BIODIVERSITY BASELINE & IMPACT ASSESSMENT FOR THE VOSLOORUS FILLING PLANT

Vosloorus, Gauteng

November 2019

CLIENT

Prepared by:

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Report Name	**BIODIVERSITY BASELINE & IMPACT ASSESSMENT FOR THE VOSLOORUS FILLING PLANT**
Submitted to	wsp
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	Martinus Erasmus (Cand Sci Nat) obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting environmental assessments and assisting specialists in field during his studies since 2015.
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	Lindi Steyn has a PhD in Biodiversity and Conservation from the University of Johannesburg. She specialises in avifauna and has worked in this specialisation since 2013.
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	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 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.

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 in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

December 2019

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1 Introduction

The Biodiversity Company (TBC) was appointed to conduct a biodiversity baseline and impact assessment for the proposed Vosloorus Filling Plant. The plant will be commissioned in four stages during which the following operational activities will be undertaken (WSP, 2019):

Phase 1: Filling Plant

"The operation of a filling plant within which various chemicals will be decanted from bulk tankers to smaller package sizes that will be distributed to various markets. No manufacturing will be undertaken during this phase. Chemicals to be decanted in the filling plant include:

- Water Purification Chemicals: (Hydrochloric Acid; Sulphuric Acid; Sodium Hypochlorite; Caustic Soda; Ferric Chloride; Sodium Chlorite Liquid and Sodium Metabisulphite);
- Nitric Acid;
- Formalin;
- SLES70%;
- Sulphonic Acid (LABSA);
- Soda Ash;
- Potassium Hydroxide Liquid; and
- Phosphoric Acid.

It is estimated that at full filling production, the plant will have a maximum of 2000MT – 2500MT combined storage capacity of all bulk tanks and small tanks

Phase 2: Acid Regeneration Plant

Phase 2 will include the reprocessing of waste Hydrochloric Acid into Ferric Chloride and a small portion of Calcium Chloride at the acid regeneration plant. The process is a simple one of routing the spent Hydrochloric Acid with a high Iron content through an Iron Exchange, and an evaporating process (with the use of a paraffin fuelled boiler) to get the Ferric Chloride produced from about 30% to 42%. No waste is expected to be generated or disposed of from the operation.

Phase 3: Manufacturing of Caustic Soda

During phase 3 Caustic Soda Flakes will be generated from Caustic Soda Lye in a dry evaporation process/drying process that uses about 50% to 99% of the Caustic Lye. Approximately 50-60MT of caustic lye will be used to produce an estimated 25MT dry tons of caustic soda per day

Phase 4: Solvent Filling Plant

This phase will also include decanting chemicals from bulk to smaller package sizes. A list of solvent chemicals to be stored and decanted is provided below:

- Methanol;
- Thinners;
- Paraffin;
- Shelsol A;
- Benzine;
- Toluene; and
- Acetone" (WSP, 2019).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making with regards to the proposed project.

This assessment was conducted in accordance with the 2014 EIA Regulations (No. R. 982-985, Department of Environmental Affairs, 4 December 2014) emanating from Chapter 5 of the National Environmental Management Act (Act No. 107 of 1998). The findings and information herein are in terms of Appendix 6 of the 2014 NEMA EIA Regulations (amended in 2017).

2 Project Area

The site is located approximately 26 km south east of Johannesburg and 2.6 km east of Vosloorus centre, between the N3 and the R103 roads. The project area currently functions as a sandblasting business and has been disturbed. The location of the project area is presented in Figure 1.

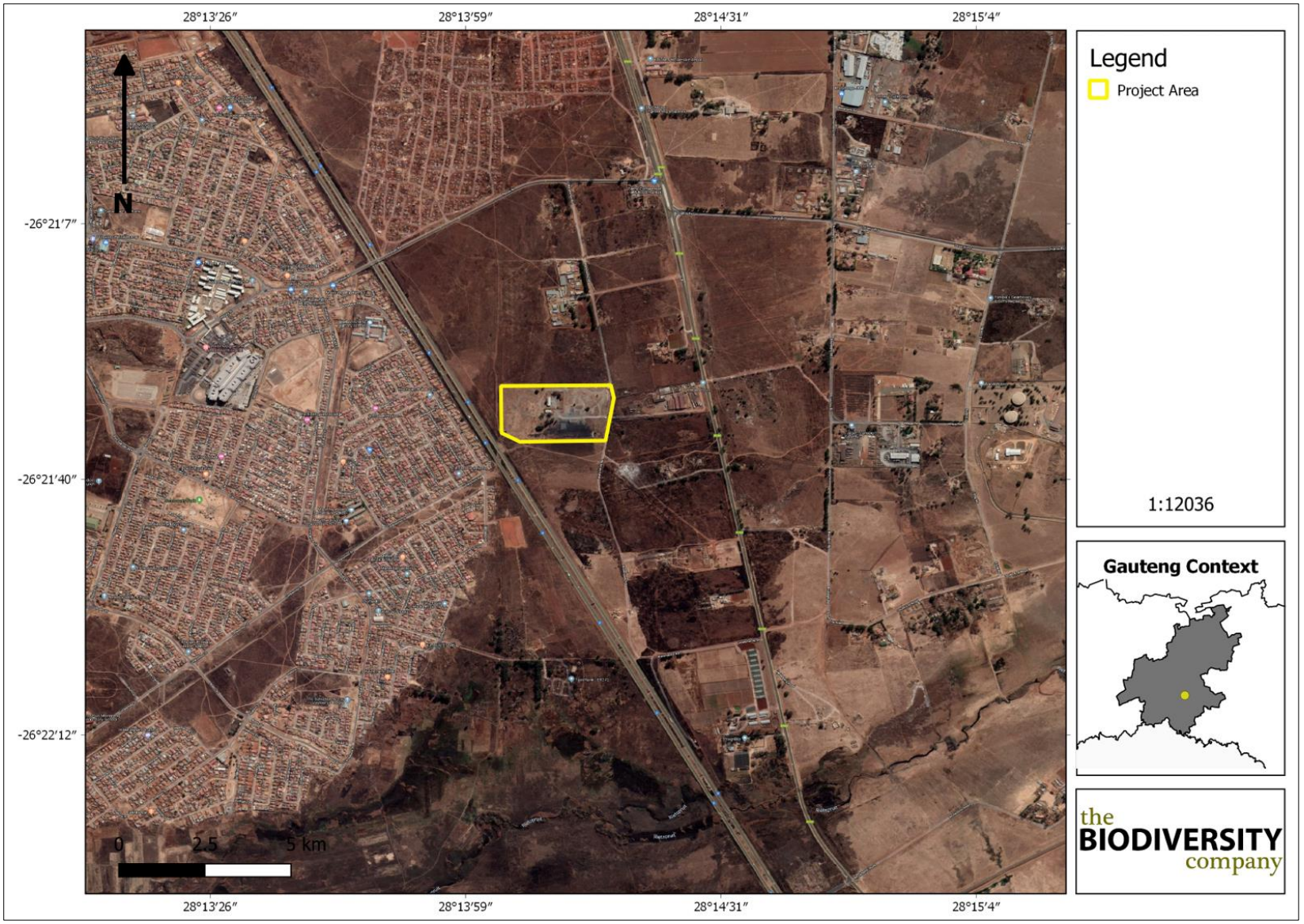

Figure 1:The general location of the proposed project area

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 project 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;
- Provide a map to identify sensitive receptors in the project area, based on available maps, database information & site visit verification; and
- Identification of risk factors associated with the developments.

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 wet season;
- This study has not assessed any temporal trends for the respective seasons; and
- 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 project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- Important Bird and Biodiversity Areas 2015 – BirdLife South Africa (vector geospatial dataset); and
- Terrestrial critical biodiversity areas for Gauteng.

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. The methodology included the following survey techniques:

- Sensitivity analysis based on available remaining natural structural habitat; and
- Identification of expected floral Red Data species (desktop analysis).

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:

- 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);
- 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;
- 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) (EWT, 2016);
- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2017) (mammalmap.adu.org.za); and
- A Field Guide to the Tracks and Signs of Southern, Central and East African Wildlife (Stuart & Stuart, 2013).

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

5.6 Wet Season Fieldwork

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

At each sample site notes were made regarding current impacts (e.g. erosion, lifestock, etc.), and subjective recording of dominant vegetation species was noted, including any sensitive features (e.g. wetlands, outcrops etc.). 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.

Table 1: A list of key legislative requirements relevant to biodiversity and conservation within the project area

INTERNATIONAL	Convention on Biological Diversity (CBD, 1993)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
NATIONAL	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The 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)
	National Freshwater Ecosystem Priority Areas (NFEPA's)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
PROVINCIAL	GDARD Requirements for Biodiversity Assessments (Version 3, 2014a)
	Gauteng Department of Agriculture and Rural Development (GDARD): Checklist for Biodiversity Assessments

6 Project Area

6.1 Desktop Spatial Assessment

The following features represent a summary of various spatial datasets analysed in regard to the project area with an emphasis on those aspects which are deemed to have a possible impact on the receiving environment. This assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI. The desktop analysis and their relevance to this project are listed in Table 2.

Table 2: Desktop spatial features examined

Desktop Information Considered	Relevant/Not relevant	Section
Conservation Plan	A portion of the project area falls in a CBA: Important area	6.1
Rocky Ridges	Irrelevant: Closest ridge is 11km away from the project area	-
Ecosystem Threat Status	Falls within a *CR* ecosystem	6.3.1
Ecosystem Protection Level	Falls in a *poorly protected* ecosystem	6.3.2
Protected Areas	Irrelevant: Closest PA is more than 6.5km away from the project area: Rondebult Nature Reserve	-
NFEPA Rivers and Wetlands	Irrelevant: The project area does not intersect with any NFEPA rivers or NFEPA wetlands	-
Mining and Biodiversity Guidelines	Irrelevant: No mining component	-
Important Bird and Biodiversity Areas	Irrelevant: Project area is situated more than 7.5 km away from the Suikerbosrand IBA.	-

6.2 Gauteng Critical Biodiversity Areas

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either ‘Irreplaceable’ (must be conserved), or ‘Important’.

