatcher, Fiscal	*Sigelus silens*				
Flycatcher, Southern Black	*Melaenornis pammelaina*				
Flycatcher, Spotted	*Muscicapa striata*				
Francolin, Shelley's	*Scleroptila shelleyi*				
Goose, Egyptian	*Alopochen aegyptiacus*				
Goose, Spur-winged	*Plectropterus gambensis*				
Goshawk, African	*Accipiter tachiro*			Sched 3	II
(*) Grassbird, Cape	*Sphenoeacus afer*				
Grebe, Little	*Tachybaptus ruficollis*				
Greenbul, Sombre	*Andropadus importunus*				
Greenbul, Yellow-bellied	*Chlorocichla flaviventris*				
Green-pigeon, African	*Treron calvus*			Sched 3	
Ground-thrush, Spotted	*Zoothera guttata*			Sched 3	
Gull, Grey-headed	*Larus cirrocephalus*				
Hamerkop, Hamerkop	*Scopus umbretta*			Sched 3	
Harrier-Hawk, African	*Polyboroides typus*			Sched 3	II
Heron, Black-headed	*Ardea melanocephala*			Sched 3	
Heron, Grey	*Ardea cinerea*			Sched 3	
Heron, Purple	*Ardea purpurea*			Sched 3	
Heron, Squacco	*Ardeola ralloides*			Sched 3	
Hobby, Eurasian	*Falco subbuteo*			Sched 3	II
Honeybird, Brown-backed	*Prodotiscus regulus*				
Honey-buzzard, European	*Pernis apivorus*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Honeyguide, Greater	*Indicator indicator*				
Honeyguide, Lesser	*Indicator minor*				
Honeyguide, Scaly-throated	*Indicator variegatus*				
Hoopoe, African	*Upupa africana*				
Hornbill, Crowned	*Tockus alboterminatus*				
Hornbill, Trumpeter	*Bycanistes bucinator*				
House-martin, Common	*Delichon urbicum*				
Ibis, African Sacred	*Threskiornis aethiopicus*				
Ibis, Glossy	*Plegadis falcinellus*				
Ibis, Hadeda	*Bostrychia hagedash*				
Indigobird, Dusky	*Vidua funerea*				
Kestrel, Rock	*Falco rupicolus*			Sched 3	
Kingfisher, Brown-hooded	*Halcyon albiventris*				
Kingfisher, Giant	*Megaceryle maximus*				
Kingfisher, Malachite	*Alcedo cristata*				
Kite, Black	*Milvus migrans*			Sched 3	II
Kite, Black-shouldered	*Elanus caeruleus*				
Kite, Yellow-billed	*Milvus aegyptius*				
Lapwing, African Wattled	*Vanellus senegallus*				
Lapwing, Blacksmith	*Vanellus armatus*				
Lapwing, Crowned	*Vanellus coronatus*				
Lark, Red-capped	*Calandrella cinerea*				
Lark, Rufous-naped	*Mirafra africana*				
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*	EN/LC		Sched 3	

