



# Ecological Baseline & Impact Assessment for the Chelmsford EMP Amendment Process

**KwaZulu-Natal, South Africa**

June 2018

**CLIENT**



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Declaration	<p>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, 2014 (as amended). 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 principles of science.</p>



## DECLARATION

I, Martinus Erasmus, 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 and is punishable in terms of Section 24F of the Act.



Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

June 2018

## DECLARATION

I, Michael Adams, 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 and is punishable in terms of Section 24F of the Act.



Michael Adams

Terrestrial Ecologist

The Biodiversity Company

June 2018

## EXECUTIVE SUMMARY

The project area is situated across three farm portions (Macclesfield 8418 Ptn Re, Herons Court 8521 Ptn 1 and Herons Court 8521 Ptn Re) which were previously earmarked for underground mining in the original EMP, but the Holder of the Mining Right now proposes to mine this via open cast methods. The new open cast area will be approximately 281 ha in extent. The approved EMP was for underground mining. Thus, an EMP Amendment and application for Environmental Authorisation is required.

A Water Use License (No. 11/V31E/ACGIJ/5164) has been authorised for the Chelmsford Colliery (dated 27 March 2017). This license permits the open cast mining through, and placement of infrastructure within 100m of wetland areas on designated property portions.

The completion of a study, in conjunction with the detailed results from the survey means that there is a high confidence in the information provided. The survey which was completed, and the corresponding studies resulted in good site coverage, within the proposed mining footprint area, assessing the major habitats and ecosystems, obtaining a general species (fauna and flora) overview and observing the major current impacts.

It is clear from the regional ecological overview, as well as the baseline data collected to date, that the project area is an assembly of different conditions and certain areas have been altered both historically and presently. Current impacts include secondary roads, agricultural practices, active mining, dumping of rubble, livestock, litter and infringement by people and livestock into natural areas.

However, despite these impacts, the remaining natural habitats (mostly the northern portion of the project area) exhibit healthy ecological functionality, integrity and provide habitat for several threatened species. This diversity is indicative of the importance of these systems to collectively provide refugia, food and corridors for dispersal in and through the surrounding area.

The proposed mining area is situated within, and near, to areas identified as Irreplaceable CBAs. Field surveys confirmed the ecological integrity of this CBA, as well as the presence of multiple threatened species (including Oribi and Grey Crowned Cranes). The likelihood of other threatened species occurring in the project area was rated as high.

The proposed project area is situated just outside of the 5 km protected areas buffer from the Chelmsford Dam Nature Reserve.

The following further conclusions were reached based on the results of this assessment:

- According to the KZN BPS it can be concluded that the proposed mining is likely to impact on a CBA: Irreplaceable. The mining footprint area directly intersects with portions of a CBA: Irreplaceable. Moreover, the entire northern section of the proposed mining area borders directly on areas classed as a CBA: Irreplaceable;
- According to the NBA (2011) terrestrial ecosystem threat status', the project area falls within one ecosystem, which is listed as Vulnerable (VU) and poorly protected;
- Based on the SANBI (2010) Protected Areas Map and the National Protected Areas Expansion Strategy (NPAES) the project area doesn't overlap with any formally protected area, but is situated 5.2 km from the Chelmsford Dam Nature Reserve;

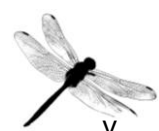
- According to the Mining and Biodiversity Guidelines (2013), portions of the proposed mining areas are listed as 'highest biodiversity importance'. These areas are also listed as 'highest risk for mining'.
- The project area is situated across two different vegetation types; Northern KwaZulu-Natal Moist Grassland (Gs4) (which constitutes the majority of the area) and Eastern Temperate Freshwater Wetlands vegetation types, according to Mucina & Rutherford (2006). The Northern KwaZulu-Natal Moist Grassland vegetation type is listed as Vulnerable;
- Nine (9) Category 1b invasive plant species were recorded within the project area and must therefore be removed by implementing an alien invasive plant management programme;
- Sixty-five (65) bird species were recorded in the project area during the May 2018 survey. Three avifaunal SCC were recorded during the survey, namely Grey Crowned Crane, Southern Bald Ibis and Cape Cormorant, based on the presence of pristine, suitable habitat, and the nearby Chelmsford Nature Reserve, there is a high probability that many other bird SCC occur within the project area;
- Two mammal SCC were recorded during the survey, namely Oribi and Serval, based on the presence of pristine, suitable habitat, and the nearby Chelmsford Nature Reserve, there is a high probability that many other mammal SCC occur within the project area.

## Impact Statement

An impact statement is required as per the NEMA EIA regulations (as amended) with regards to the proposed development.

The proposed mining area is situated approximately 5 km to the Chelmsford Nature Reserve, will partially impact upon a CBA: Irreplaceable. The project area is also listed as an area that presents the highest risk to mining due to environmental sensitivities and falls within the 1 km buffer from the Horn River (Mining and Biodiversity Guidelines, 2013). Field surveys confirmed the ecological integrity of this CBA, as well as the presence of multiple threatened or endangered species. Furthermore, the ecosystems present, although somewhat disturbed, showed the potential to host a number of reptile, mammal and bird species of conservation concern.

In the event that environmental authorisation is issued for this project, proven ecological (or environmental) controls and mitigation measures must be entrenched in the management framework.





## DOCUMENT GUIDE

The table below provides the NEMA EIA Regulations, 2014 (as amended) Requirements for Ecological Assessments, and also the relevant sections in the report where these requirements are addressed:

GNR 326 May 2017	Description	Section in the Report
<b>Specialist Report</b>		
Appendix 6 (a)	A specialist report prepared in terms of these Regulations must contain— details of— i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page (i)
Appendix 6 (b)	A declaration that the specialist is independent in a form as may be specified by the competent authority;	Page (ii) and (iii)
Appendix 6 (c)	An indication of the scope of, and the purpose for which, the report was prepared;	Section 3
Appendix 6 (cA)	<u>An indication of the quality and age of base data used for the specialist report;</u>	Section 5
Appendix 6 (cB)	<u>A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;</u>	Section 9.2
Appendix 6 (d)	The <u>duration</u> , date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5.6
Appendix 6 (e)	A description of the methodology adopted in preparing the report or carrying out the specialised process <u>inclusive of equipment and modelling used;</u>	Section 5
Appendix 6 (f)	<u>Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;</u>	Section 8
Appendix 6 (g)	An identification of any areas to be avoided, including buffers;	Section 8
Appendix 6 (h)	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 8
Appendix 6 (i)	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4
Appendix 6 (j)	A description of the findings and potential implications of such findings on the impact of the proposed activity <u>or activities;</u>	Section 10
Appendix 6 (k)	Any mitigation measures for inclusion in the EMP;	Section 10.5
Appendix 6 (l)	Any conditions for inclusion in the environmental authorisation;	Section 11,12
Appendix 6 (m)	Any monitoring requirements for inclusion in the EMP or environmental authorisation;	Section 10.5
Appendix 6 (n)	A reasoned opinion— i. whether the proposed activity, <u>activities</u> or portions thereof should be authorised; <u>(iA) regarding the acceptability of the proposed activity or activities; and</u> ii. if the opinion is that the proposed activity, <u>activities</u> or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMP, and where applicable, the closure plan;	Section 12 Section 10.5

Chelmsford EMP Amendment

GNR 326 May 2017	Description	Section in the Report
Appendix 6 (o)	A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
Appendix 6 (p)	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
Appendix 6 (q)	Any other information requested by the competent authority.	None



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## 1 Introduction

Chelmsford Colliery is an existing, operational coal mine located within the Newcastle Local Municipality of the Amajuba District Municipality in the KwaZulu Natal Province. The Biodiversity Company was appointed to conduct a comprehensive biodiversity assessment for the proposed Chelmsford EMP Amendment Process (the Macclesfield Project Area).

This area is situated across three farm portions (Macclesfield 8418 Ptn Re, Herons Court 8521 Ptn 1 and Herons Court 8521 Ptn Re) which were previously earmarked for underground mining in the original EMP, but the Holder of the Mining Right now proposes to mine this via open cast methods. The new open cast area will be approximately 281 ha in extent.

A Water Use License (No. 11/V31E/ACGIJ/5164) has been approved for the Chelmsford Colliery. This license permits the open cast mining through, and placement of infrastructure within 100m of wetland areas on designated property portions.

In terms of the Mineral and Petroleum Resources Development Act No. 28 of 2002 (MPRDA), Future Coal (Pty) Ltd holds two mining Rights for the overall project area:

- Mining Right No. 30/5/1/2/2/196MR issued on the 16th August 2010 over the farm Forts 8502 HS, RE of Chelmsford 8642 HS, RE of Herons Court 8521 HS, and RE of Harbeest Bult 9197 HS measuring 2 023.91 ha in extent; and
- Mining Right No. 30/5/1/2/2/10006MR issued on the 4th December 2013 over the farm Exmoor 8095 HS; RE of Macclesfield 8418 HS; Ptn 1 of Herons Court 8521; RE and Ptns 1 and 2 of Spectacle Spruit 9079 HS; and Ptns 1, 2 and RE of Mooikrantz 9562HS measuring 2 963.19 ha.

Further to this, the Mine has an approved Environmental Management Plan report (EMP) and subsequent EMP Addendum for the operations. These are summarised below:

- Chelmsford Colliery EIA and EMP Report, October 2008. Prodigy Environmental;
- Revised and Augmented EIA and EMP Report for Chelmsford Colliery, August 2011. Prodigy Environmental; and
- Chelmsford Colliery II Environmental Impact Assessment and Environmental Management Plan, May 2012. Prof. Dr. Wouter van Hoven and R.Needham.

The approved EMP had the farms Macclesfield and Herons Court earmarked for underground mining. Thus, an EMP Amendment and application for Environmental Authorisation is required.

### 1.1 Project Description

The mineral to be mined is coal. mining methods on site will include open cast truck-and-shovel and underground bord-and-pillar methods.

The operation can be divided into five operational areas, namely:

- Ashley Section;
- Shelley Section;

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- Macclesfield Section;
- Mooikrantz Section; and
- Exmoor Section.

Future Coal has commenced with mining at the Ashley and Shelley; with Macclesfield targeted as the next development for the Chelmsford Colliery. The current status of the overall operations can be summarised as follows:

- Ashley Section (active):
  - Open cast and underground mining through highwall adits;
  - Security access control;
  - Crushing, screening and stockpiling of coal at the plant area (and washing in future);
  - Central mining support infrastructure area, including workshops, stores and wash bays;
  - Administrative area and central offices;
  - Pollution control dams (PCDs); and
  - Explosives magazine (lies between Ashley and Shelley).
- Shelley Section (active):
  - Open cast mining.
  - Rune-of-mine (RoM) stockpile area and crushing and screening,
  - Future PCD as designed in the Integrated Water Use Licence (IWUL) and
  - Container offices/workshops.
- Macclesfield Section:
  - Currently no activities underway. This area has however been earmarked for open cast mining in future and will include a small RoM stockpile area and container offices/workshops.
- Mooikrantz Section:
  - Currently no activities underway. This area will be mined via underground methods in future and will include a small RoM stockpile area and container offices/workshops.
- Exmoor and Spectacle Spruit Sections:
  - Currently no activities underway. A decline shaft plus ventilation shafts will be sunk to access the large reserve of bituminous coal.

The overall planned life-of-mine (LoM) is approximately 25+ years, with an additional 3-5 years post-closure monitoring.



## Chelmsford EMP Amendment

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Department of Mineral Resources (DMR), enabling informed decision making as to the ecological viability of the proposed development and to provide an opinion on the whether any environmental authorisation process or licensing is required for the proposed development.

The aim of the study will be to undertake and compile an ecological baseline and impact (risk) assessment for the proposed project. This biodiversity assessment will be informed by the National Environmental Management: Biodiversity Act (NEM:BA) No. 10 of 2004.

## 1.2 Fieldwork

A late-wet season terrestrial biodiversity survey was conducted on the 18<sup>th</sup>, 19<sup>th</sup> and 20<sup>th</sup> May 2018 by two terrestrial ecologists and a wetland ecologist. The survey primarily focussed on the development footprint area (open cast areas), referred to as the project area herein. Furthermore, the identification and description of any sensitive receptors were recorded across the project area, and the manner in which these sensitive receptors may be affected by the activity was also investigated.

## 2 Project Area

The project area is situated approximately 10 km south of the town of Newcastle and 4.5 km north of the Chelmsford Dam, in the KwaZulu Natal Province, South Africa. The area identified for open cast mining is approximately 281 ha in extent and is situated across three farm portions (Macclesfield 8418 Ptn Re, Herons Court 8521 Ptn 1 and Herons Court 8521 Ptn Re).

The land uses surrounding the project area consist mainly of agricultural land, rural land with associated houses and livestock grazing. Infrastructure such as existing coal mines, secondary tar roads, gravel roads and homesteads, occur within the proximity of the project area (Figure 1).





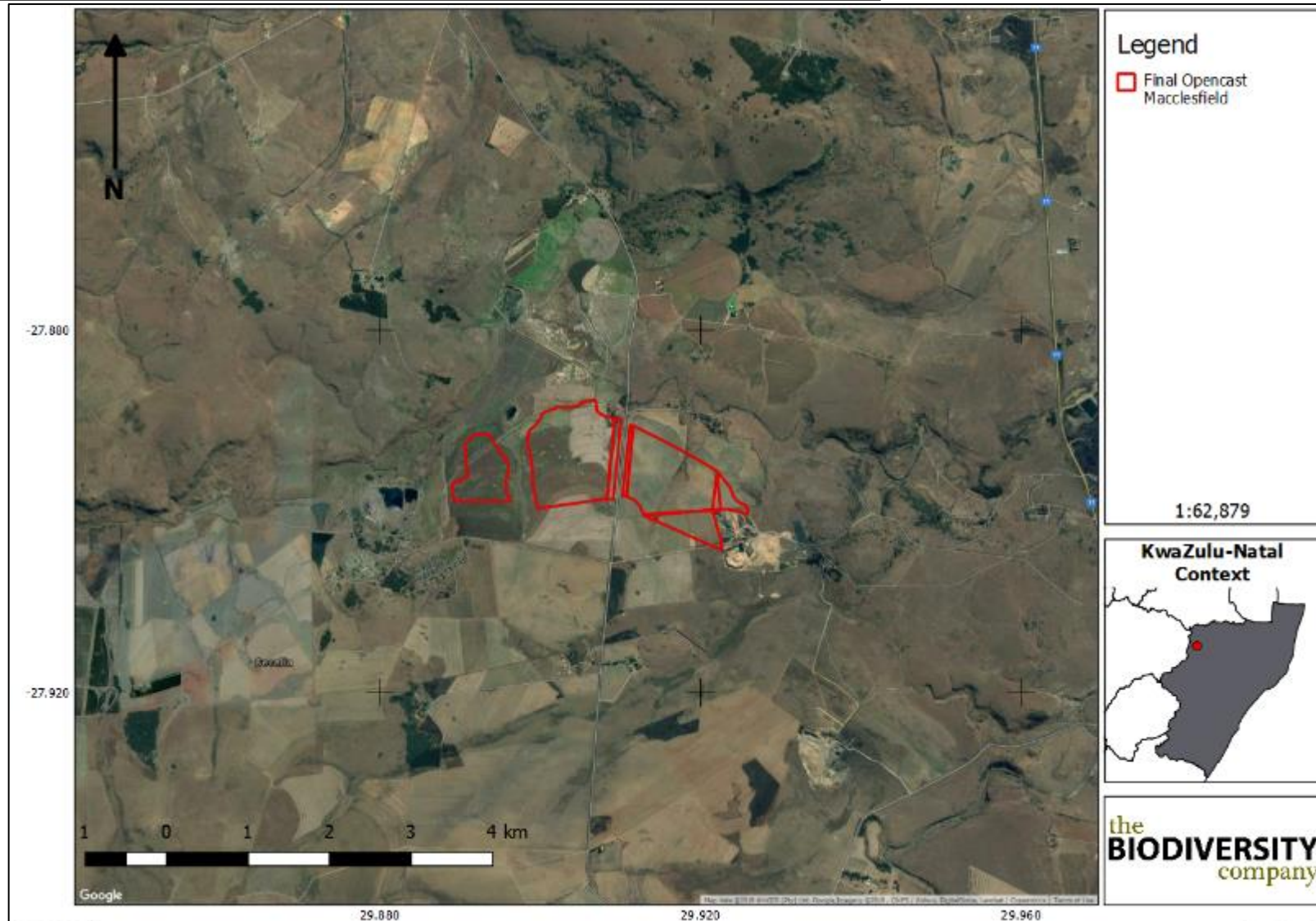


Figure 1: The general location of the project area

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### 3 Scope of Work

The Terms of Reference (ToR) included the following:

- Desktop description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist disciplines (biodiversity) that occur in the study area, and the manner in which these sensitive receptors may be affected by the activity;
- Identify 'significant' ecological, botanical and faunal features within the proposed development areas;
- Identification of conservation significant habitats around the project area which might be impacted by the proposed development;
- Site visit to verify desktop information;
- Screening to identify any critical issues (potential fatal flaws) that may result in project delays or rejection of the application; and
- Provide a map to identifying sensitive receptors in the study area, based on available maps, database information & site visit verification.

### 4 Limitations

The following limitations should be noted for the study:

- As per the scope of work, the fieldwork component of the assessment comprised of one assessment only, which was conducted during the late-wet season. This study has not assessed any temporal trends for the respective seasons;
- The Scope of Work (SoW) does not include a rehabilitation plan, biodiversity management plan, nor a storm water management plan;
- Field assessments were completed to assess as much of the site as possible with focus on the proposed directly impacted and downstream areas;
- Many wetland plants had shed their flowering portions and could not be identified;
- Despite these limitations, a comprehensive desktop study was conducted, in conjunction with the detailed results from the surveys, and as such there is a high confidence in the information provided.

### 5 Methodologies

#### 5.1 Geographic Information Systems (GIS) Mapping

Existing data layers were incorporated into GIS software to establish how the proposed open cast mining operation might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:



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- Vegetation Map of South Africa, Lesotho and Swaziland (Mucina et al., 2006);
- Important Bird Areas 2015 – BirdLife South Africa (vector geospatial dataset); and
- Department of Environmental Affairs (DEA) National Landcover 2015.

Field surveys were conducted to confirm (or refute) the presence of species identified in the desktop assessment. The specialist disciplines completed for this study included:

- Botanical;
- Fauna (mammals and avifauna); and
- Herpetology (reptiles and amphibians).

Brief descriptions of the standardised methodologies applied in each of the specialist disciplines are provided below. More detailed descriptions of survey methodologies are available upon request.

## 5.2 Botanical Assessment

The botanical study encompassed an assessment of all the vegetation units and habitat types within the project area. The focus was on an ecological assessment of habitat types as well as identification of any Red Data species within the known distribution of the project area. Due to the survey being conducted in the late-wet season this represented a limitation to the number of species identified. The methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species.

## 5.3 Literature Study

A literature review was conducted as part of the desktop study to identify the potential habitats present within the project area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA), to access distribution records on southern African plants. This is a new database which replaces the old Plants of Southern Africa (POSA) database. The POSA database provided distribution data of flora at the quarter degree square (QDS) resolution.

The Red List of South African Plants website (SANBI, 2017) was utilized to provide the most current account of the national status of flora. Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Field Guide to the Wild Flowers of the Highveld (Van Wyk & Malan, 1997);
- A Field Guide to Wild Flowers (Pooley, 1998);
- Guide to Grasses of Southern Africa (Van Oudtshoorn, 1999);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);



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- Medicinal Plants of South Africa (Van Wyk et al., 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016); and
- Identification Guide to Southern African Grasses. An identification manual with keys, descriptions and distributions. (Fish et al., 2015).

Additional information regarding ecosystems, vegetation types, and species of conservation concern (SCC) included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012);
- Grassland Ecosystem Guidelines: landscape interpretation for planners and managers (SANBI, 2013); and
- Red List of South African Plants (Raimondo et al., 2009; SANBI, 2016).

#### 5.4 Faunal Assessment (Mammals & Avifauna)

The faunal desktop assessment included the following:

- Compilation of expected species lists;
- Compilation of identified species lists;
- Identification of any Red Data or species of conservation concern (SCC) present or potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.

The field survey component of the study utilised a variety of sampling techniques including, but not limited to, the following:

- Visual observations;
- Camera trapping;
- Sherman trapping for small mammals;
- Identification of tracks and signs; and
- Utilization of local knowledge.

Habitat types sampled included pristine, disturbed and semi-disturbed zones, drainage lines and wetlands.

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](http://www.ewt.org.za)) (EWT, 2016);



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- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2017) ([mammalmap.adu.org.za](http://mammalmap.adu.org.za));
- A Field Guide to the Tracks and Signs of Southern, Central and East African Wildlife (Stuart & Stuart, 2013); and
- The Smaller Mammals of KwaZulu-Natal (Taylor, 1998).

## 5.5 Herpetology (Reptiles & Amphibians)

A herpetofauna assessment of the project area was also conducted. The herpetological field survey comprised the following techniques:

- Diurnal hand searches - are used for reptile species that shelter in or under particular microhabitats (typically rocks, exfoliating rock outcrops, fallen timber, leaf litter, bark etc.);
- Visual searches - typically undertaken for species whose behaviour involves surface activity or for species that are difficult to detect by hand-searches or pitfall trapping. May include walking transects or using binoculars to view the species from a distance without the animal being disturbed;
- Amphibians – many of the survey techniques listed above will be able to detect species of amphibians. Over and above these techniques, vocalisation sampling techniques are often the best to detect the presence of amphibians as each species has a distinct call;
- Opportunistic sampling - reptiles, especially snakes, are incredibly elusive and difficult to observe. Consequently, all possible opportunities to observe reptiles are taken in order to augment the standard sampling procedures described above. This will include talking to local people and staff at the site and reviewing photographs of reptiles and amphibians that the other biodiversity specialists may come across while on site.

Herpetofauna distributional data was obtained from the following information sources:

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

## 5.6 Late-Wet Season Fieldwork

The late-wet season fieldwork and sample sites were placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite





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imagery and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork.

The focus of the fieldwork was therefore to maximise coverage and navigate to each target site (primarily the three proposed open cast areas) in the field in order to perform a vegetation and ecological habitat assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with proposed development areas. Due to the timing of the survey, morphological structures used to identify flora, such as inflorescences and flowers, are either limited or absent, thus affecting the floral species identified.

At each sample site notes were made regarding current impacts (e.g. livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g. wetlands, outcrops etc.) present. In addition, opportunistic observations were made while navigating through the project area. Effort was made to cover all the different habitat types within the limits of time and access. The geographic location of sample sites and site coverage are shown under the Results section.

**5.7 Key Legislative Requirements**

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems (Table 1). The list below, although extensive, may not be exhaustive and other legislation, policies and guidelines may apply in addition to those listed below.

Explanation of certain documents, organisations or legislation is provided (below Table 1) where these have a high degree of relevance to the project and/or are referred to in this assessment.

*Table 1: A list of key legislative requirements relevant to biodiversity and conservation in KwaZulu-Natal*

<b>INTERNATIONAL</b>	Convention on Biological Diversity (CBD, 1993) The Convention on Wetlands (RAMSAR Convention, 1971) The United Nations Framework Convention on Climate Change (UNFCCC, 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)
<b>NATIONAL</b>	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 National Environmental Management: Waste Act, 2008 (Act 59 of 2008); The Environment Conservation Act (Act No. 73 of 1989) National Environmental Management Air Quality Act (No. 39 of 2004) National Protected Areas Expansion Strategy (NPAES) Natural Scientific Professions Act (Act No. 27 of 2003) National Biodiversity Framework (NBF, 2009) National Forest Act (Act No. 84 of 1998) National Veld and Forest Fire Act (101 of 1998) National Water Act, 1998 (Act 36 of 1998)

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	<p>National Freshwater Ecosystem Priority Areas (NFEPA's)</p> <p>National Spatial Biodiversity Assessment (NSBA)</p> <p>World Heritage Convention Act (Act No. 49 of 1999)</p> <p>National Heritage Resources Act, 1999 (Act 25 of 1999)</p> <p>Municipal Systems Act (Act No. 32 of 2000)</p> <p>Alien and Invasive Species Regulations, 2014</p> <p>South Africa's National Biodiversity Strategy and Action Plan (NBSAP)</p> <p>Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)</p> <p>Sustainable Utilisation of Agricultural Resources (Draft Legislation).</p> <p>White Paper on Biodiversity</p>
<b>PROVINCIAL</b>	<p>KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill, 2014</p> <p>KwaZulu-Natal Nature Conservation Management Act (No. 9 of 1997)</p> <p>KwaZulu-Natal Nature Conservation Management Amendment Act (No. 5 of 1999)</p> <p>KwaZulu-Natal Planning and Development Act (No. 6 of 2008)</p> <p>Local Government Municipal System's Act (No 32 of 2000)</p> <p>Guidelines for Biodiversity Impact Assessments in KZN (2013)</p>

**International Legislation and Policy**

- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival; and
- The IUCN (World Conservation Union). The IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

**National Level**

- Constitution of the Republic of South Africa (Act 108 of 1996). The Bill of Rights, in the Constitution of South Africa states that everyone has a right to a nonthreatening environment and requires that reasonable measures be applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development;
- The National Environmental Management: Biodiversity Act (NEM:BA) No. 10 of 2004: specifically, the management and conservation of biological diversity within the RSA and of the components of such biological diversity;
- National Forests Act, 1998 (Act 84 of 1998), specifically with reference to Protected Tree species;
- National Biodiversity Assessment (NBA): The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the Department of Environmental Affairs (DEA) and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Driver et al., 2011). The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over



time and informing policy and decision-making across a range of sectors (Driver et al., 2011).

### Provincial and Municipal Level

In addition to national legislation, South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

### The KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill (2014)

The KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill (2014) hereafter referred to as KZNEBPA, was used to evaluate species conservation status on a Provincial scale.

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

KZNEBPA Categories:

- Schedule 3 – KwaZulu-Natal Protected Animal Species: A list of protected animal species, including a listing of certain prohibited and restricted activities with respect to such species;
- Schedule 4 – Restricted Use of Protected Animal Species: Schedule 4 lists the restricted use of protected animal species and provides for certain prohibited and restricted activities in such respect;
- Schedule 7 – KwaZulu-Natal Threatened Plant Species: Schedule 7 lists the threatened plant species and provides for certain prohibited and restricted activities with respect to such species; and
- 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.

In addition to the legal requirements, the following National and Regional reviews, reports and guidelines were taken into consideration:

- 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); and
- KwaZulu-Natal Systematic Conservation Plan (KZNSCP, 2012).