CBAs are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met.

According to the Gauteng Terrestrial CBA Plan (C-Plan) a portion of the project area falls in a CBA: Important area (Figure 2).

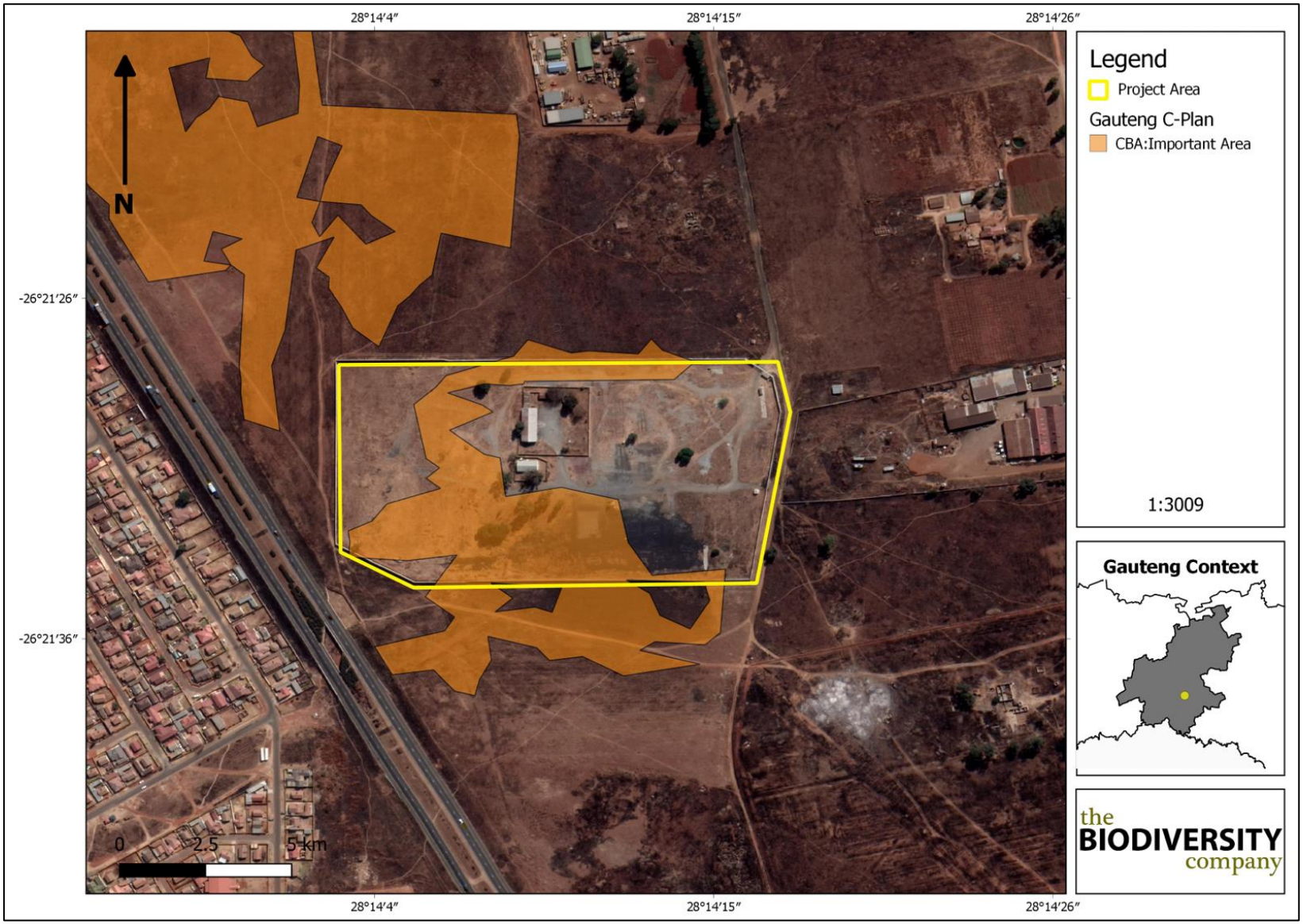

Figure 2: Project area in relation to the Gauteng CBA dataset

6.3 National Biodiversity Assessment

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al.*, 2019).

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 (Skowno *et al.*, 2019).

The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level*.

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 (Skowno *et al.*, 2019).

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 (Skowno *et al.*, 2019).

The proposed project area was superimposed on the terrestrial ecosystem threat status (Figure 3). As seen in this figure the project area falls across one ecosystem, which is listed CR.

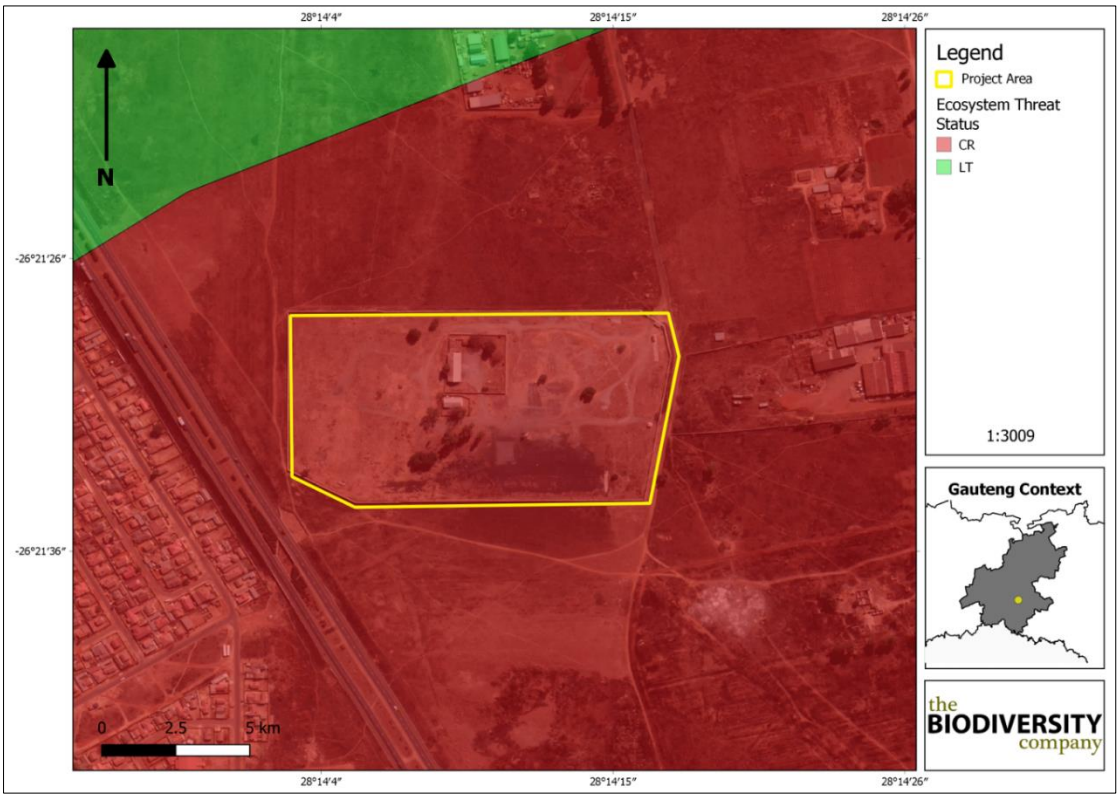

Figure 3: The project area showing the ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018)

6.3.2 Ecosystem Protection Level

Ecosystem protection level details whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as either 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 (Skowno *et al.*, 2019).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure 4). Based on this the terrestrial ecosystems associated with the proposed project area are rated as *poorly protected*. This means that these ecosystem types (and associated habitats) are not well protected anywhere in the country (such as in nationally protected areas).

Figure 4: The project area showing the level of protection of terrestrial ecosystems (NBA, 2018).

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 Savanna biome comprises of many different vegetation types. The proposed project area falls entirely within the Carletonville Dolomite Grassland vegetation type (Mucina & Rutherford, 2006).