		CONSERVATION STATUS			
COMMON NAME	SCIENTIFIC NAME	RD REGIONAL/GLOBAL	NEMBA (2015)	KZNEPBA (2014)	CITES
Martin, Brown-throated	*Riparia paludicola*				
Martin, Rock	*Hirundo fuligula*				
Martin, Sand	*Riparia riparia*				
Masked-weaver, Lesser	*Ploceus intermedius*				
Masked-weaver, Southern	*Ploceus velatus*				
Moorhen, Common	*Gallinula chloropus*				
Moorhen, Lesser	*Gallinula angulata*				
Mousebird, Red-faced	*Urocolius indicus*				
Mousebird, Speckled	*Colius striatus*				
Myna, Common	*Acridotheres tristis*				
Neddicky, Neddicky	*Cisticola fulvicapilla*				
Night-Heron, Black-crowned	*Nycticorax nycticorax*			Sched 3	
Nightjar, Fiery-necked	*Caprimulgus pectoralis*				
Olive-pigeon, African	*Columba arquatrix*				
Oriole, Black-headed	*Oriolus larvatus*				
Oriole, Eurasian Golden	*Oriolus oriolus*				
Owl, Barn	*Tyto alba*			sched 3	II
Palm-swift, African	*Cypsiurus parvus*				
Paradise-flycatcher, African	*Terpsiphone viridis*				
Parakeet, Rose-ringed	*Psittacula krameri*				
Petronia, Yellow-throated	*Petronia superciliaris*				
Pigeon, Speckled	*Columba guinea*				
Pipit, African	*Anthus cinnamomeus*				
Pipit, Long-billed	*Anthus similis*				
Pipit, Plain-backed	*Anthus leucophrys*				
Pipit, Striped	*Anthus lineiventris*				
Plover, Common Ringed	*Charadrius hiaticula*				
Plover, Grey	*Pluvialis squatarola*				
Plover, Kittlitz's	*Charadrius pecuarius*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Plover, Three-banded	*Charadrius tricollaris*				
Plover, White-fronted	*Charadrius marginatus*				
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*				
Raven, White-necked	*Corvus albicollis*				
Reed-warbler, African	*Acrocephalus baeticatus*				
Reed-warbler, Great	*Acrocephalus arundinaceus*				
Robin, White-starred	*Pogonocichla stellata*				
Robin-chat, Cape	*Cossypha caffra*				
SLS Robin-chat, Chorister	*Cossypha dichroa*				
Robin-chat, Red-capped	*Cossypha natalensis*				
Robin-chat, White-browed	*Cossypha heuglini*				
SLS Rock-thrush, Cape	*Monticola rupestris*				
Roller, European	*Coracias garrulus*	NT/NT			
Rush-warbler, Little	*Bradypterus baboecala*				
Sandpiper, Common	*Actitis hypoleucos*				
Sandpiper, Curlew	*Calidris ferruginea*	LC/NT			
Sandpiper, Marsh	*Tringa stagnatilis*				
Sandpiper, Wood	*Tringa glareola*				
Saw-wing, Black (Southern race)	*Psalidoprocne pristoptera*				
Scimitarbill, Common	*Rhinopomastus cyanomelas*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
(*) Scrub-robin, Brown	*Cercotrichas signata*				
Scrub-robin, White-browed	*Cercotrichas leucophrys*				
Seedeater, Streaky-headed	*Crithagra gularis*			Sched 3	
Shrike, Lesser Grey	*Lanius minor*				
Shrike, Red-backed	*Lanius collurio*				
Snake-eagle, Black-chested	*Circaetus pectoralis*			Sched 3	II
Snake-eagle, Brown	*Circaetus cinereus*			Sched 3	II
Sparrow, Cape	*Passer melanurus*				
Sparrow, House	*Passer domesticus*				
Sparrow, Southern Grey-headed	*Passer diffusus*				
Sparrowhawk, Black	*Accipiter melanoleucus*			Sched 3	II
Sparrowhawk, Little	*Accipiter minullus*			Sched 3	II
Spurfowl, Natal	*Pternistis natalensis*				
Starling, Black-bellied	*Lamprotornis corruscus*				
Starling, Cape Glossy	*Lamprotornis nitens*				