## 5.8 Protected Area's Buffer

As defined under the National Environmental Management: Protected Areas Act 57 Of 2003, approximately 7.2 million hectares or 5.9% of the surface area of South Africa is recognized as

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protected areas. Fifty six percent of this total area is made up by 21 national parks. These range in size from 1 915 671 ha (Kruger National Park) to 2 662 ha (Wilderness National Park), with a total area (excluding marine areas) of approximately 3.8 million hectares.

In terms of section 20(2) of the Act a national park may be declared to:

- Protect:
  - Areas of national or international importance for their biodiversity;
  - Areas which contain viable, representative samples of South Africa's natural systems, scenic areas or cultural heritage sites; or
  - The ecological integrity of one or more ecosystems;
- Prevent exploitation or occupation inconsistent with the protection of the ecological integrity of the area;
- Provide spiritual, scientific, educational, recreational and tourism opportunities which are environmentally compatible; and
- Contribute to economic development, where feasible.

Unfortunately, due to the rate and extent of development in the country, these national parks are becoming increasingly isolated from the wider natural areas. This is leading to the values of many of the national parks being impacted negatively from activities outside the national parks;

- Extinction of populations of animals outside of a national park due to their isolation from the national park population;
- Excessive disturbance in a national park due to a development on its border; and where the national park is used for access to that development. In addition to affecting national park values some developments may have negative regional economic impacts including;
- Excessive development which negates the primary attraction of the national park; and
- Development clustered round a national park which success is due to the intrinsic value of the national park, but which has negative effects on the national park (e.g. ribbon development along the Crocodile River on the border of the Kruger National Park).

Therefore, the concept of a buffer zone around national parks has been established. This buffer's function is to reduce or mitigate the negative influences of activities taking place outside the parks on the parks and, to better integrate parks into their surrounding landscapes. This concept has been widely recommended, including in the operational guidelines of UNESCO's World Heritage Convention.

Therefore, the purpose of a buffer zone is to: Protect the purpose and values of the national park, which is to be explicitly defined in the management plan submitted in terms of section 39(2) of the Act;

- Protect important areas of high value for biodiversity and/or to society where these extend beyond the boundary of the Protected Area;

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- Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972; and
- Assist adjacent and affected communities to secure appropriate and sustainable benefits from the national park and buffer zone area itself by promoting a conservation economy, ecotourism and its supporting infrastructure and services, and sustainability through properly planned harvesting.

A buffer zone may be established around a national park when considered necessary for the proper conservation and effective protection of the national park in achieving its objectives. The buffer zone is an area surrounding a national park which has complementary legal and management restrictions placed on its use and development, aimed at providing an extra layer of protection to the integrity of the national park. This should include the immediate setting of the national park, important views and other areas or attributes that are functionally important as a support to the national park and its protection.

A special case is made in the Biodiversity Policy for paying attention to areas adjacent to national parks, given that activities occurring in such areas may be critical to the protected area's success. Furthermore, the ecological landscape is often a continuum between designated protected areas and surrounding regions. The viability of protected areas is thus dependent upon the extent to which such areas are socially, economically, and ecologically integrated into the surrounding region. This fact is also recognised by the Convention on Biological Diversity, which has a specific provision aimed at promoting sustainable development in areas adjacent to protected areas.

## 6 Project Area

### 6.1 General Land Use and Cover

The land uses surrounding the project area consist mainly of existing agricultural land with associated homes and some livestock, such as cattle, as well as coal mining activities. The overall project area is modified due to these activities, and few natural areas remain. Other impacts within the vicinity of the project area include access roads, erosion, forestry and alien or invasive plant species.

The following infrastructure exists within the project area and surroundings:

- Historical coal mining activities (open cast and underground), other coal mining activities have been approved in the area but mining is yet to commence;
- Extensive agricultural farming;
- Livestock farming;
- Forestry;
- Farm housing / dwellings;
- Various secondary tar and gravel access roads; and
- Electrical infrastructure.

## 6.2 Project Area in Relation to the KwaZulu-Natal (KZN) Biodiversity Sector Plan

### 6.2.1 Aim and Objectives of the KZN Biodiversity Sector Plan (KZN BSP)

The aim of the Biodiversity Sector Plan is to:

- Identify and map critical biodiversity assets in KwaZulu-Natal District Municipalities; and
- Provide associated management guidelines which aim to maintain the integrity of these biodiversity features.

The objectives of the Biodiversity Sector Plan are to:

- Ensure aquatic and terrestrial biodiversity targets are met at the District level;
- Conserve representative samples of biodiversity pattern;
- Conserve the ecological and evolutionary processes that allow biodiversity to persist over time; and
- Serve as a first step towards the development of a Bioregional Plan.

#### The Purpose of the BSP:

The key purpose of the BSP is to assist and guide land use planners and managers within various district and local municipalities, to account for biodiversity conservation priorities in all land use planning and management decisions, thereby promoting sustainable development and the protection of biodiversity, and in turn the protection of ecological infrastructure and associated ecosystem services.

#### Critical Biodiversity Areas

The KZN BSP also provides a spatial representation of land and coastal marine areas required to ensure the persistence and conservation of biodiversity and biodiversity targets within KZN, reflected as **Critical Biodiversity Areas (CBA)** and **Ecological Support Areas (ESA)**.

A CBA is considered a significant and ecologically sensitive area and needs to be kept in a pristine or near-natural state to ensure the continued functioning of ecosystems (SANBI, 2017). A CBA represents the best choice for achieving biodiversity targets. ESAs are not essential for achieving targets, but they play a vital role in the continued functioning of ecosystems.

Based on this assessment much of the project area is situated in previously disturbed areas (agricultural areas). Nonetheless, the project area is directly adjacent to an area classed as a CBA: Irreplaceable. It is likely that the proposed development will indirectly impact on this sensitive ecological area (Figure 2). Smaller portions of this CBA will be directly impacted by the proposed mining activities.

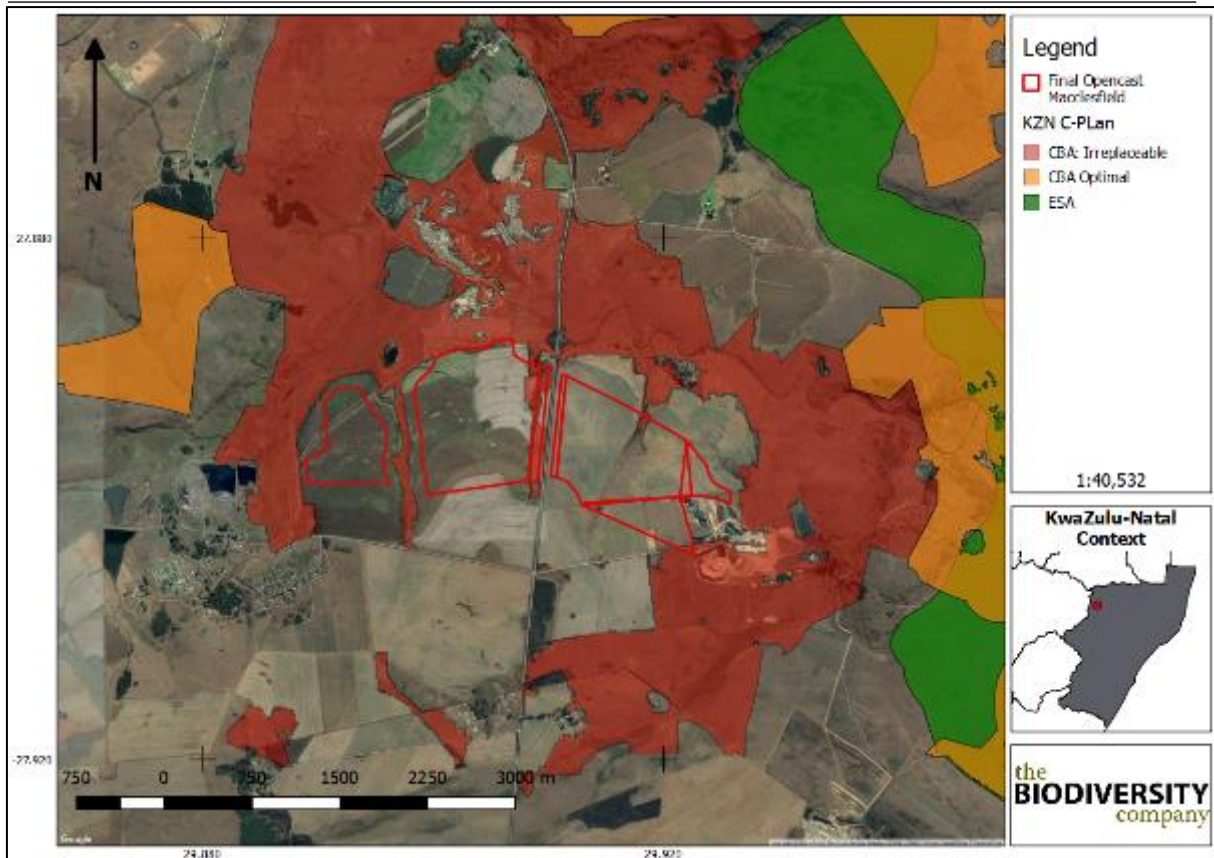


Figure 2: The project area superimposed on the KZN BSP (2014)

According to the biodiversity sector plan, ‘local corridors’ and ‘landscape corridors’ have also been identified to ensure uninhibited movement of wildlife between landscapes and important biodiversity areas (including Protected Areas (PAs), CBAs and stewardship sites), based on the following definitions:

- Landscape Corridors
  - A series of bio-geographic corridors were created in KZN to facilitate evolutionary, ecological and climate change processes to create a linked landscape for the conservation of species in a fragmented landscape.
- Local Corridors
  - Corridors were developed at a district scale to create fine scale links within the landscape that facilitate ecological processes and ensure persistence of critical biodiversity features.

Based on the spatial file for the KZN C-Plan it can be concluded that the proposed development is situated within a 5 km buffer area of an identified ‘local corridor’ (Figure 3).



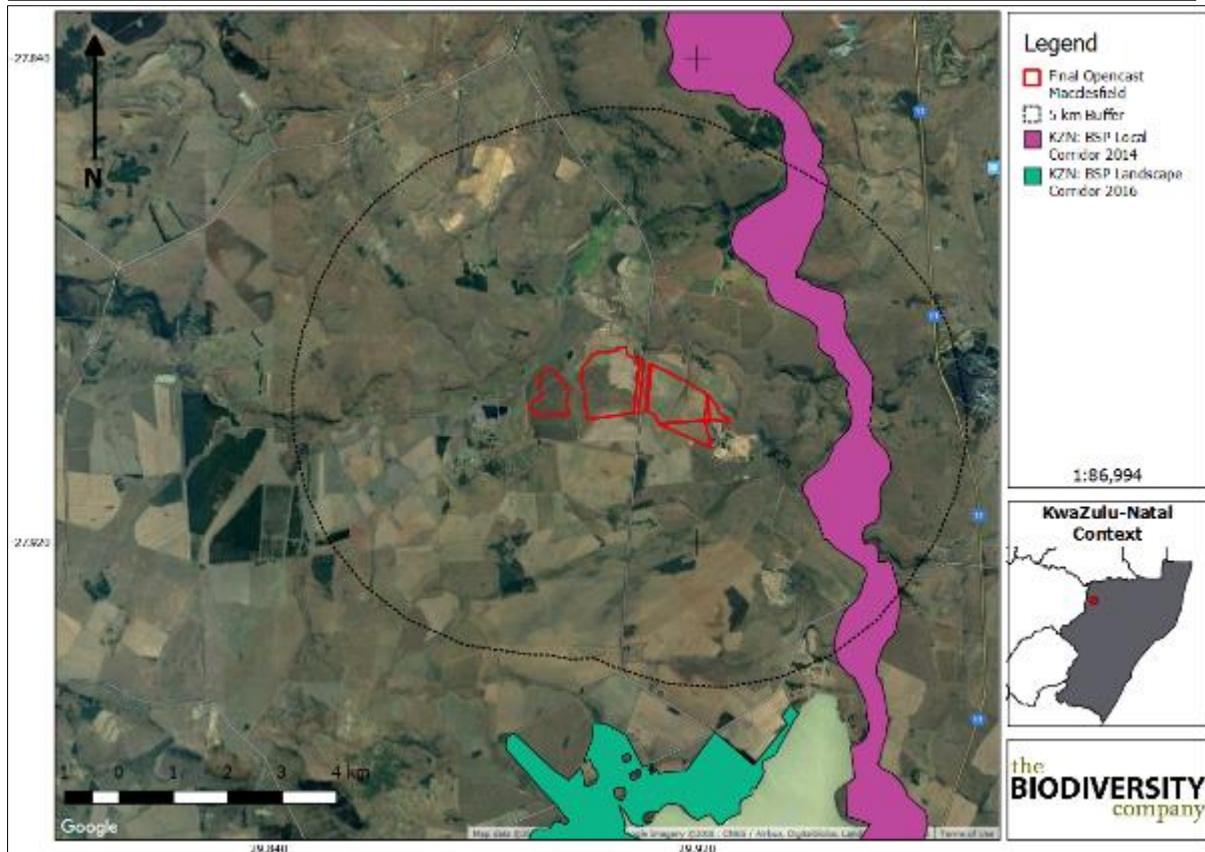


Figure 3: The project area superimposed on the KZN BSP corridor spatial layer

### 6.3 National Biodiversity Assessment

The two headline indicators assessed in the NBA are ecosystem threat status and ecosystem protection level (Driver et al., 2011).

#### 6.3.1 Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Driver et al., 2011).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Driver et al., 2011).

The proposed project was superimposed on the terrestrial ecosystem threat status (Figure 4). As seen in Figure 4 the project area falls within one ecosystem, which is listed as a Vulnerable (VU) ecosystem.

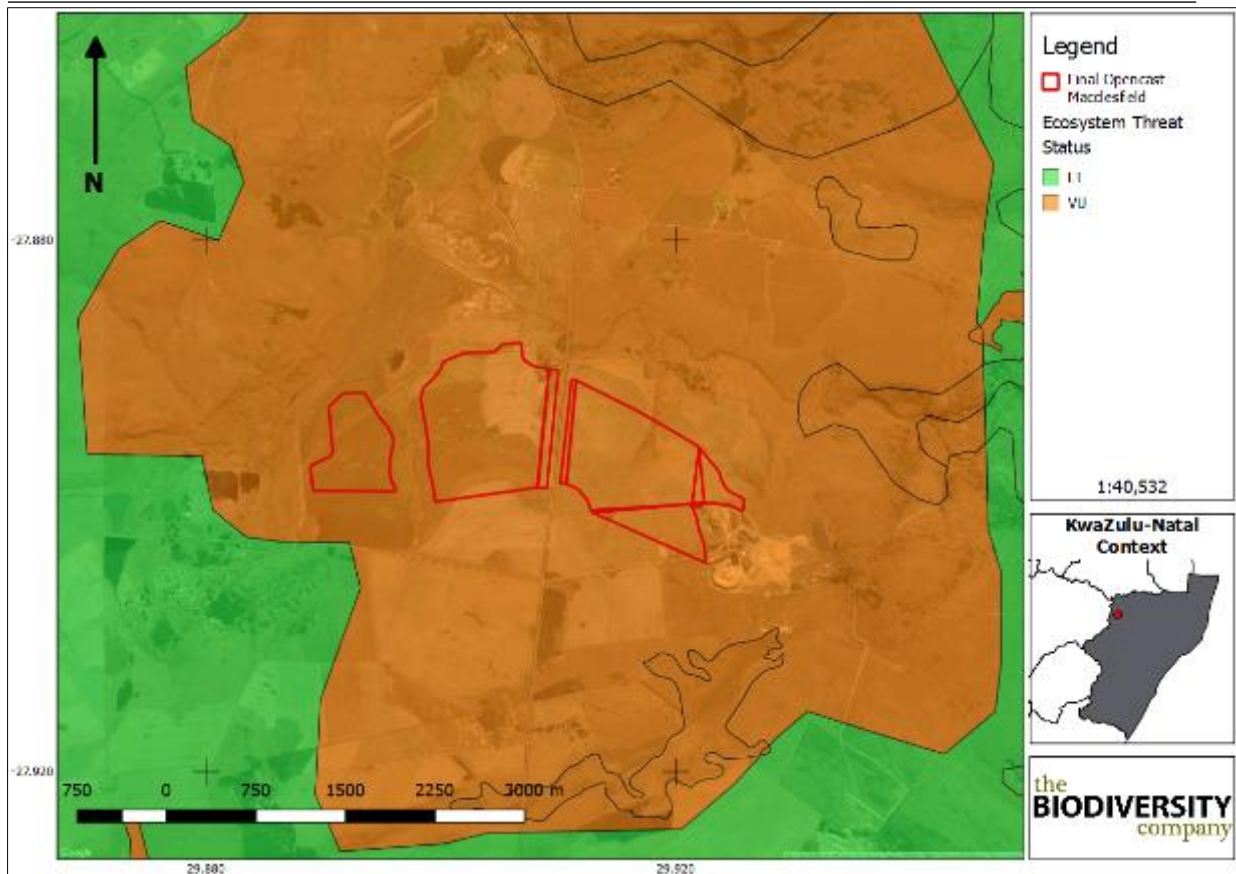


Figure 4: The project area showing the ecosystem threat status of the associated terrestrial ecosystems (NBA, 2012)

### 6.3.2 Ecosystem Protection Level

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Driver et al., 2011).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure 5). Based on Figure 5 the terrestrial ecosystems associated with the proposed project area are rated as *poorly protected*. This means that this ecosystem type (and associated habitats) are not well protected anywhere in the country (such as in nationally protected areas).



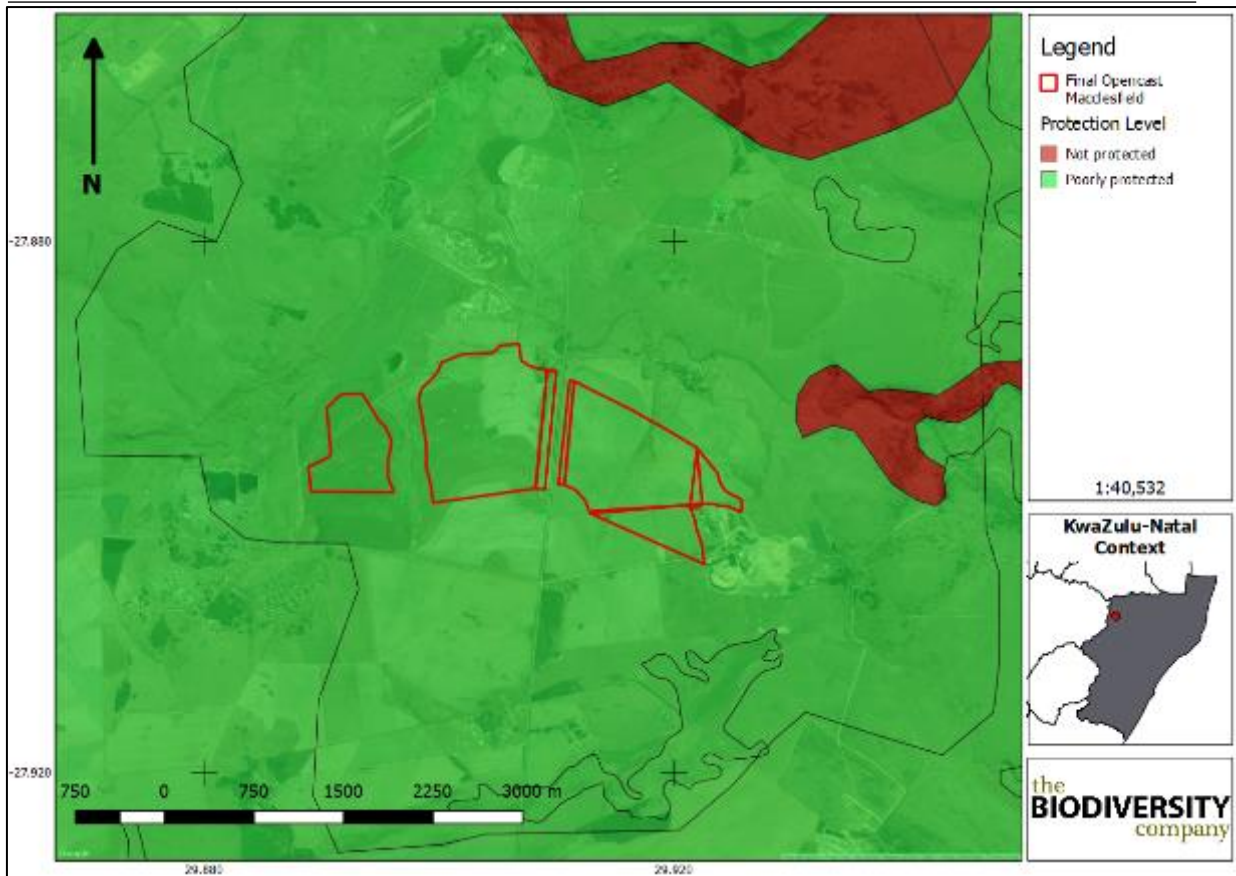


Figure 5: The project area showing the level of protection of terrestrial ecosystems (NBA, 2012)

#### 6.4 Project Area in Relation to Protected Areas

Figure 6 shows the location of formally protected areas in relation to the project area. Formally protected areas refer to areas protected either by national or provincial legislation. Based on the SANBI (2010) Protected Areas Map and the National Protected Areas Expansion Strategy (NPAES) the project area does not overlap with any formally protected area (Figure 6). However, the Chelmsford Nature Reserve is situated 5.2 km south of the project area. This reserve is home to a critically important population of Oribi, which are listed as Endangered.

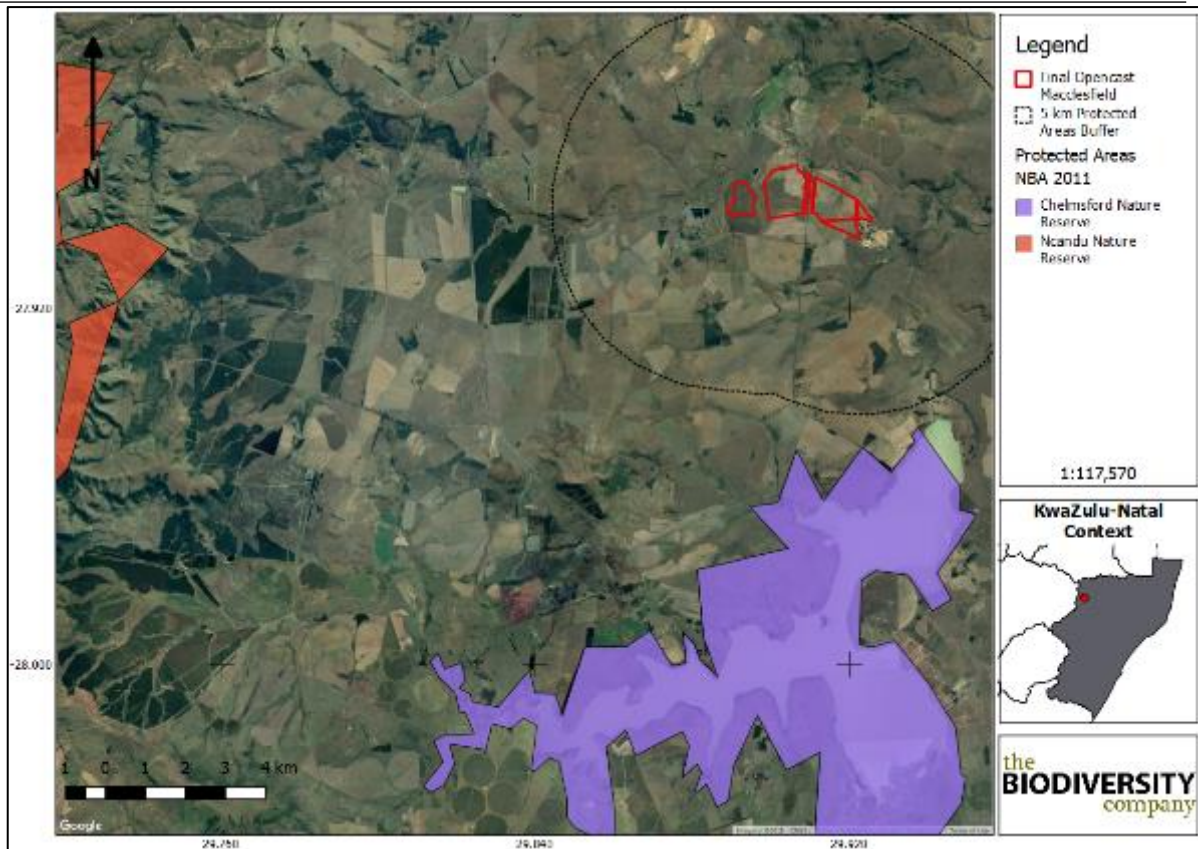


Figure 6: The project area in relation to the formally protected areas (NPAES, 2011)

## 6.5 The Mining and Biodiversity Guidelines

The Mining and Biodiversity Guidelines (2013) was developed by the Department of Mineral Resources, the Chamber of Mines, the South African National Biodiversity Institute and the South African Mining and Biodiversity Forum, with the intention to find a balance between economic growth and environmental sustainability. The Guideline is envisioned as a tool to “foster a strong relationship between biodiversity and mining which will eventually translate into best practice within the mining sector. In identifying biodiversity priority areas which have different levels of risk against mining, the Guideline categorises biodiversity priority areas into four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining in these areas:

- A) Legally protected areas, where mining is prohibited;
- B) Areas of highest biodiversity importance, which are at the highest risk for mining;
- C) Areas of high biodiversity importance, which are at a high risk for mining; and
- D) Areas of moderate biodiversity importance, which are at a moderate risk for mining.

Table 2 shows the four different categories and the implications for mining within each of these categories.

The Guideline provides a tool to facilitate the sustainable development of South Africa’s mineral resources in a way that enables regulators, industry and practitioners to minimise the impact of

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mining on the country's biodiversity and ecosystem services. It provides the mining sector with a practical, user- friendly manual for integrating biodiversity considerations into the planning processes and managing biodiversity during the operational phases of a mine, from exploration through to closure. The Guideline provides explicit direction in terms of where mining-related impacts are legally prohibited, where biodiversity priority areas may present high risks for mining projects, and where biodiversity may limit the potential for mining.