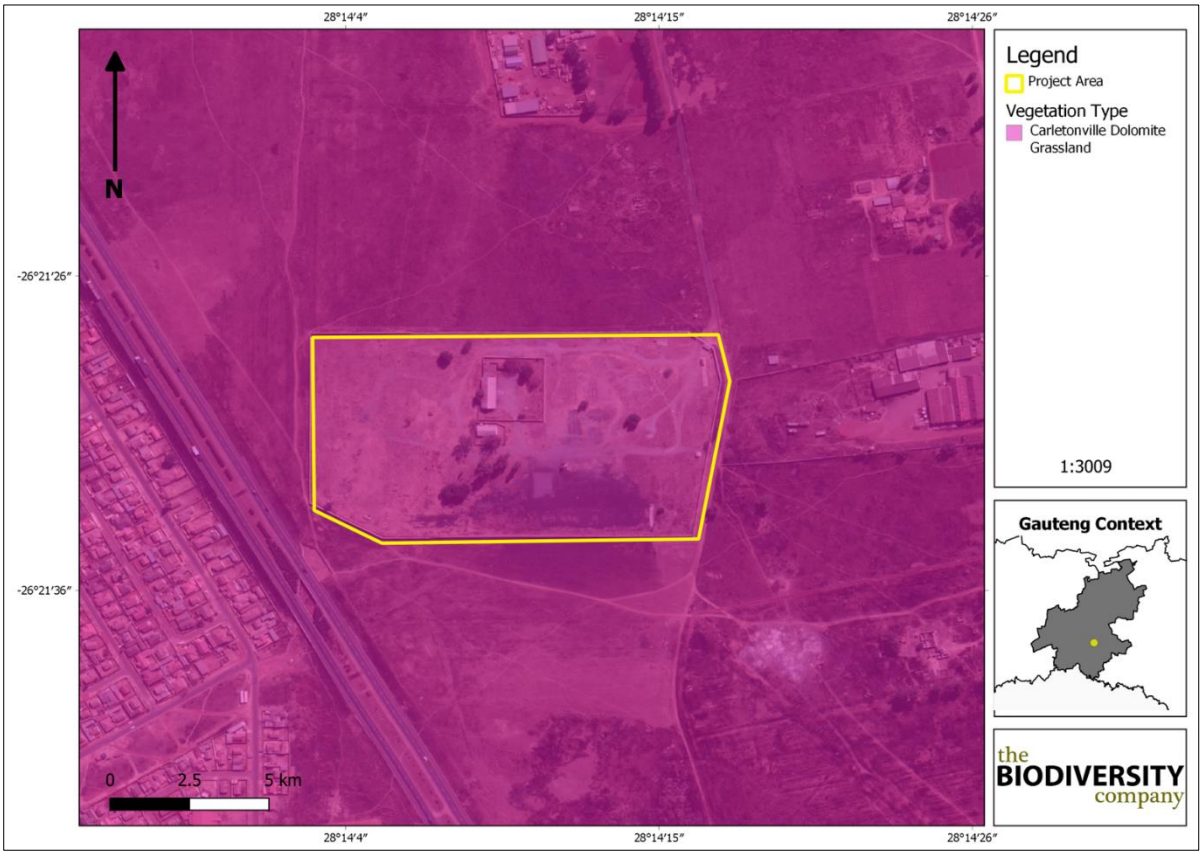

Figure 5: The project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)

7.1.1.2 Carletonville Dolomite Grassland

This vegetation type occurs on slightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands forming a complex mosaic pattern dominated by many species (Mucina & Rutherford, 2006). This vegetation type occurs in the North-West, Gauteng and marginally into the Free State Province: In the region of Potchefstroom, Ventersdorp and

Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province.

7.1.1.3 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 **Carletonville Dolomite Grassland** vegetation type:

Graminoids: *Aristida congesta , Brachiaria serrata, Cynodon dactylon, Digitaria tricholaenoides , Diheteropogon amplectens, Eragrostis chloromelas, E. racemosa, Heteropogon contortus, Loudetia simplex, Schizachyrium sanguineum, Setaria sphacelata, Themeda triandra, Alloteropsis semialata subsp. eckloniana, Andropogon schirensis, Aristida canescens, A. diffusa, Bewsia biflora, Bulbostylis burchellii, Cymbopogon caesius, C. pospischilii, Elionurus muticus, Eragrostis curvula, E. gummiflua, E. plana, Eustachys paspaloides, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Monocymbium ceresiiforme, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis, Triraphis andropogonoides, Tristachya leucothrix, T. rehmannii.*

Herbs: *Acalypha angustata, Barleria macrostegia, Chamaecrista mimosoides, Chamaesyce inaequilatera, Crabbea angustifolia, Dianthus mooiensis, Dicoma anomala, Helichrysum caespititium, H. miconiifolium, H. nudifolium var. nudifolium, Ipomoea ommaneyi, Justicia anagalloides, Kohautia amatymbica, Kyphocarpa angustifolia, Ophrestia oblongifolia, Pollichia campestris, Senecio coronatus, Vernonia oligocephala.*

Geophytic Herbs: *Boophone disticha, Habenaria mossii.*

Low Shrubs*: Anthospermum rigidum subsp. pumilum, Indigofera comosa, Pygmaeothamnus zeyheri var. rogersii, Rhus magalismontana, Tylosema esculentum, Ziziphus zeyheriana.*

Geoxylic Suffrutices: *Elephantorrhiza elephantina, Parinari capensis subsp. capensis*.

7.1.1.4 Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006), this vegetation type is classified as VU. The national target for conservation protection for both these vegetation types is 24%, but only a small extent is conserved in statutory (Sterkfontein Caves — part of the Cradle of Humankind World Heritage Site, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter already transformed for cultivation, by urban sprawl or by mining activity as well as the building of the Boskop and Klerkskraal Dams.

7.1.1.5 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 245 plant species are expected to occur in the project area. Figure 6 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 245-plant species, two species are listed as being SCCs ().

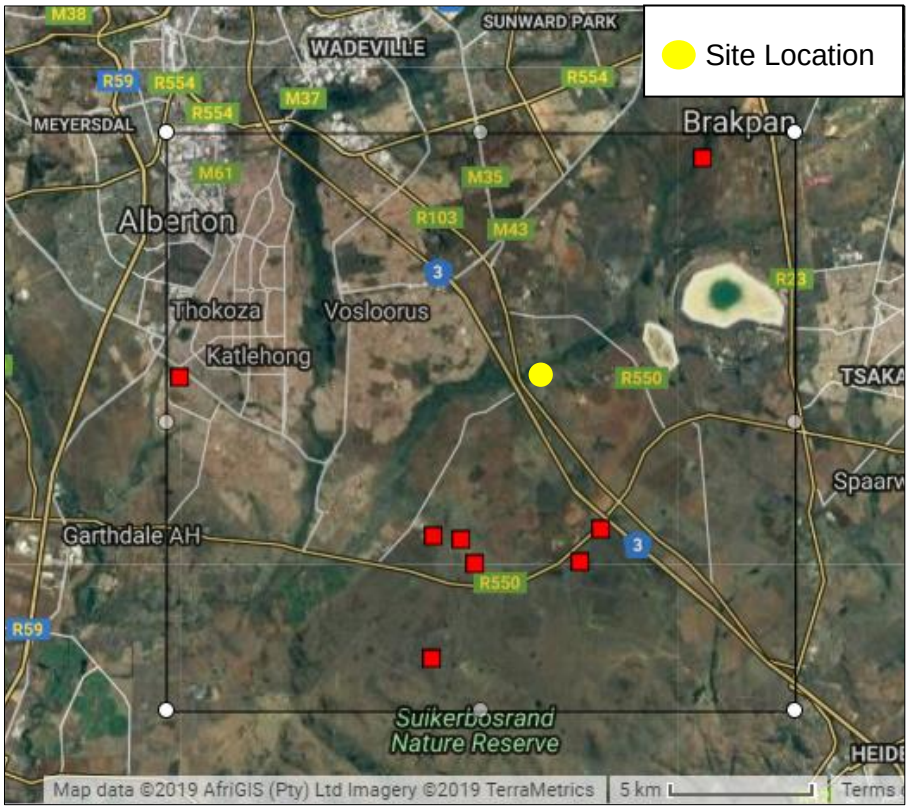

Figure 6: Map showing the grid drawn to compile an expected species list (BODATSA-POSA, 2019)

Table 3: Flora SCCs found in the project area

Family	Taxon	Author	IUCN	Ecology
Orchidaceae	*Habenaria bicolor*	Conrath & Kraenzl.	NT	Indigenous
Aizoaceae	*Lithops lesliei subsp. lesliei*	(N.E.Br.) N.E.Br.	NT	Indigenous

Habenaria bicolor is classified as NT according to the Red List of South African Plants (SANBI, 2017). It occurs in well drained grasslands at an altitude of 1 600m. Urban expansion, habitat transformation, degradation and destruction are severe threats in Gauteng and are causing ongoing declines.

Lithops lesliei subsp. *lesliei* is listed as NT according to the Red List of South African Plants (SANBI, 2017). This species occurs primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses. This species is threatened by habitat destruction and is used in the muti trade.

7.1.2 Faunal Assessment

7.1.2.1 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 376 bird species are expected to occur in the vicinity of the project area. The full list of potential bird species is provided in Appendix B.

Of the expected bird species, Twenty seven (27) species are listed as SCC either on a regional scale or international scale (Table 4). The SCC include the following:

- Four (4) species that are listed as EN on a regional basis;
- Nine (9) species that are listed as VU on a regional basis; and
- Eleven (11) species that are listed as NT on a regional basis.

Table 4: List of bird species of regional or global conservation importance that are expected to occur in close vicinity to the project area (SABAP2, 2018, ESKOM, 2015; IUCN, 2017)

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Alcedo semitorquata	Kingfisher, Half-collared	NT	LC	Low
Anthus chloris	Pipit, Yellow-breasted	VU	VU	Low
Anthus crenatus	Pipit, African Rock	NT	LC	Low
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Low
Calidris ferruginea	Sandpiper, Curlew	LC	NT	Low
Ciconia abdimii	Stork, Abdim's	NT	LC	Low
Circus macrourus	Harrier, Pallid	NT	NT	Low
Circus maurus	Harrier, Black	EN	VU	Low
Circus ranivorus	Marsh-harrier, African	EN	LC	Low
Coracias garrulus	Roller, European	NT	LC	Low
Eupodotis caerulescens	Korhaan, Blue	LC	NT	Low
Eupodotis senegalensis	Korhaan, White-bellied	VU	LC	Low
Falco biarmicus	Falcon, Lanner	VU	LC	Moderate
Falco vespertinus	Falcon, Red-footed	NT	NT	Low
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Low
Lioptilus nigricapillus	Blackcap, Bush	VU	NT	Low
Mirafra cheniana	Lark, Melodious	LC	NT	Low
Mycteria ibis	Stork, Yellow-billed	EN	LC	Low
Oxyura maccoa	Duck, Maccoa	NT	NT	Low
Pelecanus onocrotalus	Pelican, Great White	VU	LC	Low
Phalacrocorax capensis	Cormorant, Cape	EN	EN	Low
Phoenicopterus minor	Flamingo, Lesser	NT	NT	Low
Phoenicopterus ruber	Flamingo, Greater	NT	LC	Low
Rostratula benghalensis	Painted-snipe, Greater	NT	LC	Low
Sagittarius serpentarius	Secretarybird	VU	VU	Low
Sterna caspia	Tern, Caspian	VU	LC	Low
Tyto capensis	Grass-owl, African	VU	LC	Low

Alcedo semitorquata (Half-collared Kingfisher) is listed as 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 low due to the lack f suitable waterbodies in the project area.