Starling, Common	*Sturnus vulgaris*				
Starling, Red-winged	*Onychognathus morio*				
Starling, Violet-backed	*Cinnyricinclus leucogaster*				
Starling, Wattled	*Creatophora cinerea*				
Stint, Little	*Calidris minuta*				
Stonechat, African	*Saxicola torquatus*				
Stork, White	*Ciconia ciconia*				
Sunbird, Amethyst	*Chalcomitra amethystina*				
Sunbird, Collared	*Hedydipna collaris*				
SLS Sunbird, Greater Double-collared	*Cinnyris afer*				
Sunbird, Grey	*Cyanomitra veroxii*				
Sunbird, Malachite	*Nectarinia famosa*				
Sunbird, Olive	*Cyanomitra olivacea*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Sunbird, Purple-banded	*Cinnyris bifasciatus*				
Sunbird, Scarlet-chested	*Chalcomitra senegalensis*				
(*) Sunbird, Southern Double-collared	*Cinnyris chalybeus*				
Sunbird, White-bellied	*Cinnyris talatala*				
Swallow, Barn	*Hirundo rustica*				
Swallow, Greater Striped	*Hirundo cucullata*				
Swallow, Lesser Striped	*Hirundo abyssinica*				
Swallow, White-throated	*Hirundo albigularis*				
Swallow, Wire-tailed	*Hirundo smithii*				
Swamphen, African Purple	*Porphyrio madagascariensis*				
Swamp-warbler, Lesser	*Acrocephalus gracilirostris*				
Swift, African Black	*Apus barbatus*				
Swift, Alpine	*Tachymarptis melba*				
Swift, Common	*Apus apus*				
Swift, Horus	*Apus horus*				
Swift, Little	*Apus affinis*				
Swift, White-rumped	*Apus caffer*				
Tchagra, Black-crowned	*Tchagra senegalus*				
Tchagra, Brown-crowned	*Tchagra australis*				
(*) Tchagra, Southern	*Tchagra tchagra*				
Thick-knee, Spotted	*Burhinus capensis*				
Thick-knee, Water	*Burhinus vermiculatus*				
Thrush, Groundscraper	*Psophocichla litsipsirupa*				
Thrush, Kurrichane	*Turdus libonyanus*				
Thrush, Olive	*Turdus olivaceus*				
Tinkerbird, Red-fronted	*Pogoniulus pusillus*				
Tinkerbird, Yellow-rumped	*Pogoniulus bilineatus*				
Tit, Southern Black	*Parus niger*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Trogon, Narina	*Apaloderma narina*				
SLS Turaco, Knysna	*Tauraco corythaix*			Sched 3	
Turaco, Purple-crested	*Gallirex porphyreolophus*			Sched 3	II
Turtle-dove, Cape	*Streptopelia capicola*				
Twinspot, Green	*Mandingoa nitidula*			Sched 3	
Wagtail, African Pied	*Motacilla aguimp*				
Wagtail, Cape	*Motacilla capensis*				
Wagtail, Mountain	*Motacilla clara*				
(*) Warbler, Barratt's	*Bradypterus barratti*				
Warbler, Dark-capped Yellow	*Chloropeta natalensis*				
Warbler, Garden	*Sylvia borin*				
Warbler, Marsh	*Acrocephalus palustris*				
Warbler, Sedge	*Acrocephalus schoenobaenus*				
Warbler, Willow	*Phylloscopus trochilus*				
Wattle-eye, Black-throated	*Platysteira peltata*				
Waxbill, Blue	*Uraeginthus angolensis*				
Waxbill, Common	*Estrilda astrild*				
Waxbill, Grey	*Estrilda perreini*				
Waxbill, Orange-breasted	*Amandava subflava*			Sched 3	
(*) Waxbill, Swee	*Coccopygia melanotis*			Sched 3	
(*) Weaver, Cape	*Ploceus capensis*				
Weaver, Dark-backed	*Ploceus bicolor*				
Weaver, Golden	*Ploceus xanthops*				
Weaver, Southern Brown-throated	*Ploceus xanthopterus*				
Weaver, Spectacled	*Ploceus ocularis*				
Weaver, Thick-billed	*Amblyospiza albifrons*				
Weaver, Village	*Ploceus cucullatus*				
Weaver, Yellow	*Ploceus subaureus*				