Overall, proponents of a mining activity in biodiversity priority areas should demonstrate that:

- There is significant cause to undertake mining – by commenting on whether the biodiversity priority area coincides with mineral or petroleum reserves that are strategically in the national interest to exploit. Reference should also be made to whether alternative deposits or reserves exist that could be exploited in areas that are not biodiversity priority areas or are less environmentally sensitive areas.
- Through the process of a rigorous EIA and associated specialist biodiversity studies the impacts of the proposed mining are properly assessed following good practice. It is critical that sufficient time and resources are budgeted to do so early in the planning and impact assessment process, including appointing appropriate team of people with the relevant skills and knowledge as required by legislation.
- Cumulative impacts have been taken into account.
- The mitigation hierarchy has been systematically applied and alternatives have been rigorously considered.
- The issues related to biodiversity priority areas have been incorporated into a robust EMP as the main tool for describing how the mining or prospecting operation's environmental impacts are to be mitigated and managed.
- Good practice environmental management is followed, and monitoring and compliance enforcement is ensured.

Table 2: The mining and biodiversity guidelines categories

Category	Biodiversity priority areas	Risk for mining	Implications for mining
<b>A. Legally protected</b>	<ul style="list-style-type: none"> <li>Protected areas (including National Parks, Nature Reserves, World Heritage Sites, Protected Environments, Nature Reserves)</li> <li>Areas declared under Section 49 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002)</li> </ul>	<b>Mining prohibited</b>	<p>Mining projects cannot commence as mining is legally prohibited. Although mining is prohibited in Protected Areas, it may be allowed in Protected Environments if both the Minister of Mineral Resources and Minister of Environmental Affairs approve it.</p> <p>In cases where mining activities were conducted lawfully in protected areas before Section 48 of the Protected Areas Act (No. 57 of 2003) came into effect, the Minister of Environmental Affairs may, after consulting with the Minister of Mineral Resources, allow such mining activities to continue, subject to prescribed conditions that reduce environmental impacts.</p>
<b>B. Highest biodiversity importance</b>	<ul style="list-style-type: none"> <li>Critically endangered and endangered ecosystems</li> <li>Critical Biodiversity Areas (or equivalent areas) from provincial spatial biodiversity plans</li> <li>River and wetland Freshwater Ecosystem Priority Areas (FEPAs) and a 1km buffer around these FEPAs</li> <li>Ramsar Sites</li> </ul>	<b>Highest risk for mining</b>	<p>Environmental screening, environmental impact assessment (EIA) and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision-making for mining, water use licenses, and environmental authorisations.</p> <p>If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being.</p> <p>An EIA should include the strategic assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. This assessment should fully take into account the environmental sensitivity of the area, the overall environmental and socio-economic costs and benefits of mining, as well as the potential strategic importance of the minerals to the country. Authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into license agreements and/or authorisations.</p>
<b>C. High biodiversity importance</b>	<ul style="list-style-type: none"> <li>Protected area buffers (including buffers around National Parks, World Heritage Sites* and Nature Reserves)</li> <li>Transfrontier Conservation Areas (remaining areas outside of formally proclaimed protected areas)</li> <li>Other identified priorities from provincial spatial biodiversity plans</li> <li>High water yield areas</li> <li>Coastal Protection Zone</li> <li>Estuarine functional zone</li> </ul>	<b>High risk for mining</b>	<p>These areas are important for conserving biodiversity, for supporting or buffering other biodiversity priority areas, and for maintaining important ecosystem services for particular communities or the country as a whole.</p> <p>An EIA should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity.</p> <p>Mining options may be limited in these areas, and limitations for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into license agreements and/or authorisations.</p>



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<p><b>D. Moderate biodiversity importance</b></p>	<ul style="list-style-type: none"> <li>• Ecological support areas</li> <li>• Vulnerable ecosystems</li> <li>• Focus areas for protected area expansion (land-based and offshore protection)</li> </ul>	<p><b>Moderate risk for mining</b></p>	<p>These areas are of moderate biodiversity value. EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into license agreements and/or authorisations.</p>
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According to these guidelines, the proposed project area falls within an area which is considered the highest risk for mining and of high biodiversity importance (Figure 7). As can be seen in Table 2, a buffer of 1 km is recommended around any FEPA rivers or wetlands situated in this category<sup>1</sup>. Figure 8 shows the project area in relation to the 1 km buffer from the Horn River. Based on this information, all three mining areas overlap with the recommended buffer. This buffer is regarded as a guideline (or recommended buffer width) and authorisation will be required to conduct any activity within or in close proximity to the buffer and the rivers and wetlands, whereby specialist recommendations and mitigations measures will be considered.



Figure 7: The project area superimposed on the Mining and Biodiversity Guidelines spatial dataset (2013)

<sup>1</sup> Water use authorisation has been granted which permits the open cast mining through, and placement of infrastructure within 100m of wetland areas on designated property portions



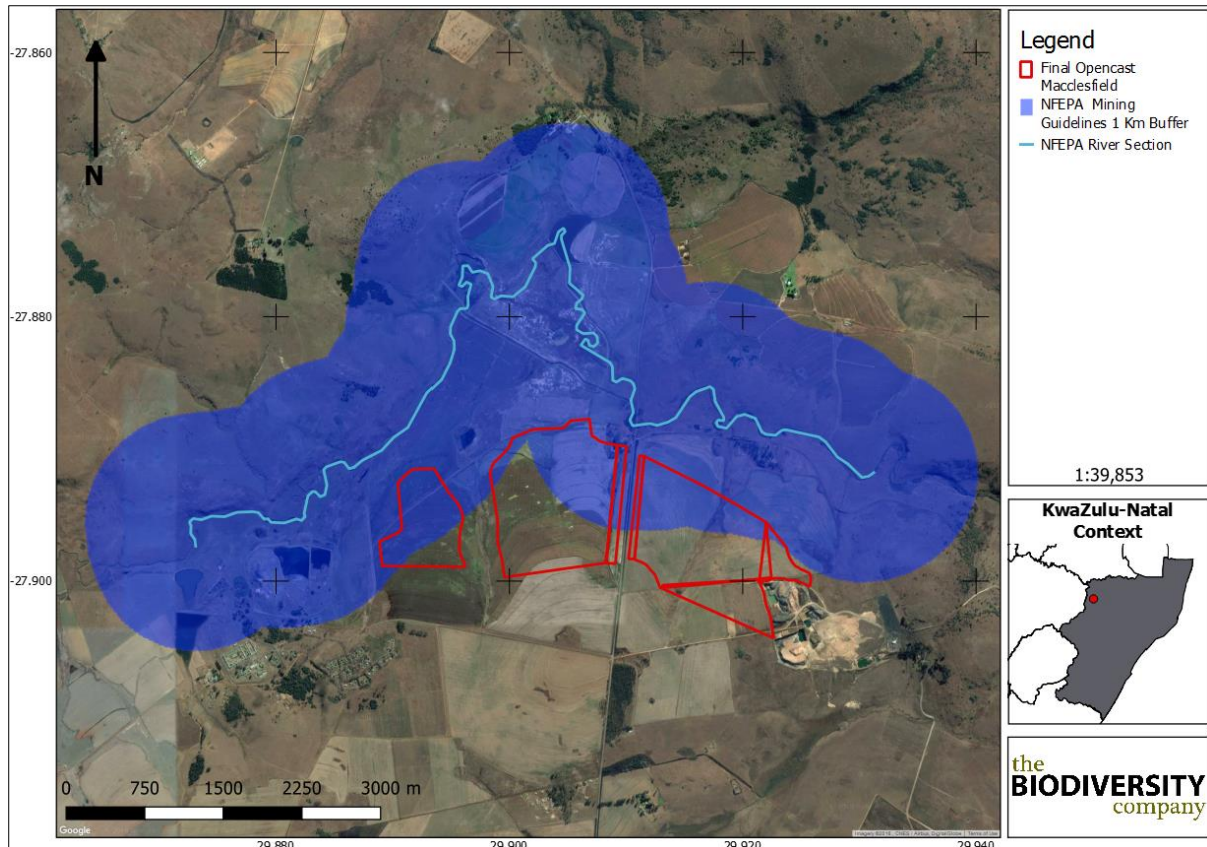


Figure 8: The Mining and Biodiversity Guidelines FEPA buffer superimposed on the project area

## 7 Results & Discussion

### 7.1 Desktop Assessment

#### 7.1.1 Vegetation Assessment

The project area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- a) Seasonal precipitation; and
- b) The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.



### 7.1.1.1 Vegetation Types

The grassland biome comprises many different vegetation types. The project area is situated across two different vegetation types; Northern KwaZulu-Natal Moist Grassland (Gs4) (which constitutes the majority of the area) and Eastern Temperate Freshwater Wetlands vegetation types, according to Mucina & Rutherford (2006) (Figure 9).

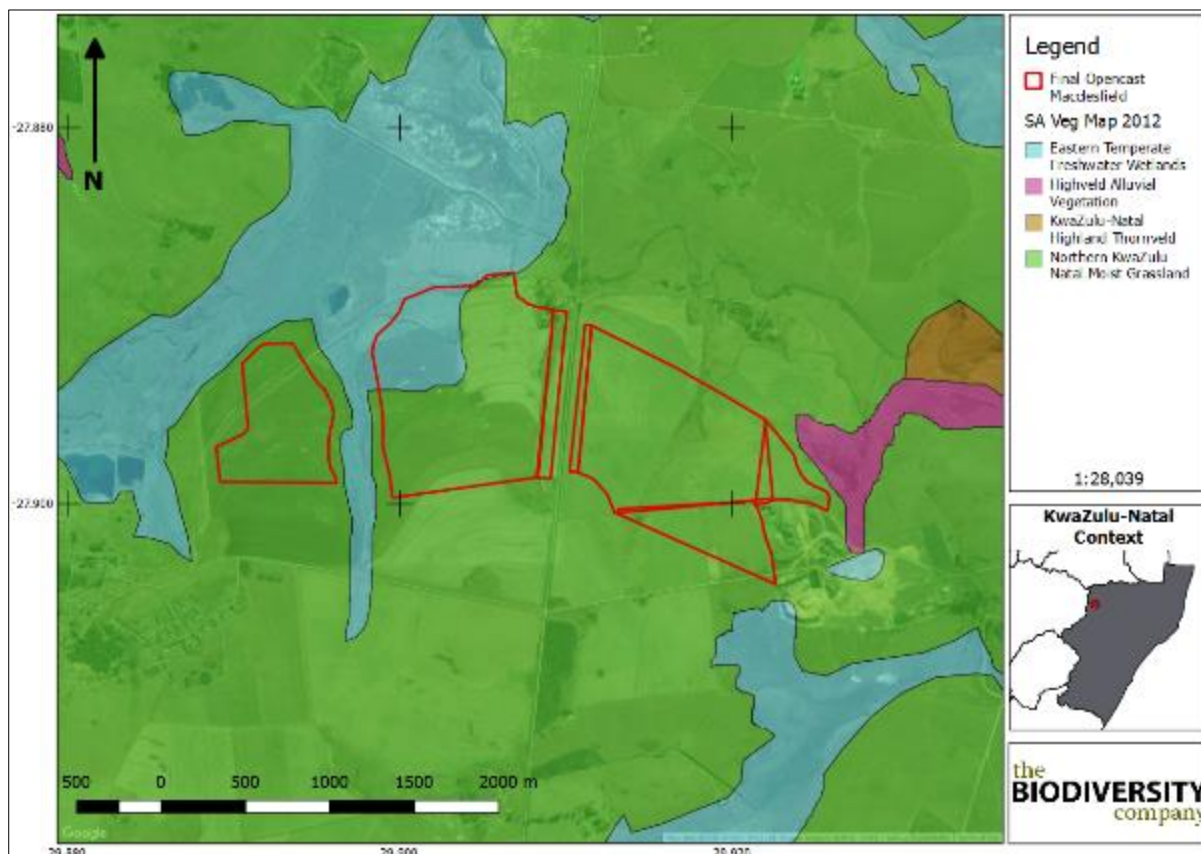


Figure 9: The project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2017)

### 7.1.1.2 Northern KwaZulu-Natal Moist Grassland

Mucina and Rutherford (2006) describe the properties of Northern KwaZulu-Natal Moist Grassland as hilly and rolling landscapes supporting tall tussock grassland usually dominated by *Themeda triandra* and *Hyparrhenia hirta*. Open *Vachellia sieberiana* var. *woodii* savanna woodlands encroach up the valleys, usually on disturbed (strongly eroded) sites.

KwaZulu-Natal Province: Occurs across the northern and north western regions of the Province, where it forms a discontinuous rim around the upper Thukela Basin and is situated almost entirely within the catchment of the Thukela River.

#### 7.1.1.2.1 Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the **Northern KwaZulu-Natal Moist Grassland** vegetation type:

**Succulent Shrub:** *Euphorbia pulvinata*

**Low Shrubs:** *Anthospermum rigidum* subsp. *pumilum*, *Erica oatesii*, *Hermannia geniculata*

**Graminoids:** *Alloteropsis semialata* subsp. *eckloniana* , *Aristida congesta* , *Cynodon dactylon*, *Digitaria tricholaenoides* , *Elionurus muticus* , *Eragrostis patentissima* , *E. racemosa* , *Harpochloa falx* , *Hyparrhenia hirta* , *Themeda triandra* , *Tristachya leucothrix* , *Abildgaardia ovata*, *Andropogon appendiculatus*, *A. eucomus*, *A. schirensis*, *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cymbopogon caesius*, *C. pospischilii*, *Cynodon incompletus*, *Digitaria monodactyla*, *D. sanguinalis*, *Diheteropogon amplexans*, *D. filifolius*, *Eragrostis chloromelas*, *E. plana*, *E. planiculmis*, *E. sclerantha*, *Festuca scabra*, *Heteropogon contortus*, *Hyparrhenia dregeana*, *Melinis nerviglumis*, *Microchloa caffra*, *Panicum natalense*, *Paspalum scrobiculatum*, *Setaria nigrirostris*, *Sporobolus africanus*.

**Herbs:** *Acanthospermum australe*, *Argyrolobium speciosum*, *Eriosema kraussianum*, *Geranium wakkerstroomianum*, *Pelargonium luridum*, *Acalypha peduncularis*, *Chamaecrista mimosoides*, *Dicoma anomala*, *Euryops transvaalensis* subsp. *setilobus*, *Helichrysum caespititium*, *H. rugulosum*, *Hermannia depressa*, *Ipomoea crassipes*, *Pearsonia grandifolia*, *Pentanisia prunelloides* subsp. *latifolia*, *Sebaea grandis*, *Senecio inornatus*, *Thunbergia atriplicifolia*, *Zaluzianskya microsiphon*.

**Geophytic Herbs** *Geophytic Herbs:* *Chlorophytum haygarthii*, *Gladiolus aurantiacus*, *Asclepias aurea*, *Cyrtanthus tuckii* var. *transvaalensis*, *Gladiolus crassifolius*, *Hypoxis colchicifolia*, *H. multiceps*, *Moraea brevistyla*, *Zantedeschia rehmannii*.

**Succulent Herb:** *Aloe ecklonis*, *Lopholaena segmentata*.

#### 7.1.1.2.2 Conservation Status of the Vegetation Type

The vegetation type is listed as Vulnerable (Mucina & Rutherford, 2006). The conservation target is at 24%. However, only about 2% is statutorily conserved in the uKhahlamba Drakensberg Park as well as in the Chelmsford, Spienkop, Moor Park, Wagendrift and Ncandu Nature Reserves. More than a quarter has already been transformed either for cultivation, plantations and urban sprawl or by building of dams (Chelmsford, Driel, Kilburn, Mtoti, Wagendrift, Windsor and Woodstock). Alien *Acacia dealbata*, *Rubus*, *Eucalyptus* and *Populus* are invasive in places. Bush encroachment is common (Mucina & Rutherford, 2006).

#### 7.1.1.3 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2016) database, 385 plant species are expected to occur in the project area. Figure 10 shows the extent of the grid that was used to compile the expected species list based on the Plants of Southern Africa (BODATSA-POSA, 2016) database. The list of expected plant species is provided in Appendix A.

Of the 385-plant species, three (3) species are listed as being Species of Conservation Concern (SCC) (Table 3).

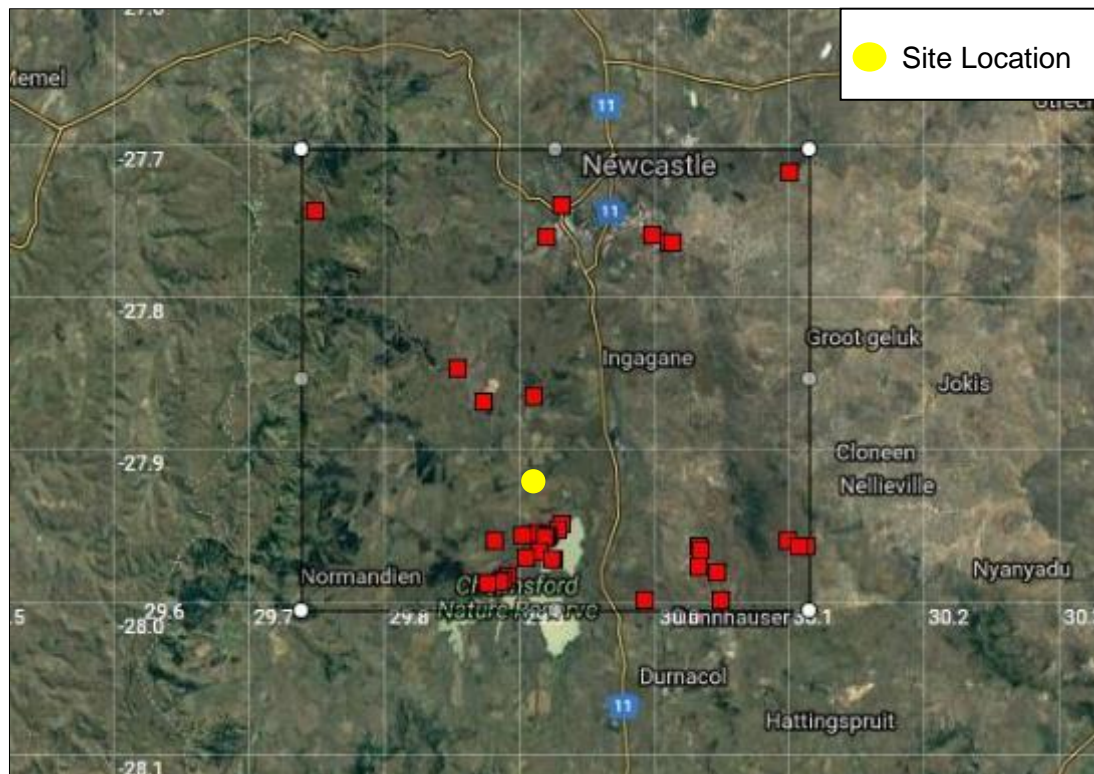


Figure 10: Map showing the grid drawn to compile an expected species list (BODATSA-POSA, 2016)

Table 3: Plant Species of Conservation Concern (SCC) expected to occur in the project area (BODATSA-POSA, 2016)

Family	Taxon	Author	IUCN status	Habitat preference	Likelihood of Occurrence
Orchidaceae	<i>Habenaria kraenzliniana</i>	Schltr.	NT	Stony, grassy hillsides, 1000-1400 m.	Moderate
Apocynaceae	<i>Stenostelma umbelluliferum</i>	(Schltr.) Bester & Nicholas	NT	Deep black turf in open woodland mainly in the vicinity of drainage lines.	Moderate
Asphodelaceae	<i>Kniphofia typhoides</i>	Codd	NT	Low lying wetlands and seasonally wet areas in climax Themeda triandra grasslands on heavy black clay soils, tends to disappear from degraded grasslands.	Moderate

## 7.1.2 Faunal Assessment

### 7.1.2.1 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 310 bird species are expected to occur in the vicinity of the project area (pentads 2745\_2945; 2745\_2950; 2745\_2955; 2750\_2945; 2750\_2950; 2750\_2955; 2755\_2945; 2755\_2950; 2755\_2955). The full list of potential bird species is provided in Appendix B.

Of the expected bird species, seventeen (17) species are listed as SCC either on a regional scale or international scale (Table 4).

The SCC include the following:

- Six (6) species that are listed as Endangered (EN) on a regional basis;
- Ten (10) species that are listed as Vulnerable (VU) on a regional basis; and
- Eight (8) species that are listed as Near Threatened (NT) on a regional basis.

*Table 4: List of bird species of regional or global conservation importance that are expected to occur in pentads 2745\_2945; 2745\_2950; 2745\_2955; 2750\_2945; 2750\_2950; 2750\_2955; 2755\_2945; 2755\_2950; 2755\_2955 (SABAP2, 2018, ESKOM, 2015; IUCN, 2017)*

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC	High
<i>Anthropoides paradiseus</i>	Crane, Blue	NT	VU	High
<i>Anthus crenatus</i>	Pipit, African Rock	NT	LC	Moderate
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC	Moderate
<i>Balearica regulorum</i>	Crane, Grey Crowned	EN	EN	High
<i>Bucorvus leadbeateri</i>	Ground-hornbill, Southern	EN	VU	Low
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC	NT	Moderate
<i>Ciconia nigra</i>	Stork, Black	VU	LC	Moderate
<i>Circus maurus</i>	Harrier, Black	EN	VU	Moderate
<i>Circus ranivorus</i>	Marsh-harrier, African	EN	LC	Moderate
<i>Coracias garrulus</i>	Roller, European	NT	LC	Moderate
<i>Eupodotis caerulea</i>	Korhaan, Blue	LC	NT	High
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	VU	LC	High
<i>Falco vespertinus</i>	Falcon, Red-footed	NT	NT	Moderate
<i>Geronticus calvus</i>	Ibis, Southern Bald	VU	VU	High
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN	Low
<i>Lioptilus nigricapillus</i>	Blackcap, Bush	VU	NT	Low
<i>Neotis denhami</i>	Bustard, Denham's	VU	NT	High
<i>Phalacrocorax capensis</i>	Cormorant, Cape	EN	EN	Moderate
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT	Moderate
<i>Phoenicopterus ruber</i>	Flamingo, Greater	NT	LC	Moderate



<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC	Moderate
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	High
<i>Stephanoaetus coronatus</i>	Eagle, African Crowned	VU	NT	Low
<i>Sterna caspia</i>	Tern, Caspian	VU	LC	Moderate
<i>Tyto capensis</i>	Grass-owl, African	VU	LC	Moderate

Some of the expected bird SCC from Table 4 are discussed below.

*Alcedo semitorquata* (Half-collared Kingfisher) is listed as Near Threatened (NT) on a regional scale and occurs across a large range. This species generally prefers narrow rivers, streams, and estuaries with dense vegetation onshore, but it may also move into coastal lagoons and lakes. It mainly feeds on fish (IUCN, 2017). The possibility of occurrence is high due to the fact that the Horn River is on the boundary of the project area, and there are various wetland areas nearby, both of which could provide suitable habitat for this species.

*Anthropoides paradiseus* (Blue Crane) is listed as Near Threatened (NT) on a regional scale. The species is near-endemic to South Africa and although populations have increased in the south and south-western Western Cape and KwaZulu-Natal Provinces, the national population has decreased by half since the 1970s, with dramatic declines in many former strongholds (IUCN, 2017). Due to the presence of suitable habitat and previous occurrence records for this species, the likelihood of occurrence for this species is rated as high.

*Anthus crenatus* (African Rock Pipit) is endemic to South Africa and Lesotho (Taylor et al. 2015). They are classed as near threatened after undergoing a decline in habitat of 34% in the last 10 years (IUCN, 2017). This predominantly insectivorous species is associated with rocky habitats that has abundant shrub and grassy areas. The presence of suitable rocky areas increases the likelihood of occurrence of this species in proximity of the study area.

*Aquila verreauxii* (Verreaux's Eagle) is listed as VU on a regional scale and LC on a global scale. This species is locally persecuted where it coincides with livestock farms, but because the species does not take carrion, is little threatened by poisoned carcasses. Where hyraxes are hunted for food and skins, eagle populations have declined (IUCN, 2017). Based on potential presence of suitable habitat for its preferred prey items – namely hyraxes, as well as previous records of the species within the area, the likelihood of occurrence of this species is rated as moderate.

*Bucorvus leadbeateri* (Southern Ground Hornbill) can be found in eastern South Africa as well as several other African countries. The species inhabits woodland and savanna and is frequently found in grassland adjoining patches of forest at altitudes of up to 3,000 m in parts of its range. The species fares well in protected areas where human threats are excluded and rural areas where cattle assist in maintaining their preferred short grass habitat (IUCN, 2017). The likelihood of occurrence is rated as low due to the absence of extensive suitable foraging and breeding habitat for this species within the project area.

*Calidris ferruginea* (Curlew Sandpiper) is a migratory species which breeds on slightly elevated areas in the lowlands of the high Arctic and may be seen in parts of South Africa during winter. During winter, the species occurs at the coast, but also inland on the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded

areas, dams and salt pans (IUCN, 2017). Due to the presence of some of these habitat types within the project area the likelihood of occurrence of this species was rated as moderate.

*Ciconia nigra* (Black Stork) is native to South Africa, and inhabits old, undisturbed, open forests. They are known to forage in shallow streams, pools, marshes swampy patches, damp meadows, flood-plains, pools in dry riverbeds and occasionally grasslands, especially where there are stands of reeds or long grass (IUCN, 2017). It is unlikely that this species would breed in the project area due to the lack of forested areas, however some suitable foraging habitat remains in the form of the open grasslands and wetland areas, and as such the likelihood of occurrence is rated as moderate.

*Circus maurus* (Black Harrier) is listed as Endangered (EN) on a local basis and is restricted to southern Africa, where it is mainly found in the fynbos and Karoo of the Western and Eastern Cape. It is also found in the grasslands of Free State, Lesotho and KwaZulu-Natal. Harriers breed close to coastal and upland marshes, damp sites, near vleis or streams with tall shrubs or reeds. South-facing slopes are preferred in mountain areas where temperatures are cooler, and vegetation is taller (IUCN, 2017). During the non-breeding season, they will also be found in dry grassland areas further north and they also visit coastal river floodplains in Namibia. The likelihood of occurrence is rated as moderate.

*Circus ranivorus* (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2015). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (IUCN, 2017). This species breeds in wetlands and forages primarily over reeds and lake margins. There are wetlands and river areas at the project site and the likelihood of occurrence of *C. ranivorus* in the project area is therefore considered to be moderate.

*Coracias garrulous* (European Roller) is a winter migrant from most of South-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller has a preference for bushy plains and dry savannah areas (IUCN, 2017). There is a moderate chance of this species occurring in the project area as they prefer to forage in open/disturbed agricultural areas.

*Eupodotis caerulescens* (Blue Korhaan) is listed as near threatened according to the IUCN (2017). Their moderately rapid decline is accredited to habitat loss that is a result of intensive agriculture. They are found in high grassveld in close proximity to water, usually above an altitude of 1 500m (del Hoyo, et al. 1996). The species nests in bare open ground, situated in thick grass or cropland. Based on the required habitat the likelihood of occurrence of this species is rated as high.