Anthus chloris (Yellow Breasted Pipit) is a resident and partial migrant of eastern South Africa and, marginally, eastern Lesotho. Globally and regionally they are listed as VU (IUCN, 2017). The species's population is suspected to have declined at a moderate rate, in line with the loss and degradation of its grassland habitat. Suitable habitat s absent form the project area.

Anthus crenatus (African Rock Pipit) is endemic to South Africa and Lesotho (IUCN, 2017). They are classed as NT after undergoing a decline in habitat of 34% in the last 10 years (IUCN, 2017). The species is associated with rocky habitats that has abundant shrub and grassy areas. The lack of suitable rocky areas decreases the likelihood of finding this species in the project 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 in southern Africa 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). No mountainous habitat is found in close proximity to the project area as such the likelihood of occurrence is rated as low.

Calidris ferruginea (Curlew Sandpiper) is 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 saltpans (IUCN, 2017). Due to the absence of these habitat types within the project area the likelihood of occurrence of this species was rated as low.

Ciconia abdimii (Abdim's Stork) is listed as NT on a local scale and the species is known to be found in open grassland and savanna woodland often near water but also in semi-arid areas, gathering beside pools and water-holes. They tend to roost in trees or cliffs (IUCN, 2017). The absence of wet areas voids the likelihood of occurrence.

Circus macrourus (Pallid Harrier) is listed as NT on a regional and global scale, and overwinters in semi-desert, scrub, savanna and wetlands. The species is migratory, with most birds wintering in sub-Saharan Africa or south-east Asia (IUCN, 2017). The species is most likely only to use the area as a migratory route or a temporary overwintering location from August to March, the likelihood of occurrence is low.

Circus maurus (Black Harrier) is listed as 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 low.

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). 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. Wetland areas are absent from the project area thus the likelihood of occurrence is rated as low.

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 low chance of this species occurring in the project area as they prefer to forage in open agricultural areas.

Eupodotis caerulescens (Blue Korhaan) is listed as NT 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 specie 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 low.

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 land, which doesn't seem present in the project area thus likelihood of occurrence was rated as low (Hockey *et al,* 2005).

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins. The likelihood of incidental records of this species in the project area is rated as moderate due to the natural veld condition and the presence of many bird species on which Lanner Falcons may predate.

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, South Africa (Hockey *et al.,* 2005). The habitat it generally prefers is open habitats with scattered trees, such as open grassy woodland, wetlands, forest fringes and croplands. These habitats are absent from the project area.

Glareola nordmanni (Black-winged Pratincole) is a migratory species which is listed as NT both globally and regionally. This species has a very large range, breeding mostly in Europe and Russia, before migrating to southern Africa. Overall population declines of approximately 20% for this species are suspected (IUCN, 2017). This species generally occurs near water and damp meadows, or marshes overgrown with dense grass. Due to it's migratory nature, this species will only be present in South Africa for a few months during the year and will not breed locally. The likelihood of occurrence is rated as low.

Lioptilus nigricapillus (Bush Blackcap) is categorised as VU on a regional and NT on a national scale. This species has a small population, which is threatened by afforestation of its habitat and is inferred to be in decline. This species prefers major stands of mature forest in ravines fringed with thickets of *Leucosidea* and *Buddleia.* This habitat is often surrounded by

grassland, or cultivated land which may prove to be beneficial for the species. The likelihood of occurrence in the project area is listed as low.

Mirafra cheniana (Melodious Lark) is seen as NT n a global scale. This species is a non endemic species that can be found in the central South African regions. It is threatened by habitat loss and change (IUCN, 2019). Due to the large amount of disturbances in the project area the likelihood of occurrence is rated as low.

Mycteria ibis (Yellow-billed Stork) is listed as EN on a regional scale and LC on a global scale. This species is migratory and has a large distributional range which includes much of sub-Saharan Africa. It is typically associated with freshwater ecosystems, especially wetlands and the margins of lakes and dams (IUCN, 2017). The lack of water bodies in the project area voids the likelihood of occurrence.

Oxyura maccoa (Maccoa Duck) has a large northern and southern range, South Africa is part of its southern distribution. During the species' breeding season, it inhabits small temporary and permanent inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds (*Phragmites* spp.) and cattails (*Typha* spp.) on which it relies for nesting (IUCN, 2017). The likelihood of occurrence of this species in the project area was rated as low.

Pelecanus onocrotalus (Great White Pelican) is listed as VU in South Africa as its breeding attempts regularly fail due to human disturbance, such as fishing activities and nest robbing. They prefer shallow lakes, estuaries, flood plain pans, dams, sheltered coastal bays and lagoons. The likelihood of occurring in the project site is rated as low.

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 as a result of the decline of the epipelagic fish stock, oil spills and avian cholera. Due to the lack of suitable habitat and proximity of the urban area, the likelihood of occurrence is rated as low.

Phoenicopterus 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 the absence of its preferred habitat within the project area, combined the proximity of the urban area, the likelihood of occurrence is low.

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 does not occur in the project area.

Sagittarius serpentarius (Secretarybird) 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). The likelihood of occurrence is rated as low due to the lack of wetlands and grasslands in the project area.

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 low and thus the likelihood of occurrence is low.

Tyto capensis (African Grass-owl) is rated as VU on a regional basis. The distribution of the species includes the eastern parts of South Africa. The species is generally solitary, but it does also occur in pairs, in moist grasslands where it roosts (IUCN, 2017). The species prefers thick grasses around wetlands and rivers which are not present in the project area. Furthermore, this species specifically has a preference for nesting in dense stands of the grass species Imperata cylindrica. None of this grass species is evident within the project area and as such the likelihood of occurrence is rated as low.

7.1.2.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 83 mammal species that could be expected to occur within the vicinity of the project area (Appendix C). Of these species, 9 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 74 small to medium sized mammal species, fourteen (14) 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 EN on a regional basis;
- Five (5) that are listed as VU on a regional basis; and
- Six (6) that are listed as NT on a regional scale.

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)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	Low
Crocidura maquassiensis	Makwassie musk shrew	VU	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Moderate
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Low
Mystromys albicaudatus	White-tailed Rat	VU	EN	Low
Ourebia ourebi	Oribi	EN	LC	Low
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Low

Pelea capreolus	Grey Rhebok	NT	LC	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low
Redunca fulvorufula	Mountain Reedbuck	EN	LC	Low

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. Based on the absence of a perennial river within the project area, the likelihood of occurrence of this species occurring in the project area is considered to be low

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Suitable habitat is not present in the project area as such the likelihood of occurrence is rated as low.

Crocidura maquassiensis (Maquassie Musk Shrew) is listed as VU on a regional basis and is known to be found in rocky, mountain habitats. It may tolerate a wider range of habitats and individuals have been collected in Kwa-Zulu Natal from a garden, and in mixed bracken and grassland alongside a river at 1,500 m (IUCN, 2017). There is a lack of suitable habitat for this species in the project area and therefore the likelihood of occurrence is rated as low.

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). No colonies of this species are known to occur in the project area or in the immediate vicinity and, although individuals may occasionally be recorded, it is not expected to be resident within the project area and therefore it's likelihood of occurrence is rated as 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 rated as low.

Hydrictis maculicollis (Spotted-necked Otter) inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes (IUCN, 2017). No waterbodies can be found in the project area and as such the likelihood of occurrence is rated as low.

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 absence of natural grassland areas in the project area and human disturbance, the likelihood of occurrence for this species is rated as low.

Mystromys albicaudatus (White-tailed Rat) is listed as VU on a regional basis and 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. No suitable habitat can be found in the project area.

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). Oribi occur in a variety of habitats – from savannahs, floodplains and tropical grasslands with moderate to tall grasses, to montane grasslands at low altitudes. The disturbed nature combined with the close proximity to human development results in a very low likelihood of occurrence.

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 which is in such close proximity to an urban area, and where they are likely to be persecuted, 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. The likelihood of occurrence is considered 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 lack of their favoured habitat within the project area, the likelihood of occurrence of this species is rated as low.

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. There is insufficient habitat for this species in the project area and the likelihood of occurrence of this species is therefore considered to be low.

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). No suitable habitat is

present in the project area along with the risk of being persecuted the likelihood of occurrence is rated as low.

7.1.2.3 Herpetofauna (Reptiles & Amphibians)

7.1.2.3.1 Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017) 52 reptile species are expected to occur in the project area (Appendix D). One (1) reptile SCC are expected to be present in the project area (Table 6).

Table 6: Expected reptile SCC that may occur in the project area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Homoroselaps dorsalis	Striped Harlequin Snake	NT	LC	Low

Homoroselaps dorsalis (Striped Harlequin Snake) is partially fossorial and known to inhabit old termitaria in grassland habitat (IUCN, 2017). Most of its range is at moderately high altitudes, reaching 1,800 m in Mpumalanga and Swaziland, but it is also found at elevations as low as about 100 m in KwaZulu-Natal. The likelihood of occurrence was rated as low due to the absence of suitable habitat.

7.1.2.3.2 Amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the ADU (ADU, 2017) Nineteen (19) amphibian species are expected to occur in the project area (Appendix E).

One amphibian SCC are expected to occur in the project area according to the above-mentioned sources (Table 7).

Table 7: Amphibian SCC expected in the project area

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Low

7.2 Field Survey

The field survey for the project area was conducted on the 20th of November 2019 by one terrestrial ecologists. During the survey the floral and faunal communities within and surrounding the project development footprint were assessed. 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 visit and some are provided in this section of the report. All site photographs are available on request.