		CONSERVATION STATUS			
COMMON NAME	**SCIENTIFIC NAME**	**RD REGIONAL/GLOBAL**	**NEMBA (2015)**	**KZNEPBA (2014)**	**CITES**
Whimbrel, Common	*Numenius phaeopus*				
(*) White-eye, Cape	*Zosterops virens*				
Whydah, Pin-tailed	*Vidua macroura*				
Widowbird, Fan-tailed	*Euplectes axillaris*				
Widowbird, Long-tailed	*Euplectes progne*			Sched 3	
Widowbird, Red-collared	*Euplectes ardens*				
Widowbird, White-winged	*Euplectes albonotatus*				
Wood-dove, Emerald-spotted	*Turtur chalcospilos*				
Wood-hoopoe, Green	*Phoeniculus purpureus*				
Woodland-warbler, Yellow-throated	*Phylloscopus ruficapilla*				
Wood-owl, African	*Strix woodfordii*				II
Woodpecker, Cardinal	*Dendropicos fuscescens*				
Woodpecker, Golden-tailed	*Campethera abingoni*				
Woodpecker, Olive	*Dendropicos griseocephalus*				
Wryneck, Red-throated	*Jynx ruficollis*				

* = Endemic

(*) = near endemic (i.e. more than 70 % of population in RSA)

SLS = endemic to South Africa, Lesotho and Swaziland

BSLS = breeding South Africa, Lesotho and Swaziland endemic

Amaoti Housing Development – Vegetation Delineation

eThekwini, KwaZulu-Natal

February 2021

CLIENT

SiVEST

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**Amaoti Housing Development – Vegetation Delineation**
Reference	**Amaoti Housing Development**
Submitted to	SiVEST
Field Survey and Spatial Analysis	**Mahomed Desai** 
	Dr. Mahomed Desai is Pr. Nat. Sci. registed (134678) and has extensive experience in assessing estuarine, freshwater and terrestrial biodiversity. He obtained his M.Sc. in Environmental Engineering and Ph.D. in Ecological Sciences, and has over 10 years of experience working with African fauna and flora as a researcher and consultant, through various projects.
	Dr Lindi Steyn completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from basic Assessments to Environmental Impact Assessments following IFC standards.
Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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List of Figures

1 Introduction

The Biodiversity Company was appointed to delineate the indigenous vegetation in order to inform whether a listed activity will be triggered National Environmental Management Act, 1998 (Act No. 107 of 1998) – Environmental Impact Assessment Regulations, 2014 for the proposed Amaoti Housing Development. "*Indigenous vegetation" refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years"*.

2 Methods

2.1 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The spatial files were provided by the client and any changes to the design subsequent to this report would not have been considered; and
- Due to safety constraints, the specialist could not survey the entire area and was not able to alight from the vehicle.

2.2 Indigenous Vegetation Delineation

A single survey was undertaken during the 19th of February 2021 (Summer) to identify areas of natural vegetation within the development boundary. The survey comprised of driving within the development boundary and observing areas that were deemed likely as indigenous based on aerial imagery that was reviewed prior to the field survey. Due to the aforementioned constraints, points at elevated positions within the landscape were used to obtain a better visual of the habitats within the area, that were observed with binoculars.

The indigenous vegetation within the development boundary was delineated using QGIS 3.16. These spatial features were delineated based on the observations made during the field survey in conjunction with available satellite imagery.

3 Results & Discussion

3.1 Indigenous Vegetation

Based on the findings of the survey there are 336.231 ha of indigenous vegetation within the Amaoti proposed development boundary (Figure 3-1). Based on the layout design provided, 46.392 ha of indigenous vegetation will be removed. Figure 3-2 provides photographs of the indigenous vegetation within the landscape, as well as the secondary/degraded grassland that will be directly impacted by the proposed development.