*Eupodotis senegalensis* (White-bellied Korhaan) is Near-endemic to South Africa, occurring from the Limpopo Province and adjacent provinces, south through Swaziland to KwaZulu-Natal and the Eastern Cape. It generally prefers tall, dense sour or mixed grassland, either open or lightly wooded, occasionally moving into cultivated or burnt land, the likelihood of occurrence was rated as high (Hockey et al, 2005).

*Falco vespertinus* (Red-footed Falcon) is known to breed from eastern Europe and northern Asia to north-western China, heading south in the non-breeding season to southern Angola and southern Africa. Within southern Africa it is locally uncommon to common in Botswana, northern Namibia, central Zimbabwe and the area in and around Gauteng (Hockey et al, 2005). It generally prefers open habitats with scattered trees, such as open grassy woodland, wetlands, forest fringes and croplands, which are present thus the likelihood of occurrence is moderate.

*Geronticus calvus* (Southern Bald Ibis) is listed as Vulnerable (VU) on a regional and global basis. The species is known to prefer high rainfall, sour and alpine grasslands, characterised by an absence of trees and a short, dense grass sward. Foraging occurs preferentially on recently burned ground, also using unburnt natural grassland, cultivated pastures, reaped maize fields and ploughed areas. It has a varied diet, mainly consisting of insects and other terrestrial invertebrates. It has high nesting success on safe, undisturbed cliffs (IUCN, 2017). This species is likely to forage in the project area due to the potential occurrence of suitable open grassland, and therefore it's likelihood of occurrence is high.

*Gyps coprotheres* (Cape Vulture) is listed as Endangered (EN) on both a regional and global scale. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). Due to the close proximity of the mountainous habitat, individuals may be seen foraging within the area, the likelihood of occurrence is rated as low.

*Sylvia nigricapillus* (Bush Blackcap) has a small population size that are threatened by afforestation of its habitat. This vulnerable species is endemic to South Africa and Swaziland. The presence of dense thickets of *Leucosidea* and *Buddleia* is a requirement of this species (IUCN, 2017). They nest in the subcanopy of a tree or bush between 1-6m of the ground. Suitable Bush Blackcap habitat was not identified at the project site and as such the likelihood of occurrence is rated as low.

*Neotis denhami* (Denham's Bustard) inhabits grasslands, grassy Acacia-studded dunes, fairly dense shrubland, light woodland, farmland, crops, dried marsh and arid scrub plains, also grass-covered ironstone pans and burnt savanna woodland in Sierra Leone and high rainfall sour Grassveld, planted pastures and cereal croplands in fynbos in South Africa (IUCN, 2017). Due to the existence of suitable habitat, the likelihood of occurrence is high.

*Phalacrocorax capensis* (Cape Cormorant) is endemic to the southwestern coast of Africa, but during the non-breeding season they spread inland and up the east coast of South Africa. The IUCN as well as Birdlife South Africa lists these birds as endangered, and the main cause of the decline is said to be as a result of the decline of the epipelagic fish stock, oil spills and avian cholera. It generally prefers estuaries and coastal lagoons, roosting at areas with good protection from predators, such as islands in wetlands or open dams with good visibility. Due to the presence of some suitable habitat, the likelihood of occurrence is rated as moderate.

*Phoeniconaias minor* (Lesser Flamingo) is listed as NT on a global and regional scale whereas *Phoenicopterus roseus* (Greater Flamingo) is listed as NT on a regional scale only. Both species have similar habitat requirements and the species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal



rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft muddy material for nest building (IUCN, 2017). Due to previous records of this species occurring in the project area, confirmation from previous EIAs and the presence of some of its preferred habitat within the project area, the likelihood of occurrence is high.

*Rostratula benghalensis* (Greater Painted-snipe) shows a preference for recently flooded areas in shallow lowland freshwater temporary or permanent wetland, it has a wide range of these freshwater habitats which they occur in, in this case, sewage pools, reservoirs, mudflats overgrown with marsh grass which may possibly exist within the project area, thus the likelihood of occurrence is moderate. The presence of suitable habitat will be confirmed during the field surveys.

*Sagittarius serpentarius* (Secretary bird) is listed as VU both regionally and globally, occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). Suitable vegetation is present on the site, and therefore the likelihood of occurrence to high.

*Stephanoaetus coronatus* (African Crowned Eagle) inhabits forest, woodland, savanna and shrubland, as well as some modified habitats, such as plantations and secondary growth, and can persist in small forest fragments including urban greenspace forests (IUCN, 2017). The species has shown high resilience to heavy deforestation and degradation in some areas. The likelihood of occurrence is rated as low.

*Sterna caspia* (Caspian Tern) is native to South Africa and are known to occur in inland freshwater systems such as large rivers, creeks, floodlands, reservoirs and sewage ponds. Habitat suitability was found to be moderate and thus the likelihood of occurrence is moderate.

The African Grass-owl (*Tyto capensis*) is categorised as VU, with the southern African population numbering less than 5 000 individuals. The presence of dense, tall *Imperata cylindrica* grassland is a requirement of this species. Some grass-owl habitat was identified at the project site (potentially due to the presence of cattle) and as such the likelihood of occurrence is rated as moderate.

#### 7.1.2.1.1 Important Bird Areas

Important Bird Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of Important Bird and Biodiversity Areas (IBAs) is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels.

No IBAs occur within, or adjacent to, the proposed project area. However, the Chelmsford Nature Reserve is an identified IBA and is situated 5.2 km south of the project area and the

Grasslands IBA is situated 12.1 km east of the project area (Figure 11). Details of the Chelmsford Nature Reserve IBA are provided below.



Figure 11: The project area in relation to defined IBAs (Birdlife, 2017)

### Chelmsford Nature Reserve IBA

Southern Bald Ibis (*Geronticus calvus*) frequently forage in this reserve. The wetlands and surrounding grasslands (Figure 12) are frequented by Grey Crowned Crane (*Balearica regulorum*) and Blue Crane (*Anthropoides paradiseus*). Other wetland and grassland species of concern are African Marsh Harrier, Corn Crake, African Grass Owl, Secretarybird and White-bellied Korhaan (Birdlife, 2017).

### Other Biodiversity

This area holds an important population (50–70) of Oribi (*Ourebia ourebi*). Other Red Data mammals present are Aardwolf (*Proteles cristatus*) and African wild cat (*Felis lybica*). Two near-endemic plants, *Searsia* (formerly *Rhus*) *gerrardii* and *Kniphofia breviflora*, are present.



Figure 12: View of the Chelmsford Dam Nature Reserve IBA

### 7.1.2.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 85 mammal species that could be expected to occur within the vicinity of the project area (Appendix C). Of these species, 7 are medium to large conservation dependant species, such as *Ceratotherium simum* (Southern White Rhinoceros) and *Equus quagga* (Plains Zebra) that, in South Africa, are generally restricted to protected areas such as game reserves. These species are not expected to occur in the project area and are removed from the expected SCC list. They are however still included in Appendix C.

Of the remaining 78 small to medium sized mammal species, fifteen (15) are listed as being of conservation concern on a regional or global basis (Table 5).

The list of potential species includes:

- Two (2) that is listed as Endangered (EN) on a regional basis;
- Six (6) that are listed as Vulnerable (VU) on a regional basis; and
- Six (6) that are listed as Near Threatened (NT) on a regional scale (Table 5).

Table 5: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016)

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	High
<i>Crocidura maquassiensis</i>	Maquassie musk shrew	VU	LC	Moderate
<i>Eidolon helvum</i>	African Straw-colored Fruit Bat	LC	NT	Moderate
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Moderate
<i>Graphiurus rupicola</i>	Stone Dormouse	NT	LC	Low-Moderate
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	VU	NT	High

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<i>Leptailurus serval</i>	Serval	NT	LC	High
<i>Myiostomys albicaudatus</i>	White-tailed Rat	VU	EN	Low-Moderate
<i>Ourebia ourebi</i>	Oribi	EN	LC	High
<i>Panthera pardus</i>	Leopard	VU	VU	Low
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	Low
<i>Pelea capreolus</i>	Grey Rhebok	NT	LC	High
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC	Moderate
<i>Redunca fulvorufula</i>	Mountain Reedbuck	EN	LC	Moderate
<i>Rhinolophus swinnyi</i>	Swinny's Horseshoe bat	VU	LC	Moderate

*Some of the expected mammal SCC are discussed below.*

*Aonyx capensis* (Cape Clawless Otter) is the most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic, and it is seldom found far from water. The likelihood of occurrence of this species occurring in the project area is considered to be high due to the presence of the nearby river and suitable habitat.

*Crocidura maquassiensis* (Maquassie Musk Shrew) is a rare species and seldom caught in traps during sampling. Its rarity is also corroborated through recent field studies in Mkhuze and Phinda Game Reserves, KwaZulu-Natal where, despite being within the range of the species it was not sampled (Rautenbach et al., 2014). The main threats to these shrews are the loss or degradation of wetland areas and rank grasslands with suitable habitat as a result of industrial and residential expansion. Currently there are no direct conservation measures in place for this species. Due to the presence of some suitable habitat for this species, its likelihood of occurrence is moderate.

*Eidolon helvum* (African Straw-coloured Fruit Bat) is listed as LC on a regional scale and NT on a global scale. This species has been recorded from a very wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). The likelihood of occurrence for this species is considered moderate.

*Felis nigripes* (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring, is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the Project area can be considered to be sub-optimal for the species and the likelihood of occurrence is therefore considered moderate.

*Hydrictis maculicollis* (Spotted-necked Otter) inhabits freshwater habitats where water is unsilted, unpolluted, and rich in small to medium sized fishes (IUCN, 2017). Suitable habitat is available in the forms of rivers and dams, and therefore the likelihood of occurrence is high.

*Leptailurus serval* (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In



sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. Due to the presence of natural grassland and wetland areas in the project area, the likelihood of occurrence for this species is rated as high.

*Mystromys albicaudatus* (White-tailed Rat) is listed as Vulnerable (VU) on a regional basis and Endangered (EN) on a global scale. It is relatively widespread across South Africa and Lesotho; the species is known to occur in shrubland and grassland areas. A major requirement of the species is black loam soils with good vegetation cover. Although the vegetation type is suitable, the likelihood of black loam is another determinant for this species, and therefore the likelihood of occurrence of this species is rated as low-moderate.

*Ourebia ourebi* (Oribi) has a patchy distribution throughout Africa and is known to occur in South Africa. Populations are becoming more fragmented as it is gradually eliminated from moderately to densely settled areas (IUCN, 2017). The likelihood of occurrence is rated as high due to the proximity of the Chelmsford Nature Reserve which is known to be a stronghold for this species.

*Panthera pardus* (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Although known to occur and persist outside of formally protected areas, the densities in these areas are considered to be low. The likelihood of occurrence in the project area is regarded as low.

*Parahyaena brunnea* (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Although this species is known to persist outside of formally protected areas, the likelihood of occurrence of this species in the project area is low.

*Pelea capreolus* (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In South Africa, their distribution is irregular and patchy, and they no longer occur north of the Orange River in the Northern Cape, or in parts of the North-West Province (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. Based on the presence of a favoured habitat at the project area, the likelihood of occurrence of this species is rated as high.

*Poecilogale albinucha* (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. Due to the presence of some preferred habitat for this species, the likelihood of occurrence of this species is considered to be moderate in the project area.

*Redunca fulvorufula* (Mountain Reedbuck) is listed as EN both regionally and globally. The South African population has undergone a decline of 61-73% in the last three generations (15 years) (IUCN, 2017). Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover). Although there is not extensive tree or bush cover in the immediate project area, there is suitable habitat on the northern border of the project area where this is rocky hillsides and some bush cover. Due to the presence of this habitat adjacent to the project area, the likelihood of occurrence of this species is rated as moderate.

### 7.1.2.3 KZNEBPA Mammals

Certain mammal species may not be protected under NEMBA or IUCN regulations but KZNEBPA has specific provincial regulations relating to some of these species which need to be adhered to. Table 6 shows the likelihood of occurrence for mammal species which are protected under KZNEBPA regulations and that were not covered under Section 7.1.2.2.

Vervet Monkeys are protected under Schedule 3 of the KZNEBPA and appear in Appendix II of CITES. Vervet monkeys are being forced into smaller pockets of vegetation as a direct result of the destruction of their natural habitat, resulting in conflict with humans.

African Wild Cats, Banded Mongooses, Chacma Baboons, Greater Galago's, Natal Red Rock Rabbit and Striped Polecats are provincially protected species (Schedule 3 of the KZNEBPA, 2014) (Table 6). Hunting, and the possession, breeding, selling, making available for sale or otherwise trade in, buying, receiving, giving or donating, or accepting as a gift, or in any way acquiring or disposing of, capturing, collecting, immobilizing, killing, translocating, releasing, displaying, importing or keep in captivity or exporting is prohibited.

Similarly, Geoffroy's Horseshoe bat, the Lesser Long-fingered Bat, Sundevall's Leaf-nosed Bat and Cape Hairy Bat are provincially protected (Schedule 3, KZNEBPA, 2014) (Table 6) from hunting and killing by fumigation, damaging communal breeding or roosting sites; possession, breeding, selling, making available for sale or otherwise trade in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposing of, capturing, collecting, immobilizing, killing, translocating, releasing, displaying, importing or keep in captivity or exporting.

Table 6: Likelihood of occurrence of KZNEBPA listed mammal species

Species	Common Name	Likelihood of Occurrence
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	High
<i>Felis silvestris lybica</i>	African Wild Cat	Moderate
<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed Bat	Moderate
<i>Ictonyx striatus</i>	Striped Polecats	High
<i>Miniopterus fraterculus</i>	Lesser Long-fingered Bat	Low
<i>Mungos mungo</i>	Banded Mongoose	Moderate
<i>Myotis tricolor</i>	Cape Hairy Bat	Low
<i>Otolemur crassicaudatus</i>	Greater Galago's	Low
<i>Papio ursinus</i>	Chacma Baboons	Low



<i>Pronolagus crassicaudatus</i>	Natal Red Rock Rabbit	Low
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	Moderate

### 7.1.2.4 Herpetofauna (Reptiles & Amphibians)

#### 7.1.2.4.1 Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017) 40 reptile species are expected to occur in the project area (Appendix D). Two (2) reptile species of conservation concern are expected to be present in the project area (Table 7).

Table 7: Expected reptile species of conservation concern that may occur in the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Bradypodion dracomontanum</i>	Drakensberg Dwarf Chameleon	NT	NT	Moderate
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC	Low

*Bradypodion dracomontanum* (Drakensberg Dwarf Chameleon) is found mainly in grassland and small forest patches, generally above 1,500 m. This species is cryptic and therefore not often encountered. Much of the project area does not present suitable habitat for this species, however there are patches of suitable habitat on the periphery and therefore the likelihood of occurrence for this species is moderate. *Crocodylus niloticus* (Nile Crocodile) prefers permanent water bodies with suitable sandy banks for basking and egg-laying. This species is often persecuted by people. The likelihood of occurrence for this species is rated as low.

#### 7.1.2.4.2 KZNEBPA Reptiles

Rock Monitor Lizards (*Varanus exanthematicus*) and Water Monitor Lizards (*Varanus niloticus*) are listed as 'Least Concern', but they are protected under Schedule 3 of the KZNEPBA and appear on Appendix II of CITES. Water Monitors are found usually close to, or in water, but they can also be found some distance away from water when foraging. Both these species have a high likelihood of occurrence throughout the project area.

#### 7.1.2.4.3 Amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017) 29 amphibian species are expected to occur in the project area (Appendix E).

Two (2) amphibian species of conservation concern could be present in the project area according to the above-mentioned sources (Table 8). There are recent records for both species occurring within, or adjacent to, the project area and therefore both species have a high likelihood of occurrence.

Table 8: Amphibian species of conservation concern which may occur in the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Hemisus guttatus</i>	Spotted Shovel Snout	NT	NT	High
<i>Strongylopus wageri</i>	Plain Stream Frog	NT	LC	High

## 7.2 Field Survey

The field survey for the project area (flora and fauna (mammals, avifauna, amphibians and reptiles)) was conducted on the 18th, 19th and 20th May by two terrestrial ecologists. During the surveys the floral and faunal communities within the project development footprint, within the project area, were assessed (Figure 13). The project area was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visits and some are provided in this section of the report. All site photographs are available on request.

### 7.2.1 Vegetation Assessment

The vegetation assessment was conducted throughout the extent of the project area and the following areas were identified based on the results of the fieldwork (Figure 13).

The 'Wetlands' area (blue) is characterized by the presence of water, whether present in dams or saturated soil. There is minor disturbance to this vegetation area due to the surrounding anthropogenic activities, especially farming and mining. The overall state of the area is predominantly undisturbed. The functioning of these areas is considered intact and critical as it is used by various fauna for refuge and as a corridor to migrate from one fragmented habitat to the next. Of importance is the linking of these smaller corridors to the large corridor to the east of the project area as identified under the KZN BSP (Figure 3). If left undisturbed these areas will continue to function as an important habitat for various faunal and floral species including multiple species of conservation concern, including Oribi.

The 'Intact Grassland' area (dark green) comprises of a large array of diverse plant species. The ecological state of the area is primary, although somewhat disturbed. Ground cover and phytomass was very good resulting in almost pristine habitat for fauna, this in conjunction with the Horn River, creates a sensitive habitat.

The 'Disturbed' area (pink) are the areas which have been transformed, mainly due to anthropogenic impacts. Roads, homesteads, livestock and informal settlements associated with human presence have had a negative effect on the ecological state of the area. Weeds such as *Bidens pilosa*, *Amaranthus hybridus* and *Tagetes minuta* occurred on the site and are most likely to dominate areas of bare soil, many alien invader plants occurred within these areas. Even though the area has been altered, it is minimal in regard to the overall size of the area and corridors and natural patches still occur which fauna will utilise.

The 'Agriculture' area (brown) covered the largest amount of area and was mainly cultivated by Maize and Soya, some *Eragrostis tef* pastures also occur within these areas which are

bailed for feed. The roads and unplanted areas within these areas contain large amounts of weeds.

The 'mining' area is an area that is currently bring actively mined and has a large amount of topsoil disturbance with the numerous weeds.

The 'Secondary Wetlands' area is an area that was previously intact wetland but was under mining influence and has been rehabilitated, however due to the disturbance of the soil has lost the characteristics of an intact wetland. This area, although secondary, still plays a vital role for fauna as a buffer to the existing more natural areas and as a migratory corridor.

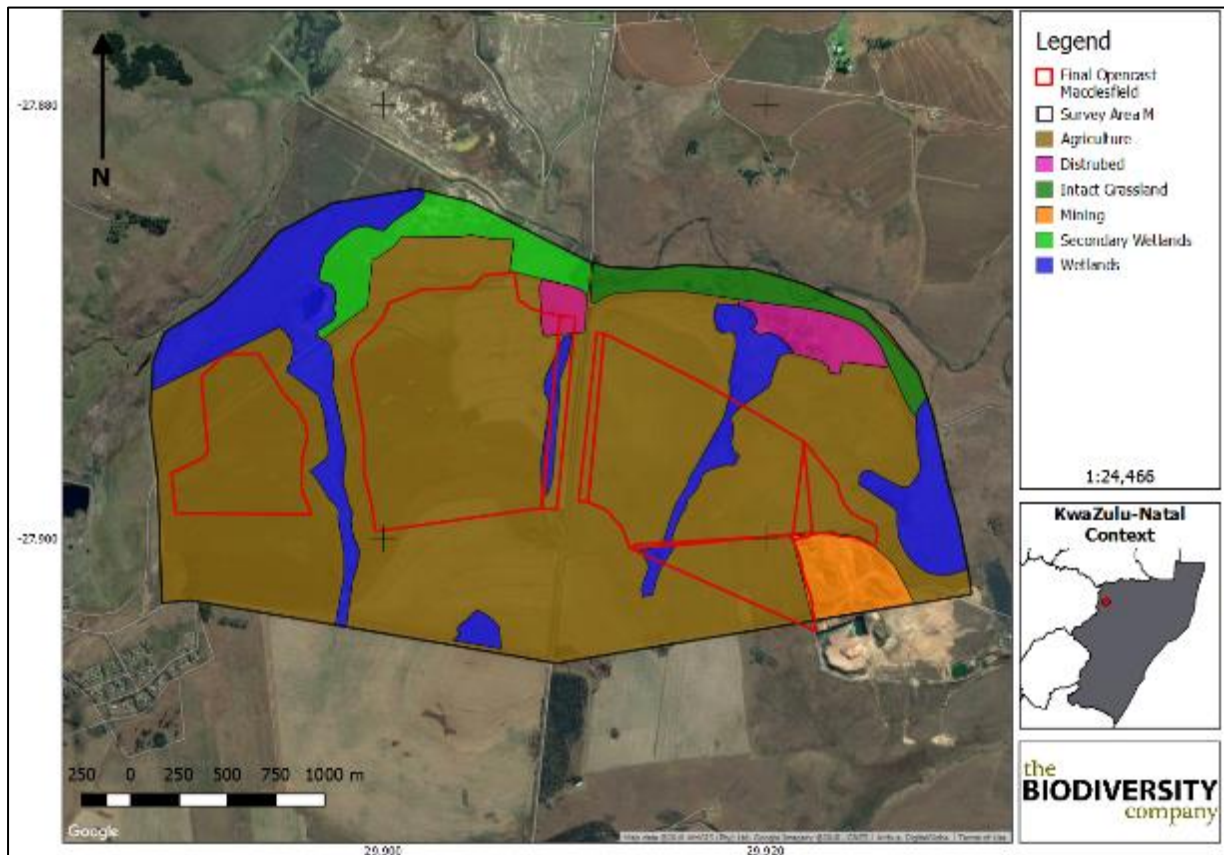


Figure 13: The various vegetation areas identified during the fieldwork

A total of 32 tree, shrub and herbaceous plant species were recorded in the project area during the field assessment (Table 9). Plants listed as Category 1 alien or invasive species under the National Environmental Management: Biodiversity Act (NEMBA) appear in green text. Plants listed in Category 2 or as 'not indigenous' or 'naturalised' according to NEMBA, appear in blue text.

Table 9: Trees, shrubs and weeds recorded at the proposed project area

Species	Threat status (SANBI, 2017)	SA Endemic	NEMBA Category
<i>Acacia mearnsii</i>			Category 2 NEMBA
<i>Amaranthus hybridus</i>			Not Indigenous; Naturalised
<i>Aristida congesta</i> subsp <i>congesta</i>	LC	No	

<i>Bidens pilosa</i>			Not Indigenous; Naturalised
<i>Cymbopogon nardus</i>	LC	No	
<i>Cynodon dactylon</i>			NEMBA Category 2
<i>Datura stramonium</i>			NEMBA Category 1b
<i>Eragrostis chloromelas</i>	LC	No	
<i>Eragrostis curvula</i>	LC	No	
<i>Eucalyptus sp</i>			NEMBA Category 1b
<i>Gomphocarpus fruticosus</i>	LC	No	
<i>Heteropogon contortus</i>	LC	No	
<i>Hyparrhenia hirta</i>	LC	No	
<i>Imperata cylindrica</i>	LC	No	
<i>Lantana camara</i>			NEMBA Category 1b
<i>Melia azedarach</i>			NEMBA Category 1b
<i>Melinis repens</i>	LC	No	
<i>Paspalum dilatatum</i>	LC	No	
<i>Pennisetum clandestinum</i>			NEMBA Category 1b
<i>Pinus elliottii</i>			NEMBA Category 1b
<i>Polygala hottentota</i>	LC	No	
<i>Richardia brasiliensis</i>			Not Indigenous; Naturalised
<i>Schkuhria pinnata</i>			Not Indigenous; Naturalised
<i>Senna didymobotrya</i>			NEMBA Category 1b.
<i>Solanum mauritianum</i>			NEMBA Category 1b
<i>Solanum panduriforme</i>	LC	No	
<i>Sporobolus africanus</i>	LC	No	
<i>Tagetes minuta</i>			Not Indigenous; Naturalised
<i>Themeda triandra</i>	LC	No	
<i>Typha capensis</i>	LC	No	
<i>Verbena bonariensis</i>			NEMBA Category 1b
<i>Zinnia peruviana</i>			Not Indigenous; Naturalised

### 7.2.1.1 Alien and Invasive Plants

Declared weeds and invader plant species have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of these systems. Therefore, it is important that these plants are controlled and eradicated by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive

Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 37886, 1 August 2014. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse.

Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
  - Section 75 of the Act;
  - The relevant invasive species management programme developed in terms of regulation 4; and
  - Any directive issued in terms of section 73(3) of the Act.

Nine (9) Category 1b invasive plant species were recorded within the project area and it is recommended that an alien invasive plant management programme be implemented in compliance of section 75 of the Act as stated above. The NEMBA listed species identified within the project area are marked in green (Table 9).



## 7.2.2 Fauna

### 7.2.2.1 Avifauna

Sixty-five (65) bird species were recorded in the project area during the May 2018 survey based on either direct observations, vocalisations, or the presence of visual tracks & signs (Table 10) (Figure 14).

Three avifaunal SCC were recorded during the survey, namely, Grey Crowned Crane, Southern Bald Ibis and Cape Cormorant. Based on the presence of pristine, suitable habitat, and the nearby Chelmsford Nature Reserve, there is a high probability that many other bird SCC occur within the project area.

Table 10: A list of avifaunal species recorded for the project area (species highlighted in red are listed species)

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Alopochen aegyptiaca</i>	Goose, Egyptian	Unlisted	LC
<i>Amblyospiza albifrons</i>	Weaver, Thick-billed	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Balearica regulorum</i>	Crane, Grey Crowned	EN	EN
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Cercomela familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	Unlisted	LC
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Colius striatus</i>	Mousebird, Speckled	Unlisted	LC
<i>Columba arquatrix</i>	Olive-pigeon, African	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Corvus capensis</i>	Crow, Cape	Unlisted	LC
<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC
<i>Dryoscopus cubla</i>	Puffback, Black-backed	Unlisted	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Euplectes capensis</i>	Bishop, Yellow	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC

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<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Geronticus calvus</i>	Ibis, Southern Bald	VU	VU
<i>Lamprolornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lonchura cucullata</i>	Mannikin, Bronze	Unlisted	LC
<i>Lophaetus occipitalis</i>	Eagle, Long-crested	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Motacilla aguimp</i>	Wagtail, African Pied	Unlisted	LC
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Oriolus larvatus</i>	Oriole, Black-headed	Unlisted	LC
<i>Phalacrocorax africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Phalacrocorax capensis</i>	Cormorant, Cape	EN	EN
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Ploceus velatus</i>	Southern Masked-weaver	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Sigelus silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Sphenoeacus afer</i>	Grassbird, Cape	Unlisted	LC
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC



Figure 14: Some of the avifauna recorded within the project area: A) Grey crowned crane (*Balearica regulorum*); B) Southern Bald Ibis (*Geronticus calvus*) (Front) and Cape Crow (*Corvus capensis*) (Back); C) Pied Kingfisher (*Ceryle rudis*); D) Three Banded Plover (*Charadrius tricollaris*); E) Blacksmith Lapwing (*Vanellus armatus*); F) African Darter (*Anhinga rufa*); G) Spur-winged Goose (*Plectropterus gambensis*); and H) Purple Heron (*Ardea purpurea*)

### 7.2.2.2 Mammals

Overall, mammal diversity in the project area was moderate, with five (5) mammal species being recorded during the May 2018 survey based on direct observations, camera trap photographs and/or the presence of visual tracks & signs (Figure 15) (Table 11).