7.2.1 Habitat Assessment

Habitats identified during the field visit can be seen in Figure 8. Two primary habitats were delineated for this assessment, namely: *degraded grassland* and *transformed* areas. The delineated areas are discussed below and visual representations from the field survey can be seen in Figure 7.

The degraded grasslands are the areas which were considered to have been altered from their natural state, sections of bare soil and low grass cover are visible due to a combination of over grazing and anthropogenic activities. This habitat has been degraded to a low ecological state.

Transformed areas have been historically and currently denuded of natural vegetation in order to construct building and other infrastructure. Portions of this habitat type are covered by the existing infrastructure within the project area which comprises of buildings, roads and a large wall. Sandblasting was the main activity taking place within the project area.

Figure 7: Habitats within the project area; A & B) Degraded Grassland and C & D) Transformed areas

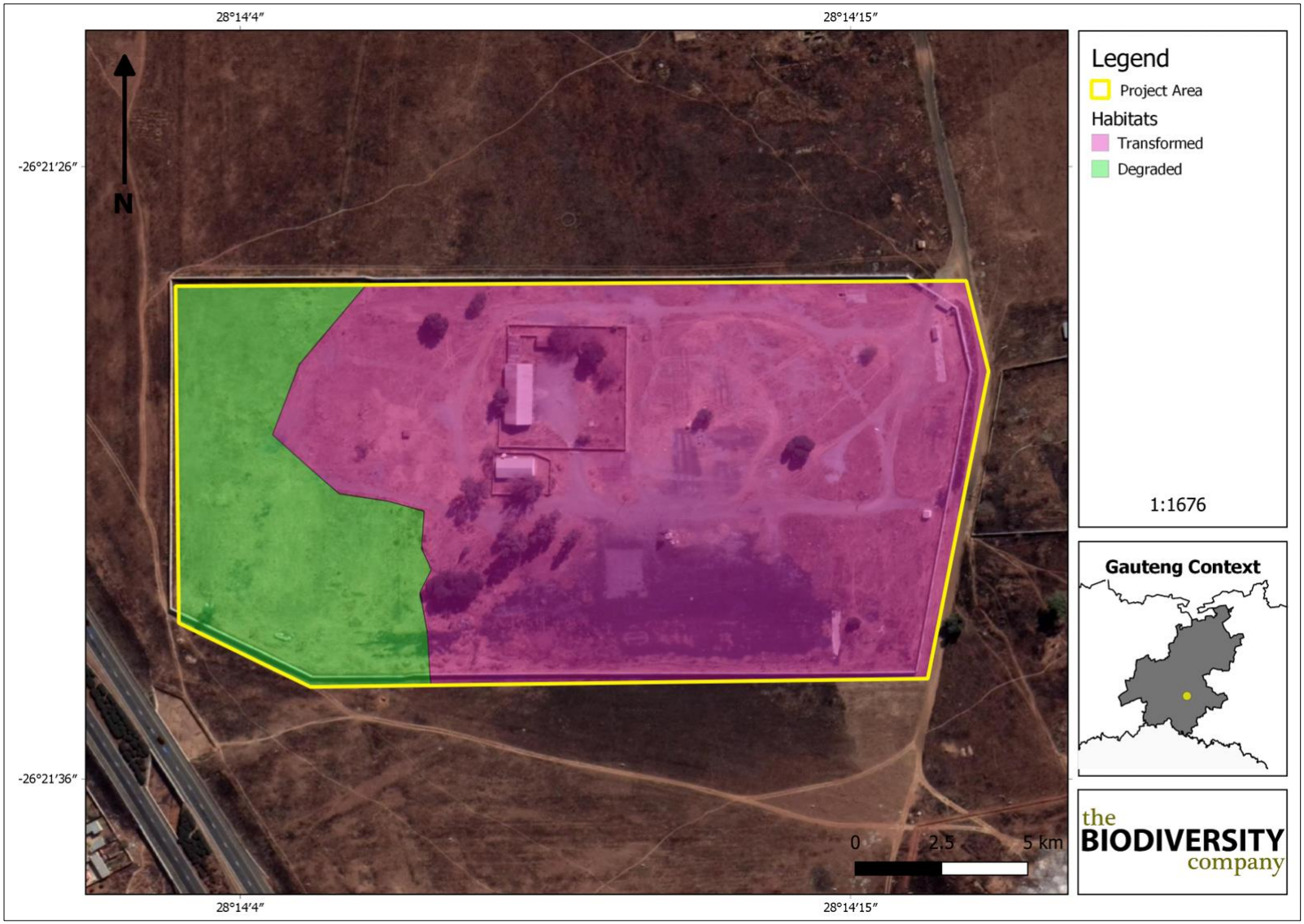

Figure 8: Habitats identified in the project area

7.2.2 Vegetation Assessment

The vegetation assessment was conducted throughout the extent of the project area. A total of 46 tree, shrub and herbaceous plant species were recorded in the project area during the field assessment (Table 8). 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 8:Trees, shrubs and weeds recorded at the project area

Species	Common Name	Threat status (SANBI, 2017)	SA Endemic	Alien Category
Acacia mearnsii	***Black Wattle***			**NEMBA Category 2**
Acacia melanoxylon	**Australian blackwood**			**NEMBA Category 2**
Acalypha angustata		LC	No	
Alternanthera pungens	**Paper thorn**			**Naturalized exotic weed**
Argemone ochroleuca				**NEMBA Category 1b**
Bidens pilosa	**Blackjack**			**Naturalized exotic weed**
Celtis australis	**European nettle tree**			**NEMBA Category 3**
Cirsium vulgare	**spear thistle**			**NEMBA Category 1b.**
Conyza bonariensis	**Flax-leaf Fleabane**			**Naturalized exotic weed**
Cynodon dactylon				**NEMBA Category 2**
Datura stramonium	**Jimsonweed**			**NEMBA Category 1b.**
Eragrostis chloromelas		LC	No	
Eragrostis curvula		LC	No	
Eriospermum cooperi		LC	No	
Erythrina zeyheri	Plough-breaker	LC	Yes	
Eucalyptus camaldulensis				**NEMBA Category 1b**
Felicia muricata		LC	No	
Ficus carica	Common fig		No	
Gomphocarpus fruticosus	Wild cotton	LC	No	
Heliotropium amplexicaule	**Creeping heliotrope**			**Naturalized exotic weed**
Hermannia depressa		**LC**	**Yes**	
Hermannia transvaalensis		LC	Yes	
Hilliardiella oligocephala		LC	No	
Hyparrhenia hirta	Common thatching grass	LC	No	
Ledebouria revoluta	Common Squill	LC	No	
Ledebouria revoluta	Common Squill	LC	No	
Ligustrum japonicum	**Japanese wax-leaved privet**			**NEMBA Category 1b.**
Morus alba	**White mulberry**			**NEMBA Category 3**
Nemesia fruticans	Mauve nemesia		No	
Nicotiana glauca	**Wild Tobacco**			**NEMBA Category 1b.**
Opuntia ficus indica	***Prickly Pear***			**NEMBA Category 1b.**
Ocimum obovatum	*Cat's Whiskers*	LC	No	
Pachycarpus schinzianus		LC	No	
Pennisetum clandestinum				**NEMBA Category 1b**

Pinus sp.				**Not Indigenous**
Planatus x acerifolia	**London Planetree**			**Not Indigenous**
Populus alba				**NEMBA Category 2**
Prunus persica		LC	No	**Not Indigenous**
Richardia brasiliensis				**Not Indigenous**
Scabiosa columbaria			No	
Solanum mauritianum				**NEMBA Category 1b**
Solanum panduriforme		LC	No	
Solanum sisymbriifolium	**Sticky nightshade**			**NEMBA Category 1b.**
Tagetes minuta				**Naturalized exotic weed**
Verbena bonariensis				**NEMBA Category 1b.**
Ziziphus zeyheriana	Haakbessie	LC	No	

Figure 9: Plant species recorded in the project area: A) Eriospermum cooperi, B) Pachycarpus schinzianus, C) Erythrina zeyheri, D) Ledebouria revoluta, E) Heliotropium amplexicaule, and F) Acalypha angustata

7.2.2.1 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 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, and was amended in February 2018 in the Government Gazette No. 41445. 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.

Eleven (11) 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 8).

7.2.3 Fauna

7.2.3.1 Avifauna

Twelve (12) bird species were recorded in the project area during the November 2019 survey based on either direct observations, vocalisations, or the presence of visual tracks & signs (Table 9) (Figure 10).

Table 9: A list of avifaunal species recorded for the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acridotheres tristis	Myna, Common	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Crithagra mozambicus	Canary, Yellow-fronted	Unlisted	LC
Euplectes ardens	Widowbird, Red-collared	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC

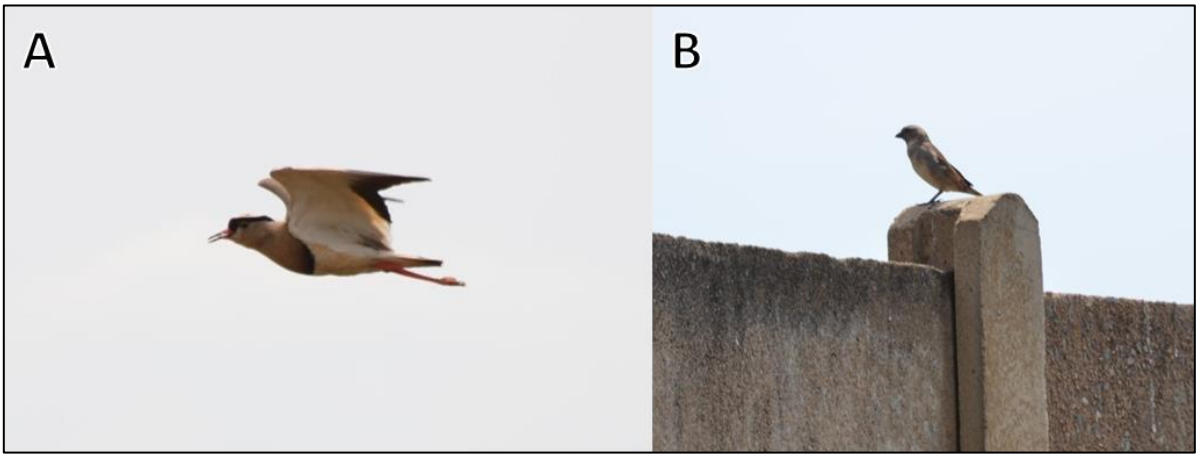

Figure 10: Some of the avifauna recorded within the project area: A) Crowned Lapwing (Vanellus coronatus) and B) Cape Sparrow (Passer melanurus)

7.2.3.2 Mammals

No mammals were observed in the project area, this is ascribed to the disturbed nature of the project area along with a large number of impacts and human presence.