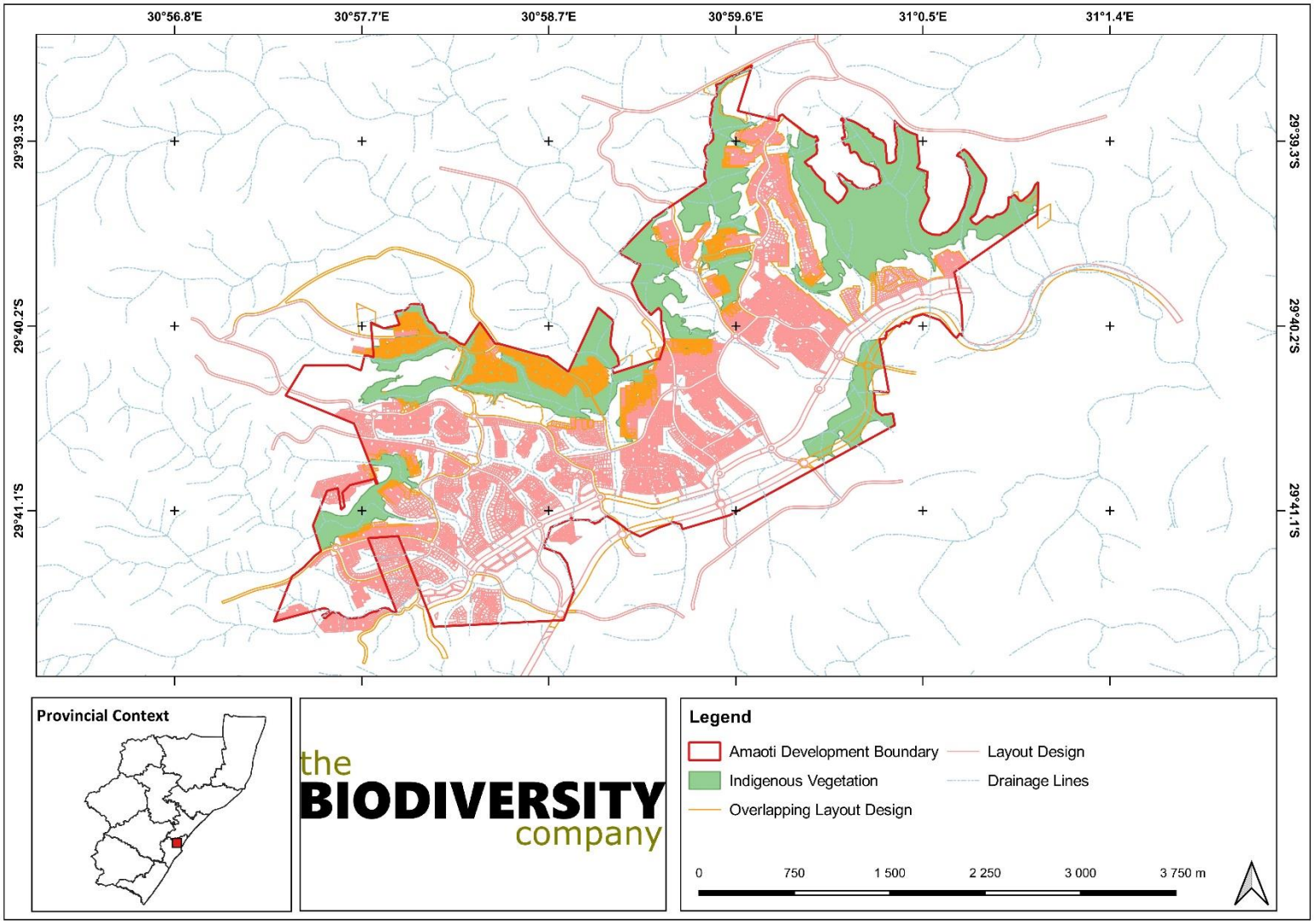


Figure 3-1 Map illustrating the location and extent of indigenous vegetation within the Amaoti Housing Development boundary

Figure 3-2 ***Photograph illustrating a portion of the indigenous vegetation within the landscape. Inset photo illustrates the secondary/degraded grassland habitat that will be directly impacted***

3.2 Conclusion

Based on the findings of this survey **Listing Notice 2, Activity 15** will be triggered.