Two mammal SCC were recorded during the survey, namely Oribi and Serval. Based on the presence of some suitable habitat, and the nearby Chelmsford Nature Reserve, there is a moderate to high probability that other mammal SCC occur within the project area.

Table 11: Mammal species recorded in the project area during the May 2018 survey (species highlighted in red are listed species)

Species	Common name	Conservation Status	
		Regional (SANBI, 2015)	IUCN (2017)
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Leptailurus serval</i>	Serval	NT	LC
<i>Ourebia ourebi</i>	Oribi	EN	LC

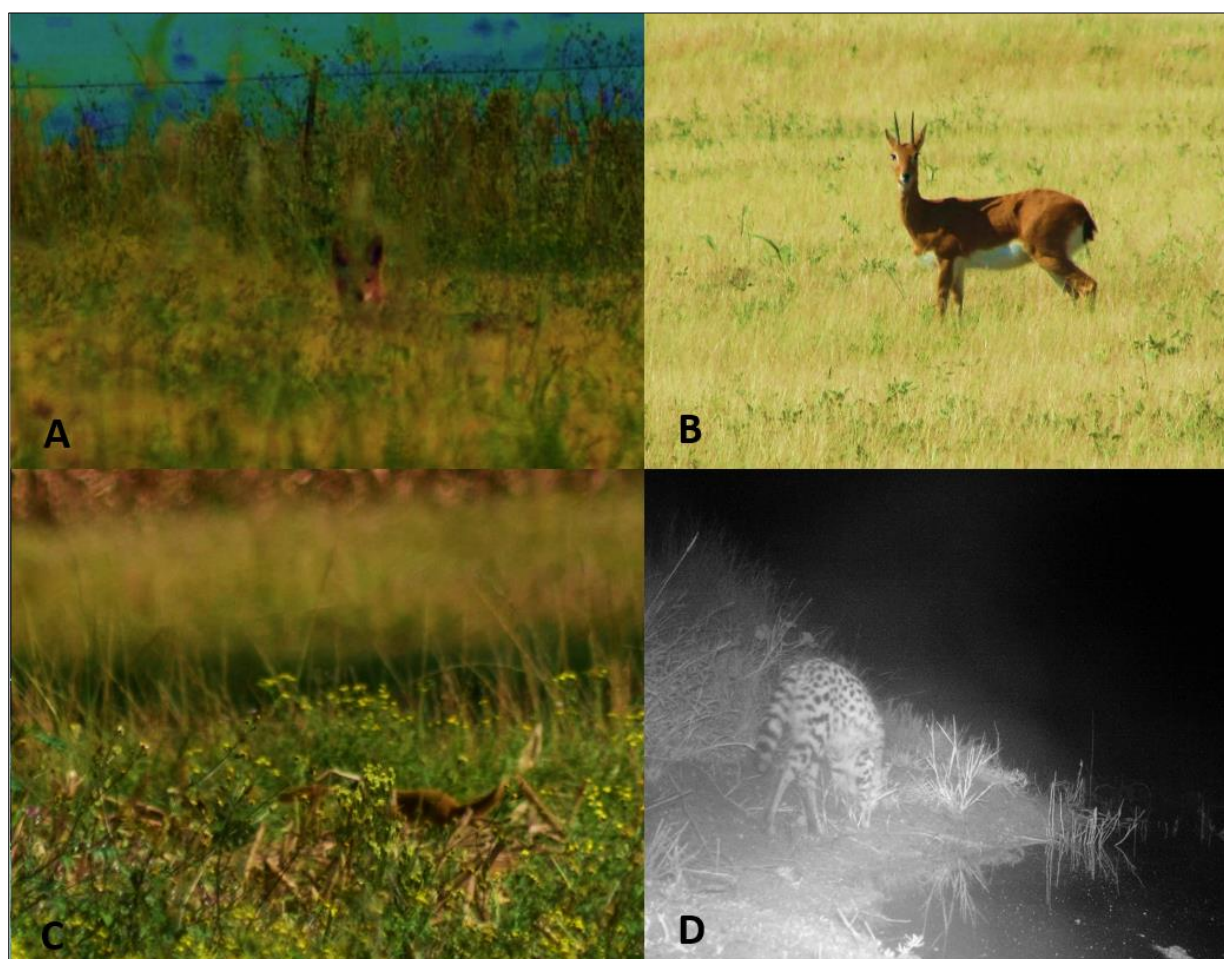


Figure 15: Some of the mammal species recorded during the survey: A) Black-backed Jackal (*Canis mesomelas*); B) Oribi (*Ourebia ourebi*); C) Yellow Mongoose (*Cynictis penicillata*); and D) Serval (*Leptailurus serval*)

### 7.2.2.3 Herpetofauna (Reptiles & Amphibians)

Herpetofauna diversity was considered to be moderate with six (6) reptile species and three (3) amphibian species observed or recorded in the project area during the May 2018 survey

(Table 12). Figure 16 shows some of the reptile and amphibian species which were recorded in the project area. One of the recorded reptiles was a large brown house snake (*Boaedon capensis*) which was found dead on the road, showing the high impact that linear structures such as this can have on herpetofauna populations.

Table 12: List of all herpetofauna recorded within the project area

Species	Common Name	South African Endemic	Conservation Status	
			Regional (Eskom, 2016)	Global (IUCN, 2017)
<b>Reptiles</b>				
<i>Aparallactus capensis</i>	Black Headed Centipede Eater	No	LC	LC
<i>Atractaspis bibronii</i>	Stiletto Snake	No	LC	LC
<i>Boaedon capensis</i>	Brown House Snake	No	LC	LC
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	No	Unlisted	Unlisted
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	No	LC	Unlisted
<i>Trachylepis varia</i>	Variable Skink	No	LC	Unlisted
<b>Amphibians</b>				
<i>Cacosternum boettgeri</i>	Boettger's Caco	No	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	No	LC	LC
<i>Sclerophrys rangeri</i>	Raucous Toad	No	LC	Unlisted



Figure 16: Some of the herpetofauna recorded within the project area: A) Black Headed Centipede Eater (*Aparallactus capensis*); B) Stiletto Snake (*Atractaspis bibronii*); C) Brown House Snake (*Boaedon capensis*) – dead on road



## 8 Habitat Sensitivity Mapping

### 8.1 Mining Footprint Area

As per the terms of reference for the project, a GIS sensitivity map is required in order to identify sensitive features in terms of the relevant specialist discipline/s within the project area, especially in reference to the defined mining footprint and access road. The sensitivity scores identified during the field survey for each habitat were then visually mapped (Figure 17).

Areas that were classified as having low or moderate sensitivities are those areas which were deemed by the specialists to have been most impacted upon and/or were modified from their original condition due to factors such as over-grazing, human activity and/or presence of alien invasive species.

The areas given a very high sensitivity rating are those areas with existing natural vegetation, are classified as a functional CBA or areas that have the capacity to serve as habitat or important corridors for various species (especially potential SCC). Freshwater ecosystems such as rivers and wetlands are generally the lowest point in a landscape, and therefore particularly vulnerable to pollution from waste, sedimentation and pollutants present in runoff. This, combined with the strong connectivity of freshwater ecosystems makes them highly susceptible to upstream and downstream impacts. Vegetative buffers areas have a significant impact on pollution control and the associated water quality in nearby water bodies, soil erosion control, and provide wildlife habitat and movement corridors for species such as Water Monitors and Otters.

The width of a vegetative buffer around a river or wetland depends on many factors such as the risk the proposed development poses to the water resource and receiving environment, the sensitivity of the water resource to diffuse-source impacts, the impact on other water users, and the requirements of the associated biodiversity – to name but a few. On a national scale, the recommended buffer width around FEPA rivers in areas where mining takes place is 1 km<sup>2</sup>.

For this project, the southern and central portions of the project area, although altered, were given a moderate sensitivity rating due to the important role this area functions as from an ecological point (corridor and an ESA). Although much of the central portion of the project area is monocultures of maize or other grasses, endangered species and other species of conservation importance were recorded utilising these areas for foraging and as corridors to move between adjacent natural areas, therefore it is given a moderate sensitivity rating.

Areas designated as having a low sensitivity are those areas which have been heavily transformed such as existing homesteads or actively mined areas.

It is important to note that this map does not replace any local, provincial or government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

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<sup>2</sup> Water use authorisation has been granted which permits the open cast mining through, and placement of infrastructure within 100m of wetland areas on designated property portions

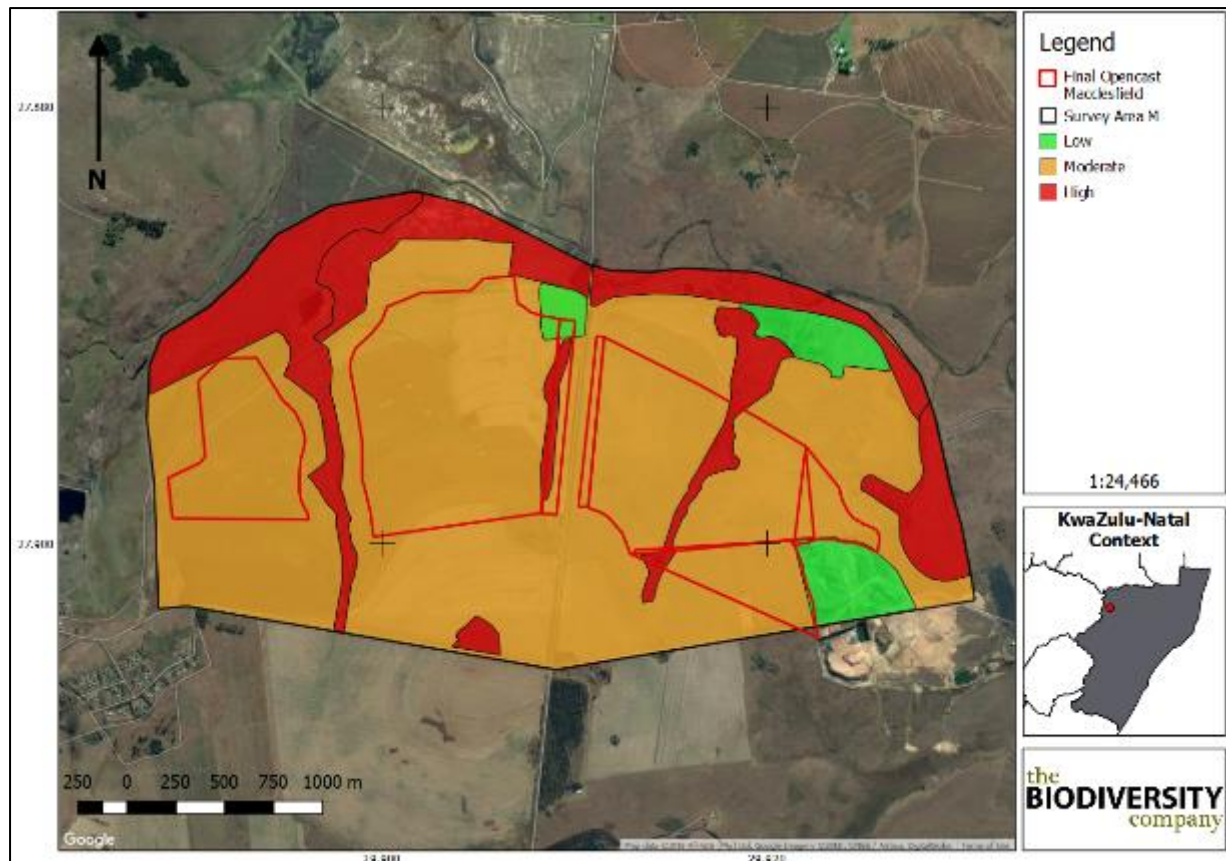


Figure 17: Habitat sensitivity map of the project area

## 9 Impact Assessment

Mining and related activities have significant impacts on biodiversity and ecosystem services, often causing irreversible and large-scale habitat loss across large areas or areas important for the provision of important ecosystem services.

Depending on the mining methods adopted, mining activities can cause considerable environmental degradation. These disturbances have numerous direct, indirect, short- and long-term potentially adverse effects on the landscape and nearby human communities.

Key impacts commonly associated with open cast mining activities are discussed below. The listed activities are merely indicative, and the proposed developments may either have additional or fewer activities 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 information becomes available. The significance (quantification) of potential environmental impacts has been assessed in terms of the Guideline Documentation on EIA Regulation; Department of Environmental Affairs and Tourism, 2014 (Impact Assessment Methodology, Appendix 6).

### Open cast pit mining activities

By its very nature, open pit mining is environmentally destructive, even if mitigation measures are applied and the site is restored to a condition said to “resemble” its natural state. Complete

disruption of the surface always occurs, which impacts on soil, fauna, flora, surface water and land use. If operations extend to depths below the water table, impacts on groundwater is inevitable. The opportunities for land use following open-pit mining are often limited.

## 9.1 Impact Assessment Methodology

Potential impacts were evaluated against the data captured during the desktop-and field assessment to identify relevance to the study area. The relevant impacts associated with the proposed open cast mining development were then subjected to a prescribed impact assessment methodology which is described below.

Impacts were assessed in terms of the construction, operational, closure, rehabilitation and post-closure phases. The operational phase refers to that phase of the project where the area is being actively mined.

Mitigation measures were only applied to impacts deemed relevant based on the impact analysis. The likelihood and consequence descriptors are presented in Table 13 and Table 14. The significance rating matrix is presented in Table 15.

*Table 13: Likelihood descriptors*

Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	Rating
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

*Table 14: Consequence Descriptors*

Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	Rating
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3

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Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Duration of impact	Rating
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 15: Significance Rating Matrix

LIKELIHOOD (Frequency of activity + Frequency of impact)	CONSEQUENCE (Severity + Spatial Scope + Duration)															Very Low
	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	Low	
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45		
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	Moderate	
5	10	15	20	25	30	35	40	45	50	55	60	65	70	75		
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	Moderately High	
7	14	21	28	35	42	49	56	63	70	77	84	91	98	105		
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	High	
9	18	27	36	45	54	63	72	81	90	99	108	117	126	135		
10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	Critical	

9.2 Current Impacts

During the field survey, the current impacts that are having a negative impact on the area were identified, and are listed below and can be seen in Figure 18;

- Presence of alien and invasive plant species;
- Secondary road with the associated noise disturbance, road mortalities and litter;
- Livestock (predominantly free ranging cattle and goats);
- Large areas of agricultural fields (typically monocultures of maize);
- Coal mining activities, including impacts from dust, noise and vibrations; and
- Existing electrical infrastructure in the form of powerlines.





Figure 18: Some of the current impacts identified within the project area (May 2018): A) Goats; B, C & D) Agricultural land use

### 9.3 Identification of Additional Potential Impacts

The proposed development is associated with mining activities, namely the open cast mining of the areas identified in this report. The proposed activities will result in direct loss and destruction of habitats, direct mortalities and displacement of fauna and flora. The removal of natural vegetation to accommodate mining will reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features.

The project area provides possible habitat and shelter to several endemic and protected mammal, reptile and bird species. Although it is assumed that the majority of fauna species will move to different areas as a result of disturbance, many protected and endemic fauna species have very specific habitat requirements, and the destruction of their habitats could result in displacement to less optimal habitats. 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.

Some other risks associated with open cast mining methods:



- Open cast coal mining destroys landscapes, forests and wildlife habitats at the site of the mine when trees, plants, and topsoil are cleared from the mining area. This in turn can lead to soil erosion and destruction of agricultural land.
- When rain washes the loosened top soil into streams, sediments pollute waterways. This can lead to fish die-offs and smother plant life downstream and cause disfiguration of river channels and streams which leads to flooding.
- There is an increased risk of chemical contamination of ground water when minerals in upturned earth seep into the water table and watersheds are destroyed when disfigured land loses the water it once held.
- Open cast coal mining causes dust and noise pollution when top soil is disrupted with heavy machinery and coal dust is created in mines.

The potential impacts associated with the various project stages are discussed below.

### 9.3.1 Construction Phase

The following potential impacts were considered on terrestrial vegetation communities:

- Destruction of, and fragmentation of, the vegetation community (including portions of a Vulnerable vegetation type, wetlands and areas classified as CBA: Irreplaceable).

Potential impacts on faunal communities include:

- Displacement of faunal community (including threatened or protected species) due to habitat loss, disturbance (noise, dust and vibration) and/or direct mortalities.

### 9.3.2 Operational Phase

The following potential impacts were considered on terrestrial vegetation communities:

- Continued removal and fragmentation of a Vulnerable vegetation community (including portions of wetlands and areas classified as CBA: Irreplaceable) due to open cast mining activities and encroachment by alien invasive plant species; and
- Potential leaks, discharges, pollutant from mining activities leaching into the surrounding environment.

Potential impacts on faunal communities include:

- Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation (litter, road mortalities and/or poaching).

### 9.3.3 Decommissioning Phase

The following potential impacts were considered on terrestrial vegetation communities:

- Continued encroachment of an indigenous and Vulnerable vegetation community by alien invasive plant species;

Potential impacts on faunal communities include:

- Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation (litter, road mortalities and/or poaching).

### 9.3.4 Closure and Rehabilitation Phase

The following potential impacts were considered on terrestrial vegetation communities:

- Encroachment and displacement of an indigenous and Vulnerable vegetation community by alien invasive plant species, potential re-establishment of natural species that were removed, the nature of which will depend on the amount of successful vegetation establishment.

Potential impacts on faunal communities include:

- Displacement of the faunal community (including threatened or protected species) due to initial rehabilitation activities and successful rehabilitation resulting in the faunal species potentially re-establishing within the area.

## 10 Assessment of Significance

### 10.1 Construction Phase

Table 16 shows the significance of potential impacts associated with the development on vegetation communities before and after implementation of mitigation measures. Prior to implementation of mitigation measures the significance of impacts were rated as moderately high (Table 16). Implementation of avoidance measures as mitigation reduced the significance of potential impact on the vegetation community to a moderately level (Table 16).

The significance of potential impacts associated with the development on faunal communities before and after mitigation is presented in Table 16. Prior to implementation of mitigation measures the significance of impacts were rated as moderately high. Implementation of avoidance measures as mitigation reduced the significance of potential impact on the faunal communities to a moderately level (Table 16).

Due to the nature of this type of development and the associated land clearance that will be required, and due to the intact nature of some of the habitats, CBA areas, and wetlands, the impacts on identified threatened faunal species and sensitive vegetation communities remains at a moderate level, even after mitigation.

### 10.2 Operational Phase

Table 17 shows the significance of potential operational phase impacts on vegetation communities before and after implementation of mitigation measures. The significance of the continued removal and fragmentation of a Vulnerable vegetation community (including portions of wetlands and areas classified as CBA: Irreplaceable) due to open cast mining activities and encroachment by alien invasive plant species was rated as moderately high prior to mitigation (Table 17). Implementation of mitigation measures in the form an alien invasive plant management plan and rehabilitation of project footprint after completion of open cast mining activities, reduced the significance of the impact to moderate levels (Table 17).

Table 17 shows the significance of potential operational phase impacts of potential leaks, discharges and/or pollutants from mining into the surrounding environment. The significance of was rated as moderate pre-mitigation and post-mitigation (Table 17).

The significance of operational phase impacts on terrestrial fauna communities was rated as moderately high prior to mitigation and low post mitigation (Table 17). This impact was attributed to the expected continued loss and fragmentation of the vegetation community in the project area and the associated loss of the faunal community which it supports unless definitive measures are taken. These measures include:

1. Awareness of the sensitivity of this community (in particular the Vulnerable vegetation type and possibility of occurrence of certain threatened species);
2. A commitment to safely and properly relocate all fauna encountered during the operational phase, including invertebrate species such as scorpions, all reptiles, amphibian, bird and/or mammal species;
3. All access roads should make use of existing access roads where possible. Signs should also be erected that warn motorists of wildlife which may stray onto access roads and all relevant speed limits should be put in place to prevent road-mortalities;
4. Storm water from the mining areas and offices must be carefully managed and should include mitigation measures that will catch and slow water flow from the area;
5. Clean and dirty water must be separated as per the GN704, and dirty water is to be contained and re-used on-site;
6. Strict measures must be put in place to prevent the presence of any feral cats, dogs or livestock on site; and
7. Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise.

### 10.3 Decommissioning Phase

Table 18 shows the significance of potential impacts associated with the decommissioning phase of the development on vegetation communities before and after implementation of mitigation measures. Prior to implementation of mitigation measures the significance of impacts were rated as moderately high (Table 18). Implementation of avoidance measures as mitigation reduced the significance of potential impact on the vegetation community to a low level (Table 18).

The significance of potential impacts associated with the decommissioning phase of the development on faunal communities before and after mitigation is presented in Table 18. Prior to implementation of mitigation measures the significance of impacts were rated as moderately high. Implementation of avoidance measures as mitigation reduced the significance of potential impact on the faunal communities to a moderate level (Table 18).

## 10.4 Closure and Rehabilitation Phase

Table 19 shows the significance of potential impacts associated with the closure and rehabilitation phase of the development on vegetation communities before and after implementation of mitigation measures. Prior to implementation of mitigation measures the significance of impacts were rated as moderate (Table 19). Implementation of avoidance measures as mitigation reduced the significance of potential impact on the vegetation community to a low level (Table 19).

The significance of potential impacts associated with the closure and rehabilitation phase of the development on faunal communities before and after mitigation is presented in Table 19. Prior to implementation of mitigation measures the significance of impacts were rated as moderate. Implementation of avoidance measures as mitigation reduced the significance of potential impact on the faunal communities to a low level (Table 19).

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Table 16: Assessment of significance of potential **construction impacts** on terrestrial biodiversity associated with the proposed open cast mining pre- and post- mitigation:

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Destruction of, and fragmentation, of the vegetation community (including portions of a Vulnerable vegetation type, wetlands and areas classified as a CBA: Irreplaceable).	3	4	5	4	5		3	3	4	4	5	
	Medium Term	Local Area	Disastrous	Ecology Highly Important	Definite	<b>Moderately High</b>	Medium Term	Local Area	Significant	Ecology Highly Important	Highly likely	<b>Moderately</b>
Displacement of faunal community (including threatened or protected species) due to habitat loss, disturbance and/or direct mortalities.	3	4	5	4	5		3	3	4	4	5	
	Medium Term	Local Area	Disastrous	Ecology Highly Important	Definite	<b>Moderately High</b>	Medium Term	Local Area	Significant	Ecology Highly Important	Highly likely	<b>Moderately</b>





Table 17: Assessment of significance of potential operational impacts on terrestrial biodiversity associated with the proposed open cast mining pre- and post- mitigation:

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued removal and fragmentation of a Vulnerable vegetation community (including portions of wetlands and areas classified as CBA: Irreplaceable) due to open cast mining activities and encroachment by alien invasive plant species.	5	3	3	4	5		4	2	2	4	2	
	Permanent	Local Area	Significant	Ecology Highly Important	Definite	<b>Moderately High</b>	Long Term (LoM)	Development Specific	Small	Ecology Highly Important	Possible	<b>Moderate</b>
Potential leaks, discharges, pollutant from mining activities leaching into the surrounding environment.	4	3	3	4	4		4	2	2	4	2	
	Long Term (LoM)	Local Area	Significant	Ecology Highly Important	Highly likely	<b>Moderate</b>	Long Term (LoM)	Development Specific	Small	Ecology Highly Important	Possible	<b>Moderate</b>
Continued displacement and fragmentation of the faunal community (including threatened species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation (litter, road mortalities and/or poaching).	5	3	4	4	5		4	2	3	4	3	
	Permanent	Local Area	Great	Ecology Highly Important	Definite	<b>Moderately High</b>	Long Term (LoM)	Development Specific	Significant	Ecology Highly Important	Likely	<b>Moderate</b>



Table 18: Assessment of significance of potential decommissioning phase impacts on terrestrial biodiversity associated with the proposed open cast mining pre- and post- mitigation:

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued encroachment and displacement of indigenous vegetation community by alien invasive plant species	4	3	3	4	5		4	2	2	4	2	
	Long Term (LoM)	Local Area	Significant	Ecology Highly Important	Definite	<b>Moderately High</b>	Long Term (LoM)	Development Specific	Small	Ecology Highly Important	Possible	<b>Low</b>
Continued displacement and fragmentation of the faunal community (including threatened species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation (litter, road mortalities and/or poaching).	5	3	4	4	5		4	2	3	4	3	
	Permanent	Local Area	Great	Ecology Highly Important	Definite	<b>Moderately High</b>	Long Term (LoM)	Development Specific	Significant	Ecology Highly Important	Likely	<b>Moderate</b>



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*Table 19: Assessment of significance of potential closure and rehabilitation phase impacts on terrestrial biodiversity associated with the proposed open cast mining pre- and post- mitigation:*

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Encroachment and displacement of an indigenous and Vulnerable vegetation community by alien invasive plant species, potential re-establishment of natural species that were removed, the nature of which will depend on the amount of successful vegetation establishment.	4	3	3	4	4		4	2	2	4	2	
	Long Term (LoM)	Local Area	Significant	Ecology Highly Important	Highly likely	<b>Moderate</b>	Long Term (LoM)	Development Specific	Small	Ecology Highly Important	Possible	<b>Low</b>
Displacement of the faunal community (including threatened or protected species) due to initial rehabilitation activities and successful rehabilitation resulting in the faunal species potentially re-establishing within the area.	4	3	3	4	4		4	2	2	4	2	
	Long Term (LoM)	Local Area	Significant	Ecology Highly Important	Highly likely	<b>Moderate</b>	Long Term (LoM)	Development Specific	Small	Ecology Highly Important	Possible	<b>Low</b>



## 10.5 Mitigation Measure Objectives

The mitigation measures mentioned below are based upon a situation where authorisation to mine via open cast methods (with the associated infrastructure) is approved by a competent authority. A container office and ROM stockpile in the boxcut is the only associated infrastructure which is yet to be approved.