7.2.3.3 Herpetofauna (Reptiles & Amphibians)

Two reptile species were recorded in the project area and the third species (Rinkhals) was confirmed based on communication with local people that are currently working on site (Table 10 and Figure 11). No amphibians were recorded, this is attributed to the lack of suitable wet areas in the project area.

Table 10: Reptile species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Boaedon capensis	Brown House Snake	LC	LC
Hemachatus haemachatus	Rinkhals	LC	LC
Trachylepis punctatissima	Speckled Rock Skink	LC	LC

Figure 11: Speckled Rock Skink (Trachylepis punctatissima) observed in the project area

7.3 Area Sensitivity

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 study area. Site sensitivities were classified and mapped.

The sensitivity scores identified during the field survey for each habitat were then visually mapped (Figure 12).

A least concerned sensitivity was given to those areas that have been impacted upon by the anthropogenic activities, such as buildings, sandblasting, paved areas, and roads. This area does not offer habitat for faunal or flora species.

The area given a low sensitivity are the degraded grassland that has been impacted and has been modified from its original condition, this area does however still offer habitat to more adaptable species.

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.

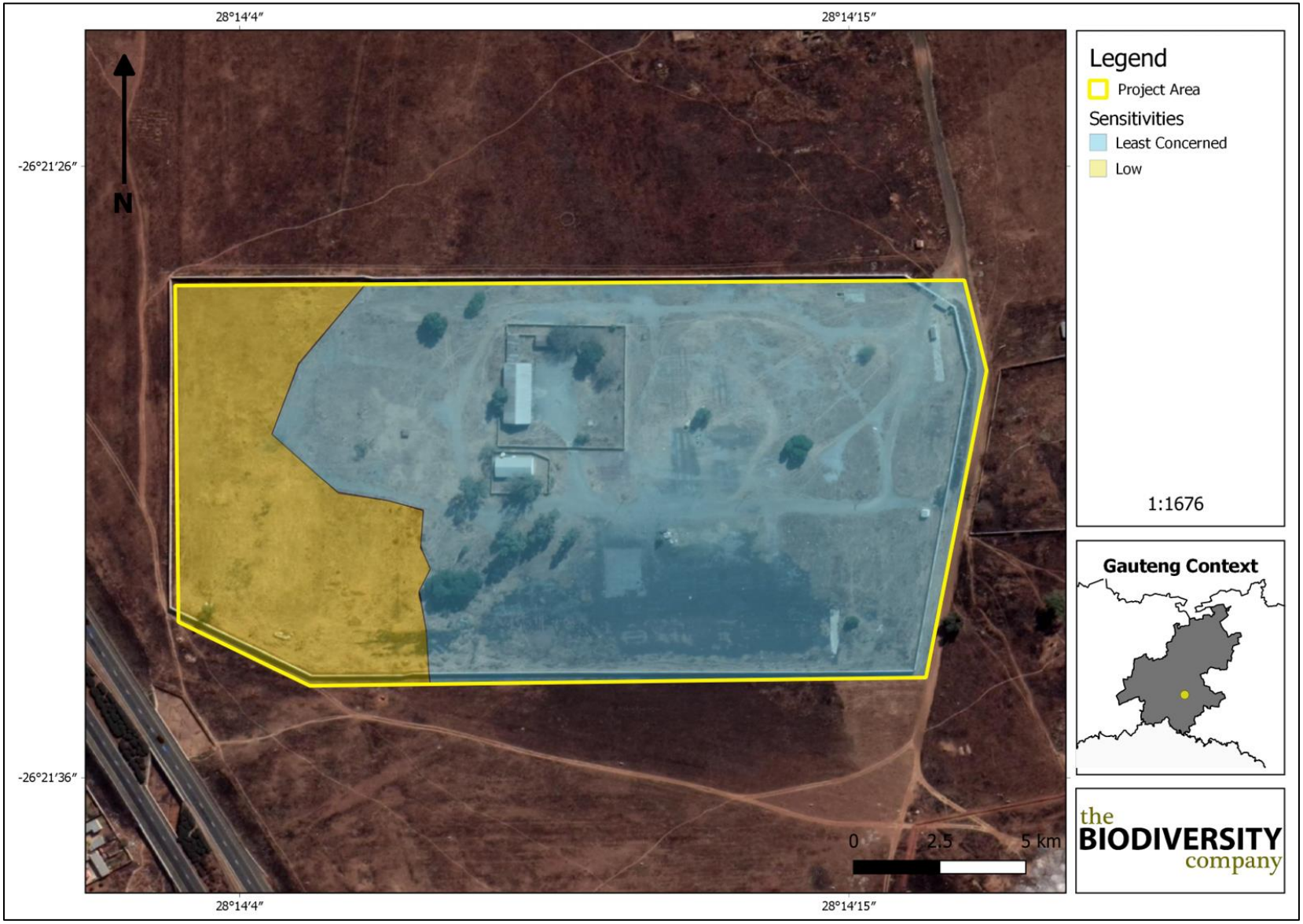

Figure 12: Habitat sensitivity map of the project area

8 Impact Assessment

Development-related activities can 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.

Key impacts commonly associated with development 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).

8.1 Impact Assessment Methodology

Potential impacts were evaluated against the data captured during the desktop and field assessment to identify relevance to the project area. The methodology used in determining the significance of potential environmental impacts relating to project was supplied by WSP.

8.2 Methodology

The ESIA will utilise a methodological framework developed by WSP to meet the combined requirements of international best practice and the relevant EIA Regulations. The determination and assessment of impacts will be based on the following criteria:

- Nature of the Impact;
- Significance of the Impact;
- Consequence of the Impact;
- Extent of the impact;
- Duration of the Impact;
- Probability if the impact;
- Degree to which the impact:
    - can be reversed;
    - may cause irreplaceable loss of resources; and
    - can be avoided, managed or mitigated.

Following international best practice, additional criteria have been included to determine the significant effects. These include the consideration of the following:

- Magnitude: to what extent environmental resources are going to be affected;
- Sensitivity of the resource or receptor (rated as high, medium and low) by considering the importance of the receiving environment (international, national, regional, district

and local), rarity of the receiving environment, benefits or services provided by the environmental resources and perception of the resource or receptor); and

- Severity of the impact, measured by the importance of the consequences of change (high, medium, low, negligible) by considering inter alia magnitude, duration, intensity, likelihood, frequency and reversibility of the change.

It should be noted that the definitions given are for guidance only, and not all the definitions will apply to all of the environmental receptors and resources being assessed. Impact significance will be assessed with and without mitigation measures in place. Impacts are assessed in terms of the following criteria:

a) The nature; a description of what causes the effect, what will be affected and how it will be affected.

Table 11: Nature or Type of Impact

Nature or Type of Impact	Definition
Beneficial / Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Adverse / Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts that arise directly from activities that form an integral part of the Project (e.g. new infrastructure).
Indirect	Impacts that arise indirectly from activities not explicitly forming part of the Project (e.g. noise changes due to changes in road or rail traffic resulting from the operation of Project).
Secondary	Secondary or induced impacts caused by a change in the Project environment (e.g. employment opportunities created by the supply chain requirements).
Cumulative	Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

b) The physical extent.

Table 12: Physical Extent Rating of Impact

Score	Description
1	the impact will be limited to the site;
2	the impact will be limited to the local area;
3	the impact will be limited to the region;
4	the impact will be national; or
5	the impact will be international;

c) The duration, wherein it is indicated whether the lifetime of the impact will be:

Table 13: Duration Rating of Impact

Score	Description
1	of a very short duration (0 to 1 years)
2	of a short duration (2 to 5 years)
3	medium term (5–15 years)
4	long term (> 15 years)
5	permanent

d) Reversibility: An impact is either reversible or irreversible. The level of reversibility is the ability of an environmental receptor to rehabilitate or restore itself after the activity

has caused environmental change (i.e. how long before impacts on receptors cease to be evident).

Table 14: Reversibility of an Impact

Score	Description
1	The impact is immediately reversible.
3	The impact is reversible within 2 years after the cause or stress is removed; or
5	The activity will lead to an impact that is in all practical terms permanent.

e) The magnitude of impact on ecological processes, quantified on a scale from 0-10, where a score is assigned.

Table 15: Magnitude Rating of Impact

Score	Description
0	small and will have no effect on the environment.
1	minor and will not result in an impact on processes.
2	low and will cause a slight impact on processes.
3	moderate and will result in processes continuing but in a modified way.
4	high (processes are altered to the extent that they temporarily cease).
5	very high and results in complete destruction of patterns and permanent cessation of processes.

f) The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:

Table 16: Probability Rating of Impact

Score	Description
1	very improbable (probably will not happen.
2	improbable (some possibility, but low likelihood).
3	probable (distinct possibility).
4	highly probable (most likely).
5	definite (impact will occur regardless of any prevention measures).