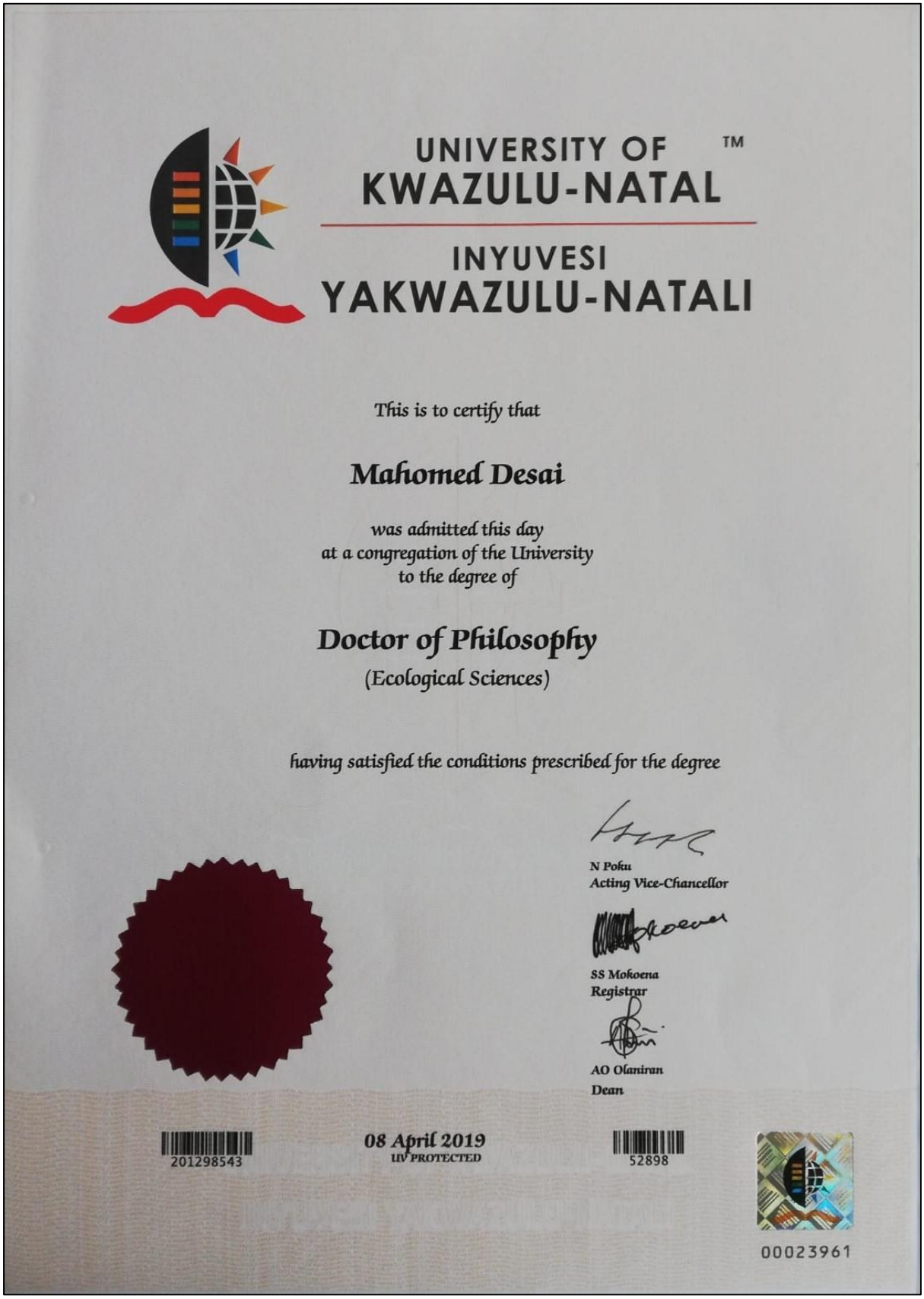
The listing is defined as “The clearance of an area of 20 hectares or more of indigenous vegetation clearance, excluding where such clearance of indigenous vegetation is required for –

(i) the undertaking of a linear activity;

(ii) maintenance purposes undertaken in accordance with a maintenance management plan”

4 Appendix Items

4.1 Appendix A – Specialists Qualifications



UNIVERSITY OF KWAZULU-NATAL ™

INYUVESI YAKWAZULU-NATALI

This is to certify that

Mahomed Desai

was admitted this day
at a congregation of the University
to the degree of

Doctor of Philosophy

(Ecological Sciences)