The focus of mitigation measures should be to reduce the significance of potential impacts associated with the mining and thereby to:

- Prevent the destruction of, and fragmentation, of the vegetation community (including portions of a Vulnerable vegetation type, wetlands and areas classified as a CBA: Irreplaceable).
- Prevent the loss of the faunal community (including potentially occurring species of conservation concern) associated with this vegetation community.

### 10.5.1 Mitigation Measures for Impacts on Vegetation Communities & CBAs

The project area is situated in close proximity to an Irreplaceable CBA, the Horn River, and approximately 5 km to the Chelmsford Nature Reserve most of which are regarded as very sensitive (based on the various spatial datasets analysed for this report, the results from the field survey and the likelihood of faunal SCC occurring, as well as the endangered species which were recorded).

From an ecological perspective the development is situated close to, and within, various natural and semi-disturbed habitats that play an important role within this area. Although somewhat disturbed, it has been shown that these areas support various faunal species, including SCC and there is a strong likelihood that other SCC may occur there.

The mitigation measures proposed below should only come in to effect if environmental authorisation is approved for this project.

It is recommended that an extensive alien plant management plan be compiled to remove all alien vegetation from within the project area, should the project receive authorisation.

#### **Recommended mitigation and rehabilitation measures include the following:**

- The mining footprint areas have been amended and reduced in consultation with the relevant authorities, and it is therefore recommended that no mining (or associated activities) be conducted beyond the approved / authorised mining footprint areas;
- Restrict mining to the designated footprint areas, avoiding the areas classified as highly sensitive. Access to the mining areas must avoid highly sensitive areas;
- It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon and preventing movement of workers into sensitive surrounding environments;
- Areas of indigenous vegetation, even secondary communities, with the exception of approved mining areas should under no circumstances be fragmented or disturbed further or used as an area for dumping of waste;



- All necessary road mitigation measures must be put in place to slow (or stop) run-off on the existing access road or any other roads which may need to be constructed. This is a vital mitigation measure to prevent erosion and wildlife road mortalities;
- Driving on access roads at night should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period;
- Appropriate speed humps and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface. All methods to slow the flow of water off the road surface must be implemented and the feasibility of building an attenuation system to hold surface water and release it slowly into the surrounding environment must be investigated;
- The areas rated as highly sensitive in the project area (Figure 17) as defined in this report should be declared a 'no-go' area during the construction and operational phases and all efforts must be made to prevent access to this area from construction workers, machinery, domestic animals and the general public. This should be implemented with the exception of those mining areas in which authorisation for mining has been granted;
- Where possible, existing access routes and walking paths must be made use of, and new routes limited;
- All laydown, storage areas etc should be restricted to within the project area;
- A qualified environmental control officer must be on site when construction begins to identify species that will be directly disturbed and to relocate fauna/flora that is found during construction (including all reptiles and amphibians);
- All livestock (including cattle, pigs, goats, domestic dogs and cats) must be kept out of the project area at all times;
- All staff and visitors to the site must undergo an extensive induction process and must be made aware of the sensitive nature of the environment and faunal species which occur there;
- Rehabilitation of the disturbed areas existing in the project area must be made a priority. Top soils must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this exact vegetation type;
  - Rehabilitation measures that are implemented must be continually monitored for a minimum period of five years given the sensitives in the area. This is to ensure that proper succession has occurred and that there is no erosion occurring or alien invasive plants taking hold;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species; and
- Compilation of and implementation of an alien vegetation management plan for the entire site.



### 10.5.2 Mitigation Measures for Impacts on Faunal Communities

Recommended mitigation and rehabilitation measures for faunal community's hinge largely on protecting their habitats and ensuring it remains intact.

#### Specific mitigation measures for birds, mammals and amphibians

- Due to the presence of the endangered Oribi occurring within the project area, it is recommended that an Oribi specialist be consulted prior to any clearance on site;
- No more than two weeks in advance of any 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 birds nesting habitat or mammal breeding habitat in the vicinity of the project area, and within the project area;
  - 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 must be created around active nests during the breeding season by a suitably qualified Zoologist; and
  - If active mammal breeding areas are identified (especially in regard to Oribi), avoidance procedures must be implemented on a case-by-case basis.
- Similarly, regarding amphibians, 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 amphibians that may be calling within the project area. This person should have specialist knowledge of the local frog species;
  - Any individuals found should be relocated to a suitable area that is undisturbed, such as the nearby Chelmsford Dam Nature Reserve; and
- The mine should investigate the feasibility of electrical infrastructure being fitted with bird-friendly structures and mitigation devices (such as 'bird flappers') to minimise avifaunal deaths on these structures.

In addition to this the following measures are recommended:

- If any indigenous faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action;
- The duration of the mining should be minimized to as short term as possible, in order to reduce the period of disturbance on fauna and flora;
- During vegetation clearance, methods should be employed to minimize potential harm to fauna species. Clearing has to take place in a phased and slow manner, commencing from the interior of the site progressing outwards towards the boundary to maximize potential for mobile species to move to adjacent areas;

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- Prior and during vegetation clearance any larger fauna species noted should be given the opportunity to move away from the construction machinery;
- 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;
- Fencing should be erected around the project area to prevent workers and members of the public from entering the surrounding farm portions and environments. This fence should have small openings to allow wildlife to pass through;
- Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site;
- No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals;
- During the construction phase noise and vibrations must be kept to a minimum to reduce the impact of the development on the fauna residing on the site;
- Furthermore, during the operational phase, noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals;
- Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process;
  - The avoidance and protection of the wetland areas and CBA areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the sensitive areas to be avoided;
  - The induction must include a focus on amphibian, mammal, bird and reptile species, especially known SCC that may occur within the project area;
- Long-term water quality monitoring of all adjacent streams and rivers must be implemented as soon as possible to monitor any potential negative effects of mining on nearby watercourse and aquatic fauna;
- Construction activities and vehicles could cause spillages of lubricants, fuels and construction material which could then be transported to the river, impacting on the water quality and potentially the functioning of the systems. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area; and
- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the surrounding environment.

## 11 Conclusion

The project area is situated across three farm portions (Macclesfield 8418 Ptn Re, Herons Court 8521 Ptn 1 and Herons Court 8521 Ptn Re) which were previously earmarked for underground mining in the original EMP, but the Holder of the Mining Right now proposes to mine this via open cast methods. The new open cast area will be approximately 281 ha in extent. The approved EMP was for underground mining. Thus, an EMP Amendment and application for Environmental Authorisation is required.

A Water Use License (No. 11/V31E/ACGIJ/5164) has been authorised for the Chelmsford Colliery (dated 27 March 2017). This license permits the open cast mining through, and placement of infrastructure within 100m of wetland areas on designated property portions

The completion of a study, in conjunction with the detailed results from the survey means that there is a high confidence in the information provided. The survey which was completed, and the corresponding studies resulted in good site coverage, within the proposed mining footprint area, assessing the major habitats and ecosystems, obtaining a general species (fauna and flora) overview and observing the major current impacts.

It is clear from the regional ecological overview, as well as the baseline data collected to date that the project area is an assembly of different conditions and some that have been altered both historically and presently. Current impacts include secondary roads, agriculture and associated human activity, including: active mining, agricultural fields, dumping of rubble, livestock, litter and infringement by people and livestock into natural areas.

However, despite these impacts, the remaining natural habitats (mostly the northern portion of the project area) exhibit healthy ecological functionality, integrity and provide habitat for several threatened species. This diversity is indicative of the importance of these systems to collectively provide refugia, food and corridors for dispersal in and through the surrounding area.

The proposed mining area is situated within, and near, to areas identified as Irreplaceable CBAs. Field surveys confirmed the ecological integrity of this CBA, as well as the presence of multiple threatened species (including Oribi and Grey Crowned Cranes). The likelihood of other threatened species occurring in the project area was rated as high.

The proposed project area is situated just outside of the 5 km protected areas buffer from the Chelmsford Dam Nature Reserve.

The following further conclusions were reached based on the results of this assessment:

- According to the KZN BPS it can be concluded that the proposed mining is likely to impact on a CBA: Irreplaceable. The mining footprint area directly intersects with portions of a CBA: Irreplaceable. Moreover, the entire northern section of the proposed mining area borders directly on areas classed as a CBA: Irreplaceable;
- According to the NBA (2011) terrestrial ecosystem threat status', the project area falls within one ecosystem, which is listed as Vulnerable (VU) and *poorly protected*;
- Based on the SANBI (2010) Protected Areas Map and the National Protected Areas Expansion Strategy (NPAES) the project area doesn't overlap with any formally protected area, but is situated 5.2 km from the Chelmsford Dam Nature Reserve;

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- According to the Mining and Biodiversity Guidelines (2013), portions of the proposed mining areas are listed as 'highest biodiversity importance'. These areas are also listed as 'highest risk for mining';
- The project area is situated across two different vegetation types; Northern KwaZulu-Natal Moist Grassland (Gs4) (which constitutes the majority of the area) and Eastern Temperate Freshwater Wetlands vegetation types, according to Mucina & Rutherford (2006). The Northern KwaZulu-Natal Moist Grassland vegetation type is listed as Vulnerable;
- Nine (9) Category 1b invasive plant species were recorded within the project area and must therefore be removed by implementing an alien invasive plant management programme;
- Sixty-five (65) bird species were recorded in the project area during the May 2018 survey. Three avifaunal SCC were recorded during the survey, namely Grey Crowned Crane, Southern Bald Ibis and Cape Cormorant, based on the presence of pristine, suitable habitat, and the nearby Chelmsford Nature Reserve, there is a high probability that many other bird SCC occur within the project area;
- Two mammal SCC were recorded during the survey, namely Oribi and Serval, based on the presence of pristine, suitable habitat, and the nearby Chelmsford Nature Reserve, there is a high probability that many other mammal SCC occur within the project area.

## 12 Impact Statement

An impact statement is required as per the NEMA EIA regulations (as amended) with regards to the proposed development.

The proposed mining area is situated approximately 5 km to the Chelmsford Nature Reserve, will partially impact upon a CBA: Irreplaceable. The project area is also listed as an area that presents the highest risk to mining due to environmental sensitivities and falls within the 1 km buffer from the Horn River (Mining and Biodiversity Guidelines, 2013). Field surveys confirmed the ecological integrity of this CBA, as well as the presence of multiple threatened or endangered species. Furthermore, the ecosystems present, although somewhat disturbed, showed the potential to host a number of reptile, mammal and bird species of conservation concern.

In the event that environmental authorisation is issued for this project, proven ecological (or environmental) controls and mitigation measures must be entrenched in the management framework.

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APPENDIX A: *Floral species expected to occur in the project area*

Family	Scientific Name	Author	Conservation Status	Ecology
Euphorbiaceae	<i>Acalypha depressinerva</i>	(Kuntze) K.Schum	LC	Indigenous
Euphorbiaceae	<i>Acalypha glabrata</i> var. <i>glabrata</i>	Thunb.	LC	Indigenous
Euphorbiaceae	<i>Acalypha peduncularis</i>	E.Mey. ex Meisn.	LC	Indigenous
Apocynaceae	<i>Acokanthera oppositifolia</i>	(Lam.) Codd	LC	Indigenous
Pteridaceae	<i>Adiantum capillus-veneris</i>	L.	LC	Indigenous
Asteraceae	<i>Afroaster serrulatus</i>	(Harv.) J.C.Manning & Goldblatt	LC	Indigenous
Lamiaceae	<i>Ajuga ophrydis</i>	Burch. ex Benth.	LC	Indigenous
Hyacinthaceae	<i>Albuca setosa</i>	Jacq.		Indigenous
Orobanchaceae	<i>Alectra vogelii</i>	Benth.	LC	Indigenous
Sapindaceae	<i>Allophylus africanus</i> var. <i>africanus</i>	P.Beauv.		Indigenous
Poaceae	<i>Alloteropsis semialata</i> subsp. <i>semialata</i>	(R.Br.) Hitchc.	LC	Indigenous
Asphodelaceae	<i>Aloe ecklonis</i>	Salm-Dyck	LC	Indigenous
Asphodelaceae	<i>Aloe maculata</i> subsp. <i>maculata</i>	All.	LC	Indigenous
Poaceae	<i>Andropogon appendiculatus</i>	Nees	LC	Indigenous
Poaceae	<i>Andropogon eucomus</i>	Nees	LC	Indigenous
Poaceae	<i>Andropogon schirensis</i>	Hochst. ex A.Rich.	LC	Indigenous
Aponogetonaceae	<i>Aponogeton junceus</i>	Lehm.	LC	Indigenous
Papaveraceae	<i>Argemone mexicana</i> forma <i>mexicana</i>	L.		Not Indigenous; Naturalised; Invasive
Papaveraceae	<i>Argemone ochroleuca</i>	Sweet		Not Indigenous; Naturalised; Invasive
Fabaceae	<i>Argyrolobium harveyanum</i>	Oliv.	LC	Indigenous
Fabaceae	<i>Argyrolobium speciosum</i>	Eckl. & Zeyh.	LC	Indigenous
Iridaceae	<i>Aristea montana</i>	Baker	LC	Indigenous
Iridaceae	<i>Aristea torulosa</i>	Klatt	LC	Indigenous
Poaceae	<i>Aristida congesta</i> subsp. <i>barbicollis</i>	Roem. & Schult.	LC	Indigenous
Poaceae	<i>Aristida congesta</i> subsp. <i>congesta</i>	Roem. & Schult.	LC	Indigenous
Poaceae	<i>Aristida junciformis</i> subsp. <i>junciformis</i>	Trin. & Rupr.	LC	Indigenous
Poaceae	<i>Aristida recta</i>	Franch.	LC	Indigenous
Poaceae	<i>Arundinella nepalensis</i>	Trin.	LC	Indigenous
Apocynaceae	<i>Asclepias albens</i>	(E.Mey.) Schltr.	LC	Indigenous
Apocynaceae	<i>Asclepias aurea</i>	(Schltr.) Schltr.	LC	Indigenous
Apocynaceae	<i>Asclepias eminens</i>	(Harv.) Schltr.	LC	Indigenous
Apocynaceae	<i>Asclepias fulva</i>	N.E.Br.	LC	Indigenous
Apocynaceae	<i>Asclepias meyeriana</i>	(Schltr.) Schltr.	LC	Indigenous
Apocynaceae	<i>Asclepias stellifera</i>	Schltr.	LC	Indigenous
Asparagaceae	<i>Asparagus ramosissimus</i>	Baker	LC	Indigenous
Apocynaceae	<i>Aspidoglossum carinatum</i>	(Schltr.) Kupicha	LC	Indigenous
Apocynaceae	<i>Aspidoglossum woodii</i>	(Schltr.) Kupicha	LC	Indigenous; Endemic
Aytoniaceae	<i>Asterella bachmannii</i>	(Steph.) S.W.Arnell		Indigenous
Acanthaceae	<i>Barleria obtusa</i>	Nees		Indigenous
Begoniaceae	<i>Begonia sutherlandii</i> subsp. <i>sutherlandii</i>	Hook.f.	LC	Indigenous

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Asteraceae	<i>Berkheya echinacea</i> subsp. <i>echinacea</i>	(Harv.) O.Hoffm. ex Burt Davy	LC	Indigenous
Asteraceae	<i>Berkheya onopordifolia</i> var. <i>glabra</i>	(DC.) O.Hoffm. ex Burt Davy	LC	Indigenous
Apiaceae	<i>Berula repanda</i>	(Hiern) Spalik & S.R.Downie	LC	Indigenous
Apiaceae	<i>Berula thunbergii</i>	(DC.) H.Wolff	LC	Indigenous
Acanthaceae	<i>Blepharis integrifolia</i> var. <i>integrifolia</i>	(L.f.) E.Mey. ex Schinz	LC	Indigenous
Poaceae	<i>Brachiaria serrata</i>	(Thunb.) Stapf	LC	Indigenous
Poaceae	<i>Brachypodium flexum</i>	Nees	LC	Indigenous
Amaryllidaceae	<i>Brunsvigia grandiflora</i>	Lindl.	LC	Indigenous; Endemic
Amaryllidaceae	<i>Brunsvigia radulosa</i>	Herb.	LC	Indigenous
Bryaceae	<i>Bryum pycnophyllum</i>	(Dixon) Mohamed		Indigenous
Bryaceae	<i>Bryum</i> sp. sp.			
Asteraceae	<i>Callilepis laureola</i>	DC.	LC	Indigenous
Cyperaceae	<i>Carex zuluensis</i>	C.B.Clarke	LC	Indigenous
Rubiaceae	<i>Cephalanthus natalensis</i>	Oliv.	LC	Indigenous
Dipsacaceae	<i>Cephalaria humilis</i>	(Thunb.) Roem. & Schult.	LC	Indigenous; Endemic
Dipsacaceae	<i>Cephalaria zeyheriana</i>	Szabó	LC	Indigenous
Caryophyllaceae	<i>Cerastium arabis</i>	E.Mey. ex Fenzl		Indigenous
Pteridaceae	<i>Cheilanthes eckloniana</i>	(Kunze) Mett.	LC	Indigenous
Pteridaceae	<i>Cheilanthes viridis</i> var. <i>viridis</i>	(Forssk.) Sw.	LC	Indigenous
Gentianaceae	<i>Chironia palustris</i> subsp. <i>palustris</i>	Burch.	LC	Indigenous
Agavaceae	<i>Chlorophytum cooperi</i>	(Baker) Nordal		Indigenous
Vitaceae	<i>Cissus cussonioides</i>	Schinz		Indigenous; Endemic
Rosaceae	<i>Cliffortia linearifolia</i>	Eckl. & Zeyh.	LC	Indigenous
Euphorbiaceae	<i>Clutia monticola</i> var. <i>monticola</i>	S.Moore	LC	Indigenous
Euphorbiaceae	<i>Clutia natalensis</i>	Bernh.	LC	Indigenous
Combretaceae	<i>Combretum caffrum</i>	(Eckl. & Zeyh.) Kuntze	LC	Indigenous; Endemic
Commelinaceae	<i>Commelina subulata</i>	Roth	LC	Indigenous
Convolvulaceae	<i>Convolvulus natalensis</i>	Bernh. ex Krauss	LC	Indigenous
Malvaceae	<i>Corchorus</i> sp. sp.			
Rubiaceae	<i>Cordylostigma virgata</i>	(Willd.) Groeninckx & Dessen		Indigenous
Caryophyllaceae	<i>Corrigiola litoralis</i> subsp. <i>litoralis</i>	L.		Indigenous
Rosaceae	<i>Cotoneaster pannosus</i>	Franch.		Not Indigenous; Cultivated; Naturalised; Invasive
Asteraceae	<i>Cotula australis</i>	(Spreng.) Hook.f.	LC	Indigenous
Asteraceae	<i>Crassocephalum picridifolium</i> (x)	(DC.) S.Moore		Indigenous
Crassulaceae	<i>Crassula nudicaulis</i> var. <i>nudicaulis</i>	L.		Indigenous; Endemic
Crassulaceae	<i>Crassula umbraticola</i>	N.E.Br.	LC	Indigenous; Endemic
Amaryllidaceae	<i>Crinum bulbispermum</i>	(Burm.f.) Milne-Redh. & Schweick	LC	Indigenous
Iridaceae	<i>Crocoshia paniculata</i>	(Klatt) Goldblatt	LC	Indigenous
Cucurbitaceae	<i>Cucumis hirsutus</i>	Sond.	LC	Indigenous
Araliaceae	<i>Cussonia spicata</i>	Thunb.		Indigenous



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Commelinaceae	<i>Cyanotis speciosa</i>	(L.f.) Hassk.	LC	Indigenous
Orobanchaceae	<i>Cycnium tubulosum subsp. tubulosum</i>	(L.f.) Engl.	LC	Indigenous
Poaceae	<i>Cymbopogon caesius</i>	(Hook. & Arn.) Stapf	LC	Indigenous
Poaceae	<i>Cymbopogon nardus</i>	(L.) Rendle	LC	Indigenous
Cyperaceae	<i>Cyperus albostriatus</i>	Schrad.	LC	Indigenous
Cyperaceae	<i>Cyperus keniensis</i>	Kük.	LC	Indigenous
Amaryllidaceae	<i>Cyrtanthus breviflorus</i>	Harv.	LC	Indigenous
Amaryllidaceae	<i>Cyrtanthus tuckii var. viridilobus</i>	Baker	LC	Indigenous; Endemic
Dryopteridaceae	<i>Cyrtomium luctuosum</i>	J.P.Roux		Indigenous
Aizoaceae	<i>Delosperma sp. sp.</i>			
Asteraceae	<i>Denekia capensis</i>	Thunb.	LC	Indigenous
Caryophyllaceae	<i>Dianthus mooiensis subsp. mooiensis</i>	F.N.Williams		Indigenous; Endemic
Scrophulariaceae	<i>Diclis reptans</i>	Benth.	LC	Indigenous
Scrophulariaceae	<i>Diclis rotundifolia</i>	(Hiern) Hilliard & B.L.Burt	LC	Indigenous
Iridaceae	<i>Dierama sp. sp.</i>			
Poaceae	<i>Digitaria monodactyla</i>	(Nees) Stapf	LC	Indigenous
Poaceae	<i>Digitaria ternata</i>	(A.Rich.) Stapf	LC	Indigenous
Poaceae	<i>Digitaria tricholaenoides</i>	Stapf	LC	Indigenous
Ebenaceae	<i>Diospyros lycioides subsp. guerkei lycioides subsp. guerkei</i>	Desf.		Indigenous
Ebenaceae	<i>Diospyros lycioides subsp. lycioides</i>	Desf.		Indigenous
Orchidaceae	<i>Disa stachyoides</i>	Rchb.f.	LC	Indigenous
Orchidaceae	<i>Disperis tysonii</i>	Bolus	LC	Indigenous
Fabaceae	<i>Dolichos angustifolius</i>	Eckl. & Zeyh.	LC	Indigenous
Hyacinthaceae	<i>Drimia calcarata</i>	(Baker) Stedje		Indigenous
Hyacinthaceae	<i>Drimia depressa</i>	(Baker) Jessop		Indigenous
Poaceae	<i>Echinochloa stagnina</i>	(Retz.) P.Beauv.	LC	Indigenous
Fabaceae	<i>Elephantorrhiza elephantina</i>	(Burch.) Skeels	LC	Indigenous
Poaceae	<i>Elionurus muticus</i>	(Spreng.) Kunth	LC	Indigenous
Hypoxidaceae	<i>Empodium elongatum</i>	(Nel) B.L.Burt	LC	Indigenous
Equisetaceae	<i>Equisetum ramosissimum subsp. ramosissimum</i>	Desf.	LC	Indigenous
Poaceae	<i>Eragrostis capensis</i>	(Thunb.) Trin.	LC	Indigenous
Poaceae	<i>Eragrostis chloromelas</i>	Steud.	LC	Indigenous
Poaceae	<i>Eragrostis curvula</i>	(Schrad.) Nees	LC	Indigenous
Poaceae	<i>Eragrostis gummiflua</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis heteromera</i>	Stapf	LC	Indigenous
Poaceae	<i>Eragrostis planiculmis</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis racemosa</i>	(Thunb.) Steud.	LC	Indigenous
Fabaceae	<i>Eriosema cordatum</i>	E.Mey.	LC	Indigenous
Fabaceae	<i>Eriosema kraussianum</i>	Meisn.	LC	Indigenous
Fabaceae	<i>Eriosema lucipetum</i>	C.H.Stirt.	LC	Indigenous
Fabaceae	<i>Eriosema salignum</i>	E.Mey.	LC	Indigenous
Fabaceae	<i>Eriosema sp. sp.</i>			
Ruscaceae	<i>Eriospermum cooperi var. cooperi</i>	Baker	LC	Indigenous
Fabaceae	<i>Erythrina latissima</i>	E.Mey.	LC	Indigenous
Orchidaceae	<i>Eulophia hians var. nutans</i>	Spreng.	LC	Indigenous
Orchidaceae	<i>Eulophia sp</i>			
Orchidaceae	<i>Eulophia streptopetala</i>	Lindl.	LC	Indigenous

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Euphorbiaceae	<i>Euphorbia indica</i>	Lam.	NE	Not Indigenous; Naturalised
Asteraceae	<i>Euryops transvaalensis</i> subsp. <i>setilobus transvaalensis</i>	Klatt	LC	Indigenous
Asteraceae	<i>Felicia quinquenervia</i>	(Klatt) Grau	LC	Indigenous
Poaceae	<i>Festuca caprina</i>	Nees	LC	Indigenous
Poaceae	<i>Festuca costata</i>	Nees	LC	Indigenous
Cyperaceae	<i>Fimbristylis complanata</i>	(Retz.) Link	LC	Indigenous
Cyperaceae	<i>Fimbristylis dichotoma</i>	(L.) Vahl		Indigenous
Cyperaceae	<i>Fimbristylis dichotoma</i> subsp. <i>dichotoma</i>	(L.) Vahl	LC	Indigenous
Fissidentaceae	<i>Fissidens borgenii</i>	Hampe		Indigenous
Fissidentaceae	<i>Fissidens sciophyllus</i>	Mitt.		Indigenous
Fossombroniaceae	<i>Fossombronia crispa</i>	Nees		Indigenous
Rubiaceae	<i>Galium capense</i> subsp. <i>garipense</i>	Thunb.	NE	Indigenous
Asteraceae	<i>Gazania linearis</i>	(Thunb.) Druce		Indigenous
Asteraceae	<i>Gerbera ambigua</i>	(Cass.) Sch.Bip.	LC	Indigenous
Iridaceae	<i>Gladiolus crassifolius</i>	Baker	LC	Indigenous
Iridaceae	<i>Gladiolus dalenii</i> subsp. <i>dalenii</i>	Van Geel	LC	Indigenous
Iridaceae	<i>Gladiolus permeabilis</i> subsp. <i>edulis</i>	D.Delaroche	LC	Indigenous
Iridaceae	<i>Gladiolus sericeovillosus</i> subsp. <i>sericeovillosus</i>	Hook.f.	LC	Indigenous; Endemic
Apocynaceae	<i>Gomphocarpus fruticosus</i> subsp. <i>fruticosus</i>	(L.) Aiton f.	LC	Indigenous
Orobanchaceae	<i>Graderia scabra</i>	(L.f.) Benth.	LC	Indigenous
Malvaceae	<i>Grewia hispida</i>	Harv.	LC	Indigenous; Endemic
Malvaceae	<i>Grewia occidentalis</i> var. <i>occidentalis</i>	L.	LC	Indigenous
Orchidaceae	<i>Habenaria clavata</i>	(Lindl.) Rchb.f.	LC	Indigenous
Orchidaceae	<i>Habenaria dives</i>	Rchb.f.	LC	Indigenous
Orchidaceae	<i>Habenaria epipactidea</i>	Rchb.f.	LC	Indigenous
Orchidaceae	<i>Habenaria kraenzliniana</i>	Schltr.	NT	Indigenous; Endemic
Amaryllidaceae	<i>Haemanthus humilis</i> subsp. <i>hirsutus</i>	Jacq.	LC	Indigenous
Asteraceae	<i>Haplocarpha scaposa</i>	Harv.	LC	Indigenous
Poaceae	<i>Harpochloa falx</i>	(L.f.) Kuntze	LC	Indigenous
Scrophulariaceae	<i>Hebenstretia comosa</i>	Hochst.	LC	Indigenous
Scrophulariaceae	<i>Hebenstretia</i> sp.			
Asteraceae	<i>Helichrysum aureonitens</i>	Sch.Bip.	LC	Indigenous
Asteraceae	<i>Helichrysum monticola</i>	Hilliard	LC	Indigenous
Asteraceae	<i>Helichrysum pallidum</i>	DC.	LC	Indigenous
Asteraceae	<i>Helichrysum rugulosum</i>	Less.	LC	Indigenous
Asteraceae	<i>Helichrysum setosum</i>	Harv.	LC	Indigenous
Brassicaceae	<i>Heliophila rigidiuscula</i>	Sond.	LC	Indigenous
Malvaceae	<i>Hermannia auricoma</i>	(Szyszy)K.Schum	LC	Indigenous
Malvaceae	<i>Hermannia cernua</i>	Thunb.	LC	Indigenous
Malvaceae	<i>Hermannia cristata</i>	Bolus	LC	Indigenous
Malvaceae	<i>Hermannia depressa</i>	N.E.Br.	LC	Indigenous
Malvaceae	<i>Hermannia grandistipula</i>	(Buchinger ex Hochst.) K.Schum	LC	Indigenous
Malvaceae	<i>Hermannia</i> sp.			