- The significance, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- The status, which is described as either positive, negative or neutral;
- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources; and
- The degree to which the impact can be mitigated.

The significance is determined by combining the above criteria in the following formula:

$$Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$$

$$[S = (E + D + R + M) \times P]$$

Where the symbols are as follows:

Symbol	Criteria	Description
S	Significance Weighting	Refer to Table 17: Significance Weightings of an Impact

E	Extent	Refer to Table 12: Physical Extent Rating of Impact
D	Duration	Refer to Table 13: Duration Rating of Impact
R	Reversibility	Refer to Table 14: Reversibility of an Impact
M	Magnitude	Refer to Table 15: Magnitude Rating of Impact
P	Probability	Refer to Table 16: Probability Rating of Impact

The significance score can therefore range from 3 (minimum) to 100 (Maximum). The significance weightings are defined as Low, Medium and High, as such the scoring system has been allocated accordingly to define the significance weighting, as identified in Table 17.

Table 17: Significance Weightings of an Impact

Overall Score	Significance Rating (Negative)	Significance Rating (Positive)	Description
< 30 points	**Low**	**Low**	where this impact would not have a direct influence on the decision to develop in the area
31 - 60 points	**Medium**	**Medium**	where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	**High**	**High**	where the impact must have an influence on the decision process to develop in the area

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in the ESIA.

8.2.1 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 some are shown in Figure 13;

- Litter and general waste;
- Secondary roads and cleared areas;
- Invasive plant species;
- Livestock grazing, specifically cattle and goats;
- Sandblasting; and
- Powerlines within the vicinity of the project area.

Figure 13: Impacts observed during the fieldwork A) Livestock, B) Alien invasive plant species, C) Sandblasting, D) Powerlines and cleared areas, E) Building rubble and Fencing and F) Secondary roads.

8.3 Identification of Additional Potential Impacts

The development is associated with the Vosloorus filling plant construction. The activities will likely not result in extensive impacts as the area has been greatly disturbed however based on the type of development the likelihood of spills will have a long-term effect on the surrounding habitat. Due to the nature of the development a closure and rehabilitation phase was not considered as the development is considered to be permanent, servicing the local area.

The potential impacts associated with the each of the project phases are discussed below and the expected impact pre-mitigation and post-mitigation can be seen in, Table 18 and Table 19.

8.3.1 Construction Phase

The following potential impacts were considered on terrestrial vegetation communities. This phase refers to the period when construction of the proposed infrastructure is built/installed. This phase usually has the largest direct impact on biodiversity:

- Continued disturbance and degradation of the vegetation community and encroachment by alien invasive plant species;
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (noise, dust and vibration); and
- Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances and habitat degradation (litter, road mortalities and/or poaching).

Table 18: Terrestrial ecological assessment of impact significance for the construction phase.

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Flora	Continued disturbance and degradation of the vegetation community and encroachment by alien invasive plant species	Construction Phase	Negative	Moderate	2	2	3	2	3	**27**	**N1**	1	1	2	2	1	**6**	**N1**
					Significance	**N1 - Low**							**N1 - Low**						
Impact 2:	Fauna	Displacement of faunal community due to habitat loss, direct mortalities and disturbance (noise, dust and vibration)	Construction Phase	Negative	Moderate	2	2	3	2	3	**27**	**N1**	1	1	2	2	1	**6**	**N1**
					Significance	**N1 - Low**							**N1 - Low**						
Impact 3:	Flora	Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances and habitat degradation (litter, road mortalities and/or poaching).	Construction Phase	Negative	Moderate	2	2	3	2	3	**27**	**N1**	1	1	2	2	1	**6**	**N1**
					Significance	**N1 - Low**							**N1 - Low**						

8.3.2 Operational Phase

The following potential impacts were considered on biodiversity (fauna and flora) during the operational phase. This phase refers to when construction has been completed and the proposed infrastructure has been built and is functional:

- Continued disturbance of vegetation communities and encroachment by alien invasive plant species;
- Ongoing displacement, direct mortalities and disturbance of faunal community due to habitat loss and disturbances (such as dust and noise mainly through the maintenance of the system); and
- Spilling of corrosive and toxic substances.

Table 19: Terrestrial ecological assessment of impact significance for the operational phase.

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 4:	Flora	Continued disturbance of vegetation communities and encroachment by alien invasive plant species	Operational Phase	Negative	Moderate	3	2	3	4	4	**48**	**N2**	2	1	3	1	2	**14**	**N1**
					Significance	**N2 - Medium**							**N1 - Low**						
Impact 5:	Fauna	Ongoing displacement, direct mortalities and disturbance of faunal community due to habitat loss and disturbances (such as dust and noise mainly through the maintenance of the system)	Operational Phase	Negative	Moderate	3	2	3	4	3	**36**	**N2**	2	1	3	1	2	**14**	**N1**
					Significance	**N2 - Medium**							**N1 - Low**						
Impact 6:	Flora and Fauna	Spilling of corrosive and toxic substances	Operational Phase	Negative	Moderate	5	2	5	5	4	**68**	**N3**	2	1	3	2	2	**16**	**N1**
					Significance	**N3 - High**							**N1 - Low**						

8.4 Mitigation Measure Objectives

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

- Prevent the unnecessary destruction of, and fragmentation, of the vegetation community; and
- Prevent the loss of the faunal community associated with these vegetation communities.

8.4.1 Mitigation Measures for the Impacts

From an ecological perspective the project area is somewhat degraded, especially on a terrestrial level. The mitigation measures include the following:

- The development area must be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas be impacted upon. No persons should be allowed to enter the surrounding habitats under any circumstances;
- Areas that were 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;
- Waste management must be a priority, this of relevance during the construction phase when a construction camp will be set up. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site;
- The storage of the construction material to be built are not to be stored for extended periods of time or on any other areas than the demarcated project area;
- The storage and decanting of chemicals must be in a bunded area with the required volume;
- A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas;
- Inspections and monitoring of the infrastructure for leaks must be done on a regular basis;
- Leaking equipment must be repaired immediately or be removed from site to facilitate repair; and
- The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly;

8.4.2 Mitigation Measures for the Faunal Community

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

- No trapping, killing or poisoning of any wildlife is to be allowed on site and within the surrounding area, including snakes, birds, lizards, frogs, insects or 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 duration of the construction should be minimized to as short term as possible, in order to reduce the period of disturbance on fauna and flora; and
- An Environmental Compliance Officer (ECO) should be appointed to do weekly site visits to ensure that the above-mentioned mitigations are strictly adhered to.
- The area where storage tanks and filling are to take place needs to be lined with industry standard linings to prevent spilling of the corrosive and toxic substances into the surrounding areas.

9 Recommendations

The following recommendations are suggested:

- A vegetation alien invasive management plan should be implemented. This plan must be implemented during the construction phase of the project. Alien infestation must be monitored annually during the operational phase, and measures implemented on a needs basis;
- Soft or green engineering should be incorporated into the design of the facility; and
- A waste management plan needs to be compiled and implemented.

10 Conclusion

The survey, which was completed, and the corresponding studies resulted in good site coverage, 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 much of the project area has been extensively altered, both historically and at present due to the sandblasting business and associated disturbances, with little natural or pristine vegetation remaining. The main impact expected to influence the fauna and flora is the spilling of the corrosive and toxic substances that will be stored and decanted on site, through the implementation of a spill management plan as well as lining of the area this impact can be mitigated.

11 Impact Statement

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

Considering the findings of the respective studies, no fatal flaws were identified for the proposed project. Should the avoidance and mitigation measures prescribed be implemented, the significance of the considered impacts for all aspects is expected to be low. It is thus the opinion of the specialists that the project can proceed, but only if the prescribed mitigation measures and recommendations are implemented.

12 References

ADU (Animal Demography Unit). (2019). Virtual Museum.(Accessed: Nov 2019).

Alexander, G. & Marais, J. (2007). A guide to the Reptiles of Southern Africa. Struik, Cape Town.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). (2014). Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

BGIS. (Biodiversity GIS) (2019). http://bgis.sanbi.org/. (Accessed: Accessed: Nov 2019).

Bonn Convention (1979). Convention on the Conservation of Migratory Species of Wild Animals. www.cms.int/sites/default/files/instrument/CMS-text.en .PDF (Accessed: June 2018).

BODATSA-POSA (2019). Plants of South Africa - an online checklist. POSA ver. 3.0. http://newposa.sanbi.org/. (Accessed: Nov 2019).

Branch, W.R. (1998) Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town.

CBD (Convention on Biological Diversity). (1993). https://www.cbd.int/doc/legal/cbd-en.pdf. (Accessed: Nov 2019).

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) (1973). www.cites.org. (Accessed: June 2018).

Del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A., Fishpool, L.D.C., Boesman, P. & Kirwan, G.M. (1996). HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 2: Passerines. Lynx Editions and BirdLife International, Barcelona, Spain and Cambridge, UK.

Du Preez, & Carruthers, V. (2009) A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

EWT. (2016). Mammal Red List 2016. www.ewt.org.za (Accessed: Nov 2019).

Fish, L., Mashau, A.C., Moeaha, M.J., Nembudani, M.T. (2015). Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

FrogMap (2017). The Southern African Frog Atlas Project (SAFAP, now FrogMAP). http://vmus.adu.org.za (Accessed in Nov 2019).

GDARD. (2014). Technical Report for the Gauteng Conservation Plan (Gauteng C-Plan v3.3). Gauteng Department of Agriculture and Rural Development: Nature Conservation Directorate. 60 pages.

GDARD. (2014). Requirements for biodiversity assessments: Version 3. Gauteng Department of Agriculture and Rural Development, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

IUCN (2017). The IUCN Red List of Threatened Species. www.iucnredlist.org (Accessed: November 2017).