having satisfied the conditions prescribed for the degree

N Poku
Acting Vice-Chancellor

SS Mokoena
Registrar

AO Olaniran
Dean

201298543

08 April 2019
UV PROTECTED

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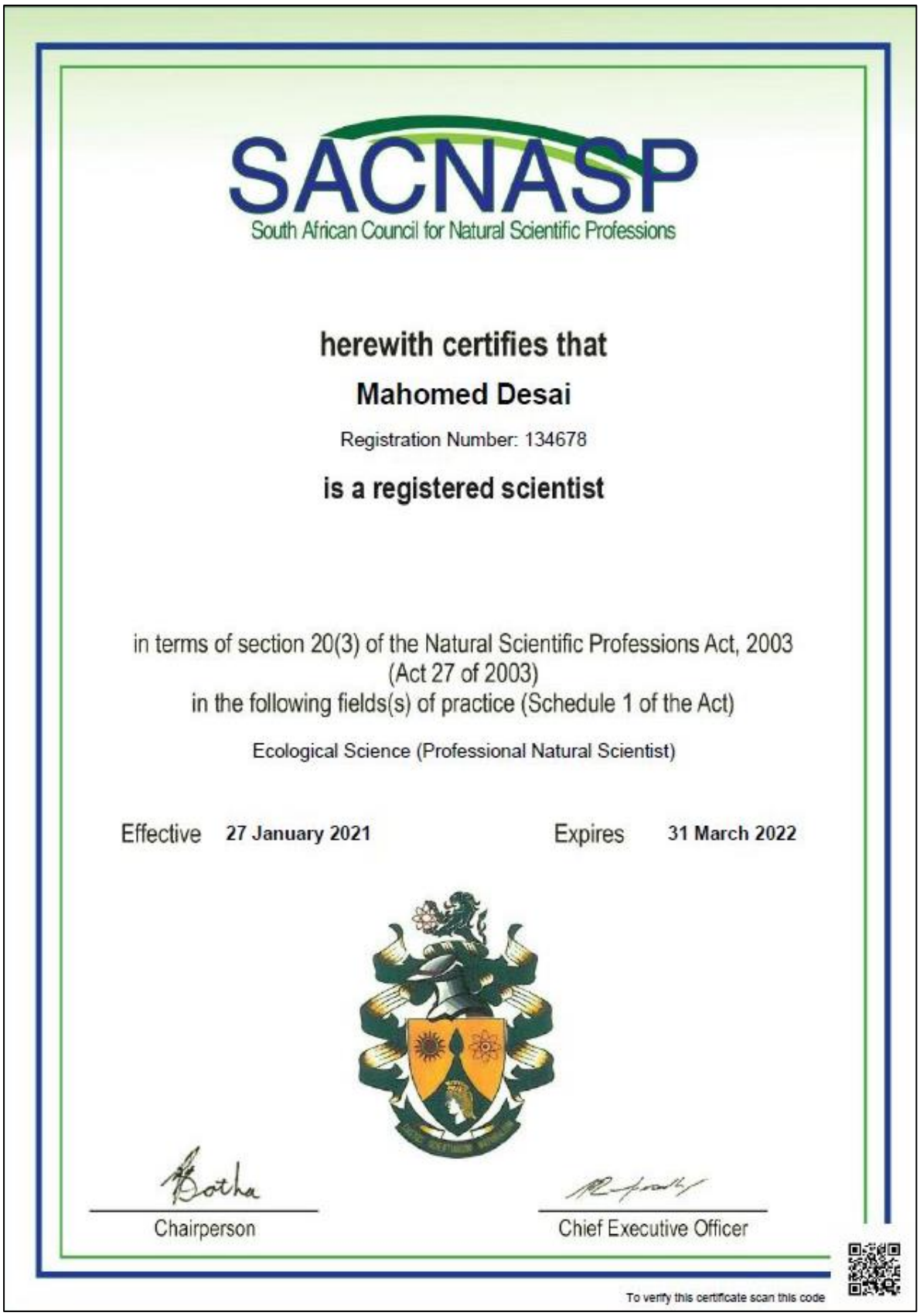

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Mahomed Desai

Registration Number: 134678

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **27 January 2021** Expires **31 March 2022**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

4.2 Appendix B – Specialists Declaration of Independence

I, Mahomed Desai, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Mahomed Desai

Biodiversity and Aquatic Specialist

The Biodiversity Company

February 2021