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Malvaceae	<i>Hermannia transvaalensis</i>	Schinz	LC	Indigenous; Endemic
Iridaceae	<i>Hesperantha coccinea</i>	(Backh. & Harv.) Goldblatt & J.C.Manning	LC	Indigenous
Apiaceae	<i>Heteromorpha arborescens var. abyssinica</i>	(Spreng.) Cham. & Schltdl.	LC	Indigenous
Malvaceae	<i>Hibiscus aethiopicus var. ovatus</i>	L.	LC	Indigenous
Asteraceae	<i>Hilliardiella aristata</i>	(DC.) H.Rob.	LC	Indigenous
Poaceae	<i>Hyparrhenia anamesa</i>	Clayton	LC	Indigenous
Poaceae	<i>Hyparrhenia dregeana</i>	(Nees) Stapf ex Stent	LC	Indigenous
Poaceae	<i>Hyparrhenia filipendula var. pilosa</i>	(Hochst.) Stapf	LC	Indigenous
Poaceae	<i>Hyparrhenia hirta</i>	(L.) Stapf	LC	Indigenous
Poaceae	<i>Hyparrhenia quarrei</i>	Robyns	LC	Indigenous
Poaceae	<i>Hyparrhenia sp.</i>			
Poaceae	<i>Hyparrhenia tamba</i>	(Steud.) Stapf	LC	Indigenous
Hypericaceae	<i>Hypericum aethiopicum subsp. sonderi</i>	Thunb.	LC	Indigenous
Hypericaceae	<i>Hypericum lalandii</i>	Choisy	LC	Indigenous
Asteraceae	<i>Hypochoeris radicata</i>	L.		Not Indigenous; Naturalised
Hypoxidaceae	<i>Hypoxis acuminata</i>	Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis angustifolia var. angustifolia</i>	Lam.	LC	Indigenous
Hypoxidaceae	<i>Hypoxis argentea var. sericea</i>	Harv. ex Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis filiformis</i>	Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis galpinii</i>	Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis hemerocallidea</i>	Fisch., C.A.Mey. & Avé-Lall.	LC	Indigenous
Hypoxidaceae	<i>Hypoxis iridifolia</i>	Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis kraussiana</i>	Buchinger	LC	Indigenous
Hypoxidaceae	<i>Hypoxis longifolia</i>	Baker	LC	Indigenous; Endemic
Hypoxidaceae	<i>Hypoxis multiceps</i>	Buchinger ex Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis obtusa</i>	Burch. ex Ker Gawl.	LC	Indigenous
Hypoxidaceae	<i>Hypoxis parvifolia</i>	Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis rigidula var. rigidula</i>	Baker	LC	Indigenous
Hypoxidaceae	<i>Hypoxis sp.</i>			
Fabaceae	<i>Indigastrum fastigiatum</i>	(E.Mey.) Schrire	LC	Indigenous
Fabaceae	<i>Indigofera evansiana</i>	Burt Davy	LC	Indigenous
Fabaceae	<i>Indigofera hedyantha</i>	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	<i>Indigofera heterantha</i>	Wall. ex Brandis	NE	Not Indigenous; Naturalised
Fabaceae	<i>Indigofera hilaris var. hilari</i>	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	<i>Indigofera sanguinea</i>	N.E.Br.	LC	Indigenous
Fabaceae	<i>Indigofera tristis</i>	E.Mey.	LC	Indigenous
Fabaceae	<i>Indigofera velutina</i>	E.Mey.	LC	Indigenous
Fabaceae	<i>Indigofera zeyheri</i>	Spreng. ex Eckl. & Zeyh.	LC	Indigenous
Convolvulaceae	<i>Ipomoea crassipes var. crassipes</i>	Hook.	LC	Indigenous
Convolvulaceae	<i>Ipomoea obscura var. obscura</i>	(L.) Ker Gawl.	LC	Indigenous
Cyperaceae	<i>Isolepis cernua var. cernua</i>	(Vahl) Roem. & Schult.	LC	Indigenous

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Cyperaceae	<i>Isolepis fluitans var. fluitans</i>	(L.) R.Br.	LC	Indigenous
Scrophulariaceae	<i>Jamesbrittenia montana</i>	(Diels) Hilliard	LC	Indigenous
Oleaceae	<i>Jasminum breviflorum</i>	Harv. ex C.H.Wright	LC	Indigenous
Juncaceae	<i>Juncus dregeanus subsp. dregeanus</i>	Kunth	LC	Indigenous
Juncaceae	<i>Juncus effusus</i>	L.	LC	Indigenous
Juncaceae	<i>Juncus oxycarpus</i>	E.Mey. ex Kunth	LC	Indigenous
Asphodelaceae	<i>Kniphofia baurii</i>	Baker	LC	Indigenous; Endemic
Asphodelaceae	<i>Kniphofia sp. sp.</i>			
Asphodelaceae	<i>Kniphofia typhoides</i>	Codd	NT	Indigenous; Endemic
Rubiaceae	<i>Kohautia amatymbica</i>	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	<i>Lablab purpureus subsp. purpureus</i>	(L.) Sweet	NE	Not Indigenous; Naturalised
Thymelaeaceae	<i>Lasiosiphon caffer</i>	Meisn.	LC	Indigenous
Thymelaeaceae	<i>Lasiosiphon kraussianus</i>	(Meisn.) Meisn.		Indigenous
Haloragaceae	<i>Laurembergia repens subsp. brachypoda</i>	(L.) P.J.Bergius	LC	Indigenous
Hyacinthaceae	<i>Ledebouria cooperi</i>	(Hook.f.) Jessop		Indigenous
Hyacinthaceae	<i>Ledebouria ovatifolia</i>	(Baker) Jessop		Indigenous; Endemic
Hyacinthaceae	<i>Ledebouria revoluta</i>	(L.f.) Jessop	LC	Indigenous
Hyacinthaceae	<i>Ledebouria sp.</i>			
Fabaceae	<i>Leobordea eriantha</i>	(Benth.) B.-E.van Wyk & Boatwr.	LC	Indigenous
Fabaceae	<i>Leobordea foliosa</i>	(Bolus) B.-E.van Wyk & Boatwr.	LC	Indigenous
Fabaceae	<i>Lessertia sp.</i>			
Scrophulariaceae	<i>Limosella longiflora</i>	Kuntze	LC	Indigenous
Linderniaceae	<i>Lindernia parviflora</i>	(Roxb.) Haines	LC	Indigenous
Lobeliaceae	<i>Lobelia flaccida subsp. mossiana</i>	(C.Presl) A.DC.	LC	Indigenous
Fabaceae	<i>Lotononis amajubica</i>	(Burt Davy) B.-E.van Wyk	LC	Indigenous; Endemic
Scrophulariaceae	<i>Manulea rhodantha subsp. aurantiaca</i>	Hilliard	LC	Indigenous; Endemic
Marchantiaceae	<i>Marchantia debilis</i>	K.I.Goebel		Indigenous
Hyacinthaceae	<i>Merwillia plumbea</i>	(Lindl.) Speta		Indigenous
Poaceae	<i>Microchloa caffra</i>	Nees	LC	Indigenous
Phrymaceae	<i>Mimulus moschatus var. moschatus</i>	Douglas	NE	Not Indigenous; Naturalised
Apocynaceae	<i>Miraglossum pulchellum</i>	(Schltr.) Kupicha	LC	Indigenous
Poaceae	<i>Miscanthus junceus</i>	(Stapf) Pilg.	LC	Indigenous
Anemiaceae	<i>Mohria vestita</i>	Baker	LC	Indigenous
Lobeliaceae	<i>Monopsis decipiens</i>	(Sond.) Thulin	LC	Indigenous
Iridaceae	<i>Moraea elliotii</i>	Baker	LC	Indigenous
Iridaceae	<i>Moraea natalensis</i>	Baker	LC	Indigenous
Boraginaceae	<i>Myosotis sylvatica</i>	Hoffm.		Not Indigenous; Naturalised
Myrsinaceae	<i>Myrsine africana</i>	L.	LC	Indigenous
Brassicaceae	<i>Nasturtium officinale</i>	R.Br.		Not Indigenous;

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				Naturalised; Invasive
Scrophulariaceae	<i>Nemesia fruticans</i>	(Thunb.) Benth.	LC	Indigenous
Scrophulariaceae	<i>Nemesia umbonata</i>	(Hiern) Hilliard & B.L.Burtt	LC	Indigenous
Orchidaceae	<i>Neobolusia tysonii</i>	(Bolus) Schltr.	LC	Indigenous
Asteraceae	<i>Nidorella anomala</i>	Steetz	LC	Indigenous; Endemic
Asteraceae	<i>Nolletia rarifolia</i>	(Turcz.) Steetz	LC	Indigenous; Endemic
Poaceae	<i>Odontelytrum abyssinicum</i>	Hack.	LC	Indigenous
Apocynaceae	<i>Orbea variegata</i>	(L.) Haw.	LC	Indigenous; Endemic
Hyacinthaceae	<i>Ornithogalum capillare</i>	J.M.Wood & M.S.Evans		Indigenous
Orchidaceae	<i>Orthochilus foliosus</i>	(Lindl.) Bytebier		Indigenous
Orchidaceae	<i>Orthochilus vinosus</i>	(McMurtry & McDonald) Bytebier		Indigenous; Endemic
Apocynaceae	<i>Pachycarpus dealbatus</i>	E.Mey.	LC	Indigenous
Rubiaceae	<i>Pachystigma thamnus</i>	Robyns	LC	Indigenous; Endemic
Poaceae	<i>Panicum natalense</i>	Hochst.	LC	Indigenous
Poaceae	<i>Paspalum dilatatum</i>	Poir.	NE	Not Indigenous; Naturalised
Poaceae	<i>Paspalum notatum</i>	Flüggé	NE	Not Indigenous; Naturalised
Poaceae	<i>Paspalum scrobiculatum</i>	L.	LC	Indigenous
Malvaceae	<i>Pavonia columella</i>	Cav.	LC	Indigenous
Fabaceae	<i>Pearsonia grandifolia</i> subsp. <i>grandifolia</i>	(Bolus) Polhill	LC	Indigenous; Endemic
Geraniaceae	<i>Pelargonium alchemilloides</i>	(L.) L'Hér.	LC	Indigenous
Geraniaceae	<i>Pelargonium bowkeri</i>	Harv.	LC	Indigenous; Endemic
Geraniaceae	<i>Pelargonium luridum</i>	(Andrews) Sweet	LC	Indigenous
Geraniaceae	<i>Pelargonium schlechteri</i>	R.Knuth		Indigenous
Pteridaceae	<i>Pellaea calomelanos</i> var. <i>calomelanos</i>	(Sw.) Link	LC	Indigenous
Polygonaceae	<i>Persicaria decipiens</i>	(R.Br.) K.L.Wilson	LC	Indigenous
Poaceae	<i>Phalaris arundinacea</i>	L.	NE	Not Indigenous; Naturalised
Bartramiaceae	<i>Philonotis falcata</i>	(Hook.) Mitt.		Indigenous
Phyllanthaceae	<i>Phyllanthus glaucophyllus</i>	Sond.	LC	Indigenous
Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>	L.	LC	Indigenous
Phyllanthaceae	<i>Phyllanthus</i> sp. sp.			
Pittosporaceae	<i>Pittosporum viridiflorum</i>	Sims	LC	Indigenous
Plagiogochilaceae	<i>Plagiogochila heterostipa</i>	Steph.		Indigenous
Lamiaceae	<i>Plectranthus hadiensis</i> var. <i>tomentosus</i>	(Forssk.) Schweinf. ex Spreng.	LC	Indigenous
Polypodiaceae	<i>Pleopeltis polypodioides</i> subsp. <i>ecklonii</i>	(L.) E.G.Andrews & Windham	LC	Indigenous
Poaceae	<i>Poa annua</i>	L.	NE	Not Indigenous; Naturalised



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Polytrichaceae	<i>Pogonatum capense</i>	(Hampe) A.Jaeger		Indigenous
Polygalaceae	<i>Polygala hottentotta</i>	C.Presl	LC	Indigenous
Polygalaceae	<i>Polygala leendertziae</i>	Burt Davy	LC	Indigenous
Molluginaceae	<i>Psammotropha mucronata</i> var. <i>mucronata</i>	(Thunb.) Fenzl	LC	Indigenous
Leskeaceae	<i>Pseudoleskeopsis claviramea</i>	(Müll.Hal.) Thér.		Indigenous
Pteridaceae	<i>Pteris cretica</i>	L.	LC	Indigenous
Cyperaceae	<i>Pycneus cooperi</i>	C.B.Clarke	LC	Indigenous
Cyperaceae	<i>Pycneus macranthus</i>	(Boeck.) C.B.Clarke	LC	Indigenous
Rubiaceae	<i>Pygmaeothamnus chamaedendrum</i> var. <i>chamaedendrum</i>	(Kuntze) Robyns	LC	Indigenous; Endemic
Ranunculaceae	<i>Ranunculus multifidus</i>	Forssk.	LC	Indigenous
Apocynaceae	<i>Raphionacme hirsuta</i>	(E.Mey.) R.A.Dyer	LC	Indigenous
Orobanchaceae	<i>Rhaphicarpa brevipedicellata</i>	O.J.Hansen	LC	Indigenous
Fabaceae	<i>Rhynchosia reptabunda</i>	N.E.Br.	LC	Indigenous
Fabaceae	<i>Rhynchosia sordida</i>	(E.Mey.) Schinz	LC	Indigenous
Fabaceae	<i>Rhynchosia woodii</i>	Schinz	LC	Indigenous
Rubiaceae	<i>Richardia brasiliensis</i>	Gomes	NE	Not Indigenous; Naturalised
Lamiaceae	<i>Rothea hirsuta</i>	(Hochst.) R.Fern.		Indigenous
Lamiaceae	<i>Rothea hirsuta</i> forma <i>triphylla</i> <i>hirsuta</i> forma <i>triphylla</i>	(Hochst.) R.Fern.		Indigenous
Acanthaceae	<i>Ruellia cordata</i>	Thunb.		Indigenous
Polygonaceae	<i>Rumex acetosella</i> subsp. <i>angiocarpus</i>	L.		Not Indigenous; Naturalised
Apiaceae	<i>Sanicula elata</i>	Buch.-Ham. ex D.Don	LC	Indigenous
Orchidaceae	<i>Satyrium longicauda</i> var. <i>longicauda</i>	Lindl.	NE	Indigenous
Orchidaceae	<i>Satyrium trinerve</i>	Lindl.	LC	Indigenous
Dipsacaceae	<i>Scabiosa columbaria</i>	L.	LC	Indigenous
Amaryllidaceae	<i>Scadoxus puniceus</i>	(L.) Friis & Nordal	LC	Indigenous
Hyacinthaceae	<i>Schizocarphus nervosus</i>	(Burch.) Van der Merwe		Indigenous
Apocynaceae	<i>Schizoglossum atropurpureum</i> subsp. <i>atropurpureum</i>	E.Mey.	LC	Indigenous
Apocynaceae	<i>Schizoglossum nitidum</i>	Schltr.	LC	Indigenous
Cyperaceae	<i>Schoenoplectus muriculatus</i>	(Kük.) Browning	LC	Indigenous
Salicaceae	<i>Scolopia zeyheri</i>	(Nees) Harv.	LC	Indigenous
Lamiaceae	<i>Scutellaria racemosa</i>	Pers.		Not Indigenous; Naturalised
Anacardiaceae	<i>Searsia dentata</i>	(Thunb.) F.A.Barkley		Indigenous
Anacardiaceae	<i>Searsia discolor</i>	(E.Mey. ex Sond.) Moffett		Indigenous
Anacardiaceae	<i>Searsia gerrardii</i>	(Harv. ex Engl.) Moffett		Indigenous
Anacardiaceae	<i>Searsia pentheri</i>	(Zahlbr.) Moffett		Indigenous
Anacardiaceae	<i>Searsia pyroides</i> var. <i>gracilis</i>	(Burch.) Moffett		Indigenous
Anacardiaceae	<i>Searsia pyroides</i> var. <i>integrifolia</i>	(Burch.) Moffett		Indigenous
Anacardiaceae	<i>Searsia pyroides</i> var. <i>pyroides</i>	(Burch.) Moffett		Indigenous
Anacardiaceae	<i>Searsia rigida</i> var. <i>dentata</i>	(Mill.) F.A.Barkley		Indigenous

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Anacardiaceae	<i>Searsia tomentosa</i>	(L.) F.A.Barkley		Indigenous
Scrophulariaceae	<i>Selago cucullata</i>	Hilliard	LC	Indigenous
Scrophulariaceae	<i>Selago densiflora</i>	Rolfe	LC	Indigenous
Asteraceae	<i>Senecio anomalochrous</i>	Hilliard	LC	Indigenous; Endemic
Asteraceae	<i>Senecio byrnensis</i>	Hilliard	LC	Indigenous; Endemic
Asteraceae	<i>Senecio consanguineus</i>	DC.	LC	Indigenous
Asteraceae	<i>Senecio erubescens</i> var. <i>crepidifolius</i>	Aiton	NE	Indigenous
Asteraceae	<i>Senecio erubescens</i> var. <i>erubescens</i>	Aiton	NE	Indigenous; Endemic
Asteraceae	<i>Senecio hieracioides</i>	DC.	LC	Indigenous
Asteraceae	<i>Senecio inaequidens</i>	DC.	LC	Indigenous
Asteraceae	<i>Senecio isatidioides</i>	E.Phillips & C.A.Sm.	LC	Indigenous
Asteraceae	<i>Senecio othonniflorus</i>	DC.	LC	Indigenous
Asteraceae	<i>Senecio parentalis</i>	Hilliard & B.L.Burt	LC	Indigenous; Endemic
Asteraceae	<i>Senecio rhomboideus</i>	Harv.	LC	Indigenous
Asteraceae	<i>Senecio subcoriaceus</i>	Schltr.	LC	Indigenous
Fabaceae	<i>Senegalia caffra</i>	(Thunb.) P.J.H.Hurter & Mabb.	LC	Indigenous
Poaceae	<i>Setaria incrassata</i>	(Hochst.) Hack.	LC	Indigenous
Poaceae	<i>Setaria nigrirostris</i>	(Nees) T.Durand & Schinz	LC	Indigenous
Poaceae	<i>Setaria pumila</i>	(Poir.) Roem. & Schult.	LC	Indigenous
Poaceae	<i>Setaria sphacelata</i> var. <i>torta</i>	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
Caryophyllaceae	<i>Silene burchellii</i> subsp. <i>modesta</i>	Othth		Indigenous
Caryophyllaceae	<i>Silene undulata</i>	Aiton		Indigenous
Brassicaceae	<i>Sisymbrium capense</i>	Thunb.	LC	Indigenous
Brassicaceae	<i>Sisymbrium turczaninowii</i>	Sond.	LC	Indigenous
Apocynaceae	<i>Sisyranthus barbatus</i>	(Turcz.) N.E.Br.	LC	Indigenous; Endemic
Solanaceae	<i>Solanum lichtensteinii</i>	Willd.	LC	Indigenous
Rubiaceae	<i>Spermacoce senensis</i>	(Klotzsch) Hiern	LC	Indigenous
Poaceae	<i>Sporobolus africanus</i>	(Poir.) Robyns & Tournay	LC	Indigenous
Poaceae	<i>Sporobolus fimbriatus</i>	(Trin.) Nees	LC	Indigenous
Poaceae	<i>Sporobolus pyramidalis</i>	P.Beauv.	LC	Indigenous
Poaceae	<i>Sporobolus sanguineus</i>	Rendle	LC	Indigenous
Lamiaceae	<i>Stachys erectiuscula</i>	Gürke	LC	Indigenous; Endemic
Lamiaceae	<i>Stachys hyssopoides</i>	Burch. ex Benth.	LC	Indigenous
Lamiaceae	<i>Stachys sessilis</i>	Gürke	LC	Indigenous
Apocynaceae	<i>Stenostelma umbelluliferum</i>	(Schltr.) Bester & Nicholas	NT	Indigenous; Endemic
Poaceae	<i>Stiburus conrathii</i>	Hack.	LC	Indigenous
Gesneriaceae	<i>Streptocarpus gardenii</i>	Hook.	LC	Indigenous; Endemic
Gesneriaceae	<i>Streptocarpus pusillus</i>	Harv. ex C.B.Clarke	LC	Indigenous
Orobanchaceae	<i>Striga bilabiata</i> subsp. <i>bilabiata</i>	(Thunb.) Kuntze	LC	Indigenous
Orobanchaceae	<i>Striga gesnerioides</i>	(Willd.) Vatke	LC	Indigenous

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Lamiaceae	<i>Syncolostemon concinnus</i>	N.E.Br.	LC	Indigenous
Lamiaceae	<i>Syncolostemon pretoriae</i>	(Gürke) D.F.Otieno	LC	Indigenous
Asteraceae	<i>Tagetes minuta</i>	L.		Not Indigenous; Naturalised; Invasive
Fabaceae	<i>Tephrosia capensis var. capensis</i>	(Jacq.) Pers.	LC	Indigenous
Fabaceae	<i>Tephrosia semiglabra</i>	Sond.	LC	Indigenous
Santalaceae	<i>Thesium pallidum</i>	A.DC.	LC	Indigenous
Asphodelaceae	<i>Trachyandra asperata var. nataglencoensis</i>	Kunth	LC	Indigenous
Poaceae	<i>Tristachya leucothrix</i>	Trin. ex Nees	LC	Indigenous
Asteraceae	<i>Troglophyton capillaceum subsp. capillaceum</i>	(Thunb.) Hilliard & B.L.Burt	LC	Indigenous
Typhaceae	<i>Typha capensis</i>	(Rohrb.) N.E.Br.		Indigenous
Poaceae	<i>Urelytrum agropyroides</i>	(Hack.) Hack.	LC	Indigenous
Fabaceae	<i>Vachellia sieberiana var. woodii</i>	(DC.) Kyal. & Boatwr.	LC	Indigenous
Verbenaceae	<i>Verbena bonariensis</i>	L.		Not Indigenous; Naturalised; Invasive
Verbenaceae	<i>Verbena officinalis</i>	L.		Not Indigenous; Naturalised
Fabaceae	<i>Vigna luteola var. luteola</i>	(Jacq.) Benth.	LC	Indigenous
Campanulaceae	<i>Wahlenbergia appressifolia</i>	Hilliard & B.L.Burt	LC	Indigenous
Campanulaceae	<i>Wahlenbergia undulata</i>	(L.f.) A.DC.	LC	Indigenous
Xyridaceae	<i>Xyris capensis</i>	Thunb.		Indigenous
Apocynaceae	<i>Xysmalobium parviflorum</i>	Harv. ex Scott-Elliot	LC	Indigenous
Apocynaceae	<i>Xysmalobium undulatum var. undulatum</i>	(L.) Aiton f.	LC	Indigenous
Araceae	<i>Zantedeschia albomaculata subsp. macrocarpa</i>	(Hook.) Baill.	LC	Indigenous
Araceae	<i>Zantedeschia rehmannii</i>	Engl.	LC	Indigenous

## APPENDIX B: Avifaunal species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	Unlisted	LC
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Acrocephalus arundinaceus</i>	Reed-warbler, Great	Unlisted	LC
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	Unlisted	LC
<i>Acrocephalus schoenobaenus</i>	Warbler, Sedge	Unlisted	LC
<i>Actitis hypoleucos</i>	Sandpiper, Common	Unlisted	LC
<i>Actophilornis africanus</i>	Jacana, African	Unlisted	LC
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Alcedo cristata</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	Unlisted	LC
<i>Amadina erythrocephala</i>	Finch, Red-headed	Unlisted	LC
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	Unlisted
<i>Amaurornis flavirostris</i>	Crake, Black	Unlisted	LC
<i>Amblyospiza albifrons</i>	Weaver, Thick-billed	Unlisted	LC
<i>Anas capensis</i>	Teal, Cape	Unlisted	LC
<i>Anas erythrorhyncha</i>	Teal, Red-billed	Unlisted	LC
<i>Anas hottentota</i>	Teal, Hottentot	Unlisted	LC
<i>Anas platyrhynchos</i>	Duck, Mallard	Unlisted	LC
<i>Anas smithii</i>	Shoveler, Cape	Unlisted	LC
<i>Anas sparsa</i>	Duck, African Black	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Anastomus lamelligerus</i>	Openbill, African	Unlisted	LC
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Anser anser</i>	Goose, Domestic	Unlisted	LC
<i>Anthropoides paradiseus</i>	Crane, Blue	NT	VU
<i>Anthus cinnamomeus</i>	Pipit, African	Unlisted	LC
<i>Anthus crenatus</i>	Pipit, African Rock	NT	LC
<i>Anthus leucophrys</i>	Pipit, Plain-backed	Unlisted	LC
<i>Anthus similis</i>	Pipit, Long-billed	Unlisted	LC
<i>Anthus vaalensis</i>	Pipit, Buffy	Unlisted	LC
<i>Apalis thoracica</i>	Apalis, Bar-throated	Unlisted	LC
<i>Apaloderma narina</i>	Trogon, Narina	Unlisted	LC
<i>Apus affinis</i>	Swift, Little	Unlisted	LC
<i>Apus apus</i>	Swift, Common	Unlisted	LC
<i>Apus barbatus</i>	Swift, African Black	Unlisted	LC
<i>Apus caffer</i>	Swift, White-rumped	Unlisted	LC
<i>Apus horus</i>	Swift, Horus	Unlisted	LC
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC
<i>Aquila wahlbergi</i>	Eagle, Wahlberg's	Unlisted	LC

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<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Ardea goliath</i>	Heron, Goliath	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Ardeola ralloides</i>	Heron, Squacco	Unlisted	LC
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Balearica regulorum</i>	Crane, Grey Crowned	<b>EN</b>	<b>EN</b>
<i>Batis capensis</i>	Batis, Cape	Unlisted	LC
<i>Batis molitor</i>	Batis, Chinspot	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Bradypterus baboecala</i>	Rush-warbler, Little	Unlisted	LC
<i>Bubo africanus</i>	Eagle-owl, Spotted	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Bucorvus leadbeateri</i>	Ground-hornbill, Southern	<b>EN</b>	<b>VU</b>
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Buteo rufofuscus</i>	Buzzard, Jackal	Unlisted	LC
<i>Buteo vulpinus</i>	Buzzard, Steppe	Unlisted	Unlisted
<i>Calandrella cinerea</i>	Lark, Red-capped	Unlisted	LC
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC	<b>NT</b>
<i>Calidris minuta</i>	Stint, Little	LC	LC
<i>Campephaga flava</i>	Cuckoo-shrike, Black	Unlisted	LC
<i>Campethera abingoni</i>	Woodpecker, Golden-tailed	Unlisted	LC
<i>Caprimulgus europaeus</i>	Nightjar, European	Unlisted	LC
<i>Caprimulgus pectoralis</i>	Nightjar, Fiery-necked	Unlisted	LC
<i>Cercomela familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	Unlisted	LC
<i>Certhilauda semitorquata</i>	Lark, Eastern Long-billed	Unlisted	LC
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	Unlisted	LC
<i>Charadrius hiaticula</i>	Plover, Common Ringed	Unlisted	LC
<i>Charadrius pecuarius</i>	Plover, Kittlitz's	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Chersomanes albofasciata</i>	Lark, Spike-heeled	Unlisted	LC
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC
<i>Chlorocichla flaviventris</i>	Greenbul, Yellow-bellied	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC
<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	Unlisted	LC
<i>Ciconia ciconia</i>	Stork, White	Unlisted	LC
<i>Ciconia nigra</i>	Stork, Black	<b>VU</b>	LC
<i>Cinnyricinclus leucogaster</i>	Starling, Violet-backed	Unlisted	LC
<i>Cinnyris afer</i>	Sunbird, Greater Double-collared	Unlisted	LC
<i>Cinnyris chalybeus</i>	Sunbird, Southern Double-collared	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC



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<i>Circaetus cinereus</i>	Snake-eagle, Brown	Unlisted	LC
<i>Circaetus pectoralis</i>	Snake-eagle, Black-chested	Unlisted	LC
<i>Circus maurus</i>	Harrier, Black	EN	VU
<i>Circus ranivorus</i>	Marsh-harrier, African	EN	LC
<i>Cisticola aberrans</i>	Cisticola, Lazy	Unlisted	LC
<i>Cisticola aridulus</i>	Cisticola, Desert	Unlisted	LC
<i>Cisticola ayresii</i>	Cisticola, Wing-snapping	Unlisted	LC
<i>Cisticola cinnamomeus</i>	Cisticola, Pale-crowned	Unlisted	LC
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	Unlisted	LC
<i>Cisticola juncidis</i>	Cisticola, Zitting	Unlisted	LC
<i>Cisticola lais</i>	Cisticola, Wailing	Unlisted	LC
<i>Cisticola natalensis</i>	Cisticola, Croaking	Unlisted	LC
<i>Cisticola textrix</i>	Cisticola, Cloud	Unlisted	LC
<i>Cisticola tinniens</i>	Cisticola, Levallant's	Unlisted	LC
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	Unlisted	LC
<i>Clamator levallantii</i>	Cuckoo, Levallant's	Unlisted	LC
<i>Coccyzygia melanotis</i>	Waxbill, Sweet	Unlisted	LC
<i>Colius striatus</i>	Mousebird, Speckled	Unlisted	LC
<i>Columba arquatrix</i>	Olive-pigeon, African	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Columba livia</i>	Dove, Rock	Unlisted	LC
<i>Coracias garrulus</i>	Roller, European	NT	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC
<i>Cossypha dichroa</i>	Robin-Chat, Chorister	Unlisted	LC
<i>Coturnix coturnix</i>	Quail, Common	Unlisted	LC
<i>Creatophora cinerea</i>	Starling, Wattled	Unlisted	LC
<i>Crecopsis egregia</i>	Crake, African	Unlisted	LC
<i>Crithagra atrogularis</i>	Canary, Black-throated	Unlisted	LC
<i>Crithagra gularis</i>	Seedeater, Streaky-headed	Unlisted	LC
<i>Crithagra mozambicus</i>	Canary, Yellow-fronted	Unlisted	LC
<i>Crithagra scotops</i>	Canary, Forest	Unlisted	LC
<i>Crithagra sulphurata</i>	Canary, Brimstone	Unlisted	Unlisted
<i>Cuculus canorus</i>	Cuckoo, Common	Unlisted	LC
<i>Cuculus clamosus</i>	Cuckoo, Black	Unlisted	LC
<i>Cuculus gularis</i>	Cuckoo, African	Unlisted	LC
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	Unlisted	LC
<i>Cursorius temminckii</i>	Courser, Temminck's	Unlisted	LC
<i>Cypsiurus parvus</i>	Palm-swift, African	Unlisted	LC
<i>Delichon urbicum</i>	House-martin, Common	Unlisted	LC
<i>Dendrocygna bicolor</i>	Duck, Fulvous	Unlisted	LC
<i>Dendrocygna viduata</i>	Duck, White-faced Whistling	Unlisted	LC
<i>Dendropicos fuscescens</i>	Woodpecker, Cardinal	Unlisted	LC
<i>Dendropicos griseocephalus</i>	Woodpecker, Olive	Unlisted	LC

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<i>Dendropicos namaquus</i>	Woodpecker, Bearded	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC
<i>Dryoscopus cubla</i>	Puffback, Black-backed	Unlisted	LC
<i>Egretta alba</i>	Egret, Great	Unlisted	LC
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC
<i>Egretta intermedia</i>	Egret, Yellow-billed	Unlisted	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Emberiza capensis</i>	Bunting, Cape	Unlisted	LC
<i>Emberiza flaviventris</i>	Bunting, Golden-breasted	Unlisted	LC
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	Unlisted	LC
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC
<i>Euplectes albonotatus</i>	Widowbird, White-winged	Unlisted	LC
<i>Euplectes ardens</i>	Widowbird, Red-collared	Unlisted	LC
<i>Euplectes axillaris</i>	Widowbird, Fan-tailed	Unlisted	LC
<i>Euplectes capensis</i>	Bishop, Yellow	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Eupodotis caerulescens</i>	Korhaan, Blue	LC	NT
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	VU	LC
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC
<i>Falco naumanni</i>	Kestrel, Lesser	Unlisted	LC
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	LC
<i>Falco vespertinus</i>	Falcon, Red-footed	NT	NT
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Gallinago nigripennis</i>	Snipe, African	Unlisted	LC
<i>Gallinula chloropus</i>	Moorhen, Common	Unlisted	LC
<i>Geocolaptes olivaceus</i>	Woodpecker, Ground	Unlisted	NT
<i>Geronticus calvus</i>	Ibis, Southern Bald	VU	VU
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	Unlisted	LC
<i>Haliaeetus vocifer</i>	Fish-eagle, African	Unlisted	LC
<i>Himantopus himantopus</i>	Stilt, Black-winged	Unlisted	LC
<i>Hirundo abyssinica</i>	Swallow, Lesser Striped	Unlisted	LC
<i>Hirundo albigularis</i>	Swallow, White-throated	Unlisted	LC
<i>Hirundo cucullata</i>	Swallow, Greater Striped	Unlisted	LC
<i>Hirundo fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Hirundo rustica</i>	Swallow, Barn	Unlisted	LC
<i>Hirundo semirufa</i>	Swallow, Red-breasted	Unlisted	LC
<i>Hirundo smithii</i>	Swallow, Wire-tailed	Unlisted	LC
<i>Indicator indicator</i>	Honeyguide, Greater	Unlisted	LC
<i>Indicator minor</i>	Honeyguide, Lesser	Unlisted	LC
<i>Ispidina picta</i>	Pygmy-Kingfisher, African	Unlisted	LC

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<i>Jynx ruficollis</i>	Wryneck, Red-throated	Unlisted	LC
<i>Lagonosticta rubricata</i>	Firefinch, African	Unlisted	Unlisted
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Laniarius ferrugineus</i>	Boubou, Southern	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lanius collurio</i>	Shrike, Red-backed	Unlisted	LC
<i>Lanius minor</i>	Shrike, Lesser Grey	Unlisted	LC
<i>Larus cirrocephalus</i>	Gull, Grey-headed	Unlisted	LC
<i>Lioptilus nigricapillus</i>	Blackcap, Bush	VU	NT
<i>Lissotis melanogaster</i>	Bustard, Black-bellied	Unlisted	LC
<i>Lonchura cucullata</i>	Mannikin, Bronze	Unlisted	LC
<i>Lophaetus occipitalis</i>	Eagle, Long-crested	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Megaceryle maximus</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Melaenornis pammelaina</i>	Flycatcher, Southern Black	Unlisted	LC
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC
<i>Merops pusillus</i>	Bee-eater, Little	Unlisted	LC
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Milvus migrans</i>	Kite, Black	Unlisted	LC
<i>Mirafra africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Mirafra fasciolata</i>	Lark, Eastern Clapper	Unlisted	LC
<i>Monticola explorator</i>	Rock-thrush, Sentinel	Unlisted	LC
<i>Monticola rupestris</i>	Rock-thrush, Cape	Unlisted	LC
<i>Motacilla aguimp</i>	Wagtail, African Pied	Unlisted	LC
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Muscicapa adusta</i>	Flycatcher, African Dusky	Unlisted	LC
<i>Muscicapa striata</i>	Flycatcher, Spotted	Unlisted	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC
<i>Nectarinia famosa</i>	Sunbird, Malachite	Unlisted	LC
<i>Neotis denhami</i>	Bustard, Denham's	VU	NT
<i>Netta erythrophthalma</i>	Pochard, Southern	Unlisted	LC
<i>Nilaus afer</i>	Brubru, Brubru	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC
<i>Oenanthe bifasciata</i>	Chat, Buff-streaked	Unlisted	LC
<i>Oenanthe monticola</i>	Wheatear, Mountain	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Oriolus larvatus</i>	Oriole, Black-headed	Unlisted	LC
<i>Ortygospiza atricollis</i>	Quailfinch, African	Unlisted	LC
<i>Pandion haliaetus</i>	Osprey, Osprey	Unlisted	LC
<i>Parus niger</i>	Tit, Southern Black	Unlisted	Unlisted
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	Unlisted	LC

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<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Pavo cristatus</i>	Peacock, Common	Unlisted	LC
<i>Petronia superciliaris</i>	Petronia, Yellow-throated	Unlisted	LC
<i>Phalacrocorax africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Phalacrocorax capensis</i>	Cormorant, Cape	EN	EN
<i>Philomachus pugnax</i>	Ruff	Unlisted	LC
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT
<i>Phoenicopterus ruber</i>	Flamingo, Greater	NT	LC
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC
<i>Phyllastrephus terrestris</i>	Brownbul, Terrestrial	Unlisted	LC
<i>Phylloscopus ruficapilla</i>	Warbler, Yellow-throated Woodland	Unlisted	LC
<i>Phylloscopus trochilus</i>	Warbler, Willow	Unlisted	LC
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Ploceus capensis</i>	Weaver, Cape	Unlisted	LC
<i>Ploceus cucullatus</i>	Weaver, Village	Unlisted	LC
<i>Ploceus ocularis</i>	Weaver, Spectacled	Unlisted	LC
<i>Ploceus velatus</i>	Southern Masked-weaver, Southern	Unlisted	LC
<i>Porphyrio madagascariensis</i>	Swamphen, African (Purple)	Unlisted	Unlisted
<i>Prinia hypoxantha</i>	Prinia, Drakensberg	Unlisted	LC
<i>Prinia maculosa</i>	Prinia, Karoo	Unlisted	LC
<i>Prinia subflava</i>	Prinia, Tawny-flanked	Unlisted	LC
<i>Prodotiscus regulus</i>	Honeybird, Brown-backed	Unlisted	LC
<i>Psalidoprocne holomelaena</i>	Saw-wing, Black (Southern race)	Unlisted	Unlisted
<i>Psophocichla litsipsirupa</i>	Thrush, Groundscraper	Unlisted	Unlisted
<i>Pternistis afer</i>	Spurfowl, Red-necked	Unlisted	LC
<i>Pternistis natalensis</i>	Spurfowl, Natal	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Recurvirostra avosetta</i>	Avocet, Pied	Unlisted	LC
<i>Rhinopomastus cyanomelas</i>	Scimitarbill, Common	Unlisted	LC
<i>Rhinoptilus chalcopterus</i>	Courser, Bronze-winged	Unlisted	LC
<i>Riparia cincta</i>	Martin, Banded	Unlisted	LC
<i>Riparia paludicola</i>	Martin, Brown-throated	Unlisted	LC
<i>Riparia riparia</i>	Martin, Sand	Unlisted	LC
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU
<i>Sarkidiornis melanotos</i>	Duck, Comb	Unlisted	LC
<i>Sarothrura rufa</i>	Flufftail, Red-chested	Unlisted	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Scleroptila afra</i>	Francolin, Grey-winged	Unlisted	LC

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<i>Scleroptila levaillantii</i>	Francolin, Red-winged	Unlisted	LC
<i>Scleroptila shelleyi</i>	Francolin, Shelley's	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop, Hamerkop	Unlisted	LC
<i>Serinus canicollis</i>	Canary, Cape	Unlisted	LC
<i>Sigelus silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Sphenoeacus afer</i>	Grassbird, Cape	Unlisted	LC
<i>Spizocorys conirostris</i>	Lark, Pink-billed	Unlisted	LC
<i>Spreo bicolor</i>	Starling, Pied	Unlisted	LC
<i>Stenostira scita</i>	Flycatcher, Fairy	Unlisted	LC
<i>Stephanoaetus coronatus</i>	Eagle, African Crowned	VU	NT
<i>Sterna caspia</i>	Tern, Caspian	VU	LC
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Struthio camelus</i>	Ostrich, Common	Unlisted	LC
<i>Sylvietta rufescens</i>	Crombec, Long-billed	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Tachymarptis melba</i>	Swift, Alpine	Unlisted	LC
<i>Tadorna cana</i>	Shelduck, South African	Unlisted	LC
<i>Tchagra senegalus</i>	Tchagra, Black-crowned	Unlisted	LC
<i>Telophorus olivaceus</i>	Bush-shrike, Olive	Unlisted	LC
<i>Telophorus sulfureopectus</i>	Bush-shrike, Orange-breasted	Unlisted	LC
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	Unlisted	LC
<i>Thamnolaea cinnamomeiventris</i>	Cliff-chat, Mocking	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	Unlisted	LC
<i>Tringa glareola</i>	Sandpiper, Wood	Unlisted	LC
<i>Tringa nebularia</i>	Greenshank, Common	Unlisted	LC
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	Unlisted	LC
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	Unlisted	LC
<i>Turdus libonyanus</i>	Thrush, Kurrichane	Unlisted	Unlisted
<i>Turdus olivaceus</i>	Thrush, Olive	Unlisted	LC
<i>Turdus smithi</i>	Thrush, Karoo	Unlisted	LC
<i>Turnix sylvaticus</i>	Buttonquail, Kurrichane	Unlisted	LC
<i>Tyto alba</i>	Owl, Barn	Unlisted	LC
<i>Tyto capensis</i>	Grass-owl, African	VU	LC
<i>Upupa africana</i>	Hoopoe, African	Unlisted	LC
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC
<i>Vanellus melanopterus</i>	Lapwing, Black-winged	Unlisted	LC



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<i>Vanellus senegallus</i>	Lapwing, African Wattled	Unlisted	LC
<i>Vidua funerea</i>	Indigobird, Dusky	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC
<i>Zosterops pallidus</i>	White-eye, Orange River	Unlisted	LC
<i>Zosterops virens</i>	White-eye, Cape	Unlisted	LC

## APPENDIX C: Mammals species expected to occur in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Aethomys ineptus</i>	Tete Veld Rat	LC	LC
<i>Aethomys namaquensis</i>	Namaqua rock rat	LC	LC
<i>Alcelaphus buselaphus</i>	Hartebeest	LC	LC
<i>Amblysomus hottentotus</i>	Hottentot's Golden Mole	LC	LC
<i>Antidorcas marsupialis</i>	Sclater's Shrew	LC	LC
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT
<i>Atilax paludinosus</i>	Water Mongoose	LC	LC
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Caracal caracal</i>	Caracal	LC	LC
<i>Ceratotherium simum</i>	White Rhinoceros	NT	NT
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC	LC
<i>Connochaetes gnou</i>	Black Wildebeest	LC	LC
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew	LC	LC
<i>Crocidura maquassiensis</i>	Makwassie musk shrew	VU	LC
<i>Cryptomys hottentotus</i>	Common Mole-rat	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC
<i>Damaliscus pygargus</i>	Blesbok	LC	LC
<i>Dendromus melanotis</i>	Grey Climbing Mouse	LC	LC
<i>Dendromus mystacalis</i>	Chestnut Climbing Mouse	LC	LC
<i>Diceros bicornis</i>	Black Rhinoceros	EN	CR
<i>Eidolon helvum</i>	African Straw-colored Fruit Bat	LC	NT
<i>Elephantulus myurus</i>	Eastern Rock Sengi	LC	LC
<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	LC	LC
<i>Equus quagga</i>	Plains Zebra	LC	NT
<i>Felis nigripes</i>	Black-footed Cat	VU	VU
<i>Felis silvestris</i>	African Wildcat	LC	LC
<i>Genetta genetta</i>	Small-spotted Genet	LC	LC
<i>Gerbilliscus brantsii</i>	Highveld Gerbil	LC	LC
<i>Graphiurus murinus</i>	Woodland Dormouse	LC	LC
<i>Graphiurus rupicola</i>	Stone Dormouse	NT	LC
<i>Herpestes pulverulentus</i>	Cape Grey Mongoose	LC	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	VU	NT
<i>Hystrix africae australis</i>	Cape Porcupine	LC	LC
<i>Ichneumia albicauda</i>	White-tailed Mongoose	LC	LC
<i>Ictonyx striatus</i>	Striped Polecat	LC	LC
<i>Kerivoula lanosa</i>	Lesser Woolly Bat	LC	LC
<i>Lemniscomys rosalia</i>	Single-striped Mouse	LC	LC
<i>Leptailurus serval</i>	Serval	NT	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC

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<i>Lepus victoriae</i>	African Savanna Hare	LC	LC
<i>Mastomys natalensis</i>	Natal Multimammate Mouse	LC	LC
<i>Mellivora capensis</i>	Honey Badger	LC	LC
<i>Mus musculus</i>	House Mouse	Unlisted	LC
<i>Myosorex varius</i>	Forest Shrew	LC	LC
<i>Myotis welwitschii</i>	Welwitsch's Hairy Bat	LC	LC
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN
<i>Neoromicia capensis</i>	Cape Serotine Bat	LC	LC
<i>Neoromicia zuluensis</i>	Aloe Bat	LC	LC
<i>Oreotragus oreotragus</i>	Klipspringer	LC	LC
<i>Orycteropus afer</i>	Aardvark	LC	LC
<i>Otomys angoniensis</i>	Angoni Vlei Rat	LC	LC
<i>Otomys irroratus</i>	Vlei Rat (Fynbos type)	LC	LC
<i>Otomys sloggetti</i>	Sloggett's Rat	LC	LC
<i>Ourebia ourebi</i>	Oribi	EN	LC
<i>Panthera pardus</i>	Leopard	VU	VU
<i>Papio ursinus</i>	Chacma Baboon	LC	LC
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT
<i>Pelea capreolus</i>	Grey Rhebok	NT	LC
<i>Pipistrellus anchietae</i>	Anchieta's Bat	LC	LC
<i>Poecilogle albinucha</i>	African Striped Weasel	NT	LC
<i>Procavia capensis</i>	Rock Hyrax	LC	LC
<i>Pronolagus crassicaudatus</i>	Natal Red Rock Rabbit	LC	LC
<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Rabbit	LC	LC
<i>Proteles cristata</i>	Aardwolf	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Rattus rattus</i>	House Rat	Exotic (Not listed)	LC
<i>Redunca arundinum</i>	Southern Reedbuck	LC	LC
<i>Redunca fulvorufula</i>	Mountain Reedbuck	EN	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	LC	LC
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	LC	LC
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	LC
<i>Rhinolophus simulator</i>	Bushveld Horseshoe Bat	LC	LC
<i>Rhinolophus swinnyi</i>	Swinny's horseshoe bat	VU	LC
<i>Scotophilus dinganii</i>	Yellow House Bat	LC	LC
<i>Steatomys krebsii</i>	Krebs's Fat Mouse	LC	LC
<i>Steatomys pratensis</i>	Fat Mouse	LC	LC
<i>Suncus varilla</i>	Lesser Dwarf Shrew	LC	LC
<i>Suricata suricatta</i>	Suricate	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC
<i>Syncerus caffer</i>	African Buffalo	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	LC
<i>Tragelaphus oryx</i>	Eland	LC	LC
<i>Tragelaphus scriptus</i>	Cape Bushbuck	LC	LC

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<i>Vulpes chama</i>	Cape Fox	LC	LC
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## APPENDIX D: Reptile species expected to occur within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Bradypodion dracomontanum</i>	Amatola Flat Gecko	LC	LC
<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	LC	LC
<i>Agama aculeata distantii</i>	Distant's Ground Agama	LC	LC
<i>Agama atra</i>	Southern Rock Agama	LC	LC
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC	LC
<i>Bitis arietans arietans</i>	Puff Adder	LC	Unlisted
<i>Boaedon capensis</i>	Brown House Snake	LC	LC
<i>Bradypodion dracomontanum</i>	Drakensberg Dwarf Chameleon	NT	NT
<i>Causus rhombeatus</i>	Rhombic Night Adder	LC	LC
<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC	LC
<i>Cordylus vittifer</i>	Common Girdled Lizard	LC	LC
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC	Unlisted
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC
<i>Dendroaspis polylepis</i>	Black Mamba	LC	LC
<i>Duberria lutrix lutrix</i>	South African Slug-eater	LC	LC
<i>Elapsoidea sundevallii sundevallii</i>	Sundevall's Garter Snake	LC	Unlisted
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC	Unlisted
<i>Hemachatus haemachatus</i>	Rinkhals	LC	LC
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	LC	Unlisted
<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	LC	LC
<i>Lamprophis aurora</i>	Aurora House Snake	LC	LC
<i>Lamprophis fuscus</i>	Yellow-bellied House Snake	LC	LC
<i>Leptotyphlops scutifrons scutifrons</i>	Peters' Thread Snake	LC	Unlisted
<i>Lycodonomorphus inornatus</i>	Olive House Snake	LC	LC
<i>Lycodonomorphus laevisissimus</i>	Dusky-bellied Water Snake	LC	LC
<i>Nucras lalandii</i>	Delalande's Sandveld Lizard	LC	LC
<i>Pachydactylus vansoni</i>	VAN Son's Gecko	LC	LC
<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	LC	LC
<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	LC	Unlisted
<i>Philothamnus natalensis occidentalis</i>	Western Natal Green Snake	LC	Unlisted
<i>Prosymna ambigua</i>	Angolan Shovel-snout	Unlisted	LC
<i>Psammophylax rhombeatus rhombeatus</i>	Spotted Grass Snake	LC	Unlisted
<i>Psammophylax tritaeniatus</i>	Striped Skaapsteker	LC	LC
<i>Pseudaspis cana</i>	Mole Snake	LC	Unlisted
<i>Pseudocordylus melanotus melanotus</i>	Common Crag Lizard	LC	LC
<i>Trachylepis capensis</i>	Cape Skink	LC	Unlisted
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC	LC
<i>Trachylepis varia</i>	Variable Skink	LC	LC
<i>Varanus niloticus</i>	Water Monitor	LC	Unlisted



APPENDIX E: *Amphibian species expected to occur within the project area*

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Amietia angolensis</i>	Angola river Frog	LC	LC
<i>Amietia delalandii</i>	Delalande's River Frog	LC	LC
<i>Amietia fuscigula</i>	Cape River Frog	LC	LC
<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC	LC
<i>Breviceps mossambicus</i>	Mozambique Rain Frog	LC	LC
<i>Breviceps verrucosus</i>	Plaintive Rain Frog	LC	LC
<i>Cacosternum boettgeri</i>	Boettger's Dainty frog	LC	LC
<i>Cacosternum nanum parvum</i>	Mountain Caco	LC	LC
<i>Hadromophryne natalensis</i>	Natal Ghost Frog	LC	LC
<i>Hemismus guttatus</i>	Spotted Shovel-nosed Frog	VU	VU
<i>Hyperolius marmoratus</i>	Painted Reed Frog	LC	LC
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC	LC
<i>Ptychadena anchietae</i>	Plain Grass Frog	LC	LC
<i>Ptychadena oxyrhynchus</i>	Sharpnosed Grass Frog	LC	LC
<i>Ptychadena porosissima</i>	Striped Grass Frog	LC	LC
<i>Schismaderma carens</i>	African Red toad	LC	LC
<i>Sclerophrys capensis</i>	Raucous Toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC
<i>Semnodactylus wealii</i>	Rattling Frog	LC	LC
<i>Strongylopus fasciatus</i>	Striped Stream Frog	LC	LC
<i>Strongylopus grayii</i>	Clicking Stream Frog	LC	LC
<i>Strongylopus wageri</i>	Plain Stream Frog	NT	LC
<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC	LC
<i>Tomopterna krugerensis</i>	Knocking Sand Frog	LC	LC
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's sand frog	LC	LC
<i>Vandijkophrynus garipeensis</i>	Karoo Toad	Not listed	Not listed
<i>Xenopus laevis</i>	Common Platanna	LC	LC