Johnson, S. & Bytebier, B. (2015). Orchids of South Africa: A Field Guide. Struik publishers, Cape Town.

MammalMap (2017). http://mammalmap.adu.org.za/ (Accessed: Nov 2019).

Measey, G.J. (2011). Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research. South African National Biodiversity Institute, Pretoria.

Minter, L., Burger, M., Harrison, J.A. & Kloepfer, D. (2004). Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. Smithsonian Institute Avian Demography Unit, Washington; Cape Town.

Monadjem, A., Taylor, P.J., Coterrill, F.D.P. & Schoeman, C. (2010). Bats of southern and central Africa: a biogeographic and taxonomic synthesis. Wits University Press, Johannesburg.

Mucina, L. and Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Mucina, L., Rutherford, M.C. & Powrie, L.W. (Eds.). (2007). Vegetation map of South Africa, Lesotho and Swaziland. 1:1 000 000 scale sheet maps. 2nd ed. South African National Biodiversity Institute, Pretoria.

NBA. (2018). Terrestrial Ecosystem Threat Status 2018. http://bgis.sanbi.org/. (Accessed: Nov 2019)

NBF (2009). National Biodiversity Framework. www.environment.gov.za (Accessed: Nov 2019).

NPAES (2011). National Protected Areas Expansion Strategy. www.environment.gov.za (Accessed: Nov 2019).

Pooley, E. (1998): A Field Guide to Wild Flowers: KwaZulu-Natal and Eastern Region. The Flora Publications Trust; ABC Bookshop, Durban.

Raimonde, D. (2009). Red list of South African Plants. SANBI, Pretoria.

RAMSAR. (1971). The RAMSAR convention. www.ramsar.org (Accessed: Nov 2019).

SABAP2 (Bird Atlas Project). (2019). http://vmus.adu.org.za/. Accessed: Nov 2019.

SANBI. (2010). SANBI Biodiversity Series 14: National Protected Area Expansion Strategy for 2008. www.sanbi.org/documents/sanbi-biodiversity-series-14-national-protected-area-expansion-strategy-for-2008/ (Accessed: June 2018).

SANBI. (2013). Grassland Ecosystem Guidelines: landscape interpretation for planners and managers. http://biodiversityadvisor.sanbi.org (Accessed: Nov 2019).

SANBI. (2019). Red List of South African Plants version 2017.1. Redlist.sanbi.org (Accessed: Nov 2019).

SANBI. (2017). Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

SARCA (2018). South African Reptile Conservation Assessment. http://sarca.adu.org.za/ (Accessed: June 2018).

Skinner J.D. & Chimimba, C.T. (2005). The Mammals of the Southern African Subregion (New Edition). Cambridge University Press. South Africa.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Stuart, C. & Stuart, T. (1994). A field guide to the tracks and signs of Southern, Central East African Wildlife. Struik Nature, Cape Town.

Taylor, P. (1998). The Smaller Mammals of KwaZulu-Natal. University of Natal Press, Durban.

Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). (2015). The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Van Oudtshoorn, F. (2004). Gids tot die grasse van Suider-Afrika. Second Edition. Briza Publikasies, Pretoria.

Van Wyk, B. & Van Wyk, P. (1997). Field guide to trees of Southern Africa. Struik Publishers, Cape Town.

Van Wyk, B. & Malan, S. (1997). Field Guide to the Wild Flowers of the Highveld: Also Useful in Adjacent Grassland and Bushveld, Struik Publishers, Cape Town.

Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. (2013). Medicinal Plants of South Africa. Briza Publications, Pretoria.

Van Wyk, B-E. & Smith, G.F. (2014). Guide to the Aloes of South Africa. Briza Publishers, Pretoria.

UNFCC. (1994). The United Nations Framework Convention on Climate Change. unfccc.int/resource/docs/convkp/conveng.pdf. (Accessed: Nov 2019).

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

Family	*Taxon*	Author	IUCN	Ecology
Cyperaceae	*Abildgaardia ovata*	(Burm.f.) Kral	LC	Indigenous
Fabaceae	*Abrus laevigatus*	E.Mey.	LC	Indigenous
Amaranthaceae	*Achyranthes aspera var. aspera*	L.		Not indigenous; Naturalised
Pteridaceae	*Adiantum raddianum*	C.Presl		Not indigenous; Naturalised
Asteraceae	*Afroaster serrulatus*	(Harv.) J.C.Manning & Goldblatt	LC	Indigenous
Rubiaceae	*Afrocanthium gilfillanii*	(N.E.Br.) Lantz	LC	Indigenous
Agapanthaceae	*Agapanthus campanulatus subsp. patens*	F.M.Leight.	LC	Indigenous
Poaceae	*Agrostis eriantha var. eriantha*	Hack.	LC	Indigenous
Lamiaceae	*Ajuga ophrydis*	Burch. ex Benth.	LC	Indigenous
Alismataceae	*Alisma plantago-aquatica*	L.	NE	Not indigenous; Naturalised; Invasive
Poaceae	*Alloteropsis semialata subsp. eckloniana*	(R.Br.) Hitchc.	LC	Indigenous
Poaceae	*Alloteropsis semialata subsp. semialata*	(R.Br.) Hitchc.	LC	Indigenous
Asphodelaceae	*Aloe marlothii subsp. marlothii*	A.Berger	LC	Indigenous
Amaranthaceae	*Amaranthus muricatus*	(Moq.) Hieron.		Not indigenous; Naturalised
Apocynaceae	*Ancylobotrys capensis*	(Oliv.) Pichon	LC	Indigenous
Poaceae	*Andropogon appendiculatus*	Nees	LC	Indigenous
Poaceae	*Andropogon schirensis*	Hochst. ex A.Rich.	LC	Indigenous
Menispermaceae	*Antizoma angustifolia*	(Burch.) Miers ex Harv.	LC	Indigenous
Fabaceae	*Argyrolobium rupestre subsp. rupestre*	(E.Mey.) Walp.	LC	Indigenous
Fabaceae	*Argyrolobium tuberosum*	Eckl. & Zeyh.	LC	Indigenous
Poaceae	*Aristida bipartita*	(Nees) Trin. & Rupr.	LC	Indigenous
Poaceae	*Aristida canescens subsp. canescens*	Henrard	LC	Indigenous
Poaceae	*Aristida diffusa subsp. burkei*	Trin.	LC	Indigenous
Poaceae	*Aristida sp.*			
Poaceae	*Arundinella nepalensis*	Trin.	LC	Indigenous
Apocynaceae	*Asclepias eminens*	(Harv.) Schltr.	LC	Indigenous
Asparagaceae	*Asparagus cooperi*	Baker	LC	Indigenous
Asparagaceae	*Asparagus laricinus*	Burch.	LC	Indigenous
Asparagaceae	*Asparagus suaveolens*	Burch.	LC	Indigenous
Asteraceae	*Athrixia angustissima*	DC.	LC	Indigenous
Asteraceae	*Athrixia elata*	Sond.	LC	Indigenous
Asteraceae	*Athrixia phylicoides*	DC.	LC	Indigenous
Iridaceae	*Babiana bainesii*	Baker	LC	Indigenous
Acanthaceae	*Barleria macrostegia*	Nees	LC	Indigenous
Acanthaceae	*Barleria obtusa*	Nees	LC	Indigenous

Asteraceae	*Berkheya seminivea*	Harv. & Sond.	LC	Indigenous; Endemic
Acanthaceae	*Blepharis stainbankiae*	C.B.Clarke	LC	Indigenous; Endemic
Poaceae	*Brachiaria serrata*	(Thunb.) Stapf	LC	Indigenous
Scrophulariaceae	*Buddleja saligna*	Willd.	LC	Indigenous
Asphodelaceae	*Bulbine narcissifolia*	Salm-Dyck	LC	Indigenous
Cyperaceae	*Bulbostylis burchellii*	(Ficalho & Hiern) C.B.Clarke	LC	Indigenous
Amaranthaceae	*Chenopodium album*	L.		Not indigenous; Naturalised; Invasive
Amaranthaceae	*Chenopodium schraderianum*	Roem. & Schult.		Not indigenous; Naturalised
Amaranthaceae	*Chenopodium sp.*			
Poaceae	*Chloris virgata*	Sw.	LC	Indigenous
Asteraceae	*Cineraria aspera*	Thunb.	LC	Indigenous
Rosaceae	*Cliffortia nitidula subsp. pilosa*	(Engl.) R.E.Fr. & T.C.E.Fr.		Indigenous
Combretaceae	*Combretum erythrophyllum*	(Burch.) Sond.	LC	Indigenous
Asteraceae	*Conyza podocephala*	DC.		Indigenous
Asteraceae	*Cotula coronopifolia*	L.	LC	Indigenous
Asteraceae	*Cotula microglossa*	(DC.) O.Hoffm. & Kuntze ex Kuntze	LC	Indigenous; Endemic
Acanthaceae	*Crabbea acaulis*	N.E.Br.	LC	Indigenous
Crassulaceae	*Crassula alba var. alba*	Forssk.	NE	Indigenous
Crassulaceae	*Crassula arborescens subsp. arborescens*	(Mill.) Willd.	LC	Indigenous; Endemic
Crassulaceae	*Crassula setulosa var. jenkinsii*	Harv.	NE	Indigenous; Endemic
Asteraceae	*Crepis hypochaeridea*	(DC.) Thell.		Not indigenous; Naturalised; Invasive
Convolvulaceae	*Cuscuta campestris*	Yunck.		Not indigenous; Naturalised; Invasive
Commelinaceae	*Cyanotis speciosa*	(L.f.) Hassk.	LC	Indigenous
Poaceae	*Cymbopogon caesius*	(Hook. & Arn.) Stapf	LC	Indigenous
Poaceae	*Cynodon transvaalensis*	Burtt Davy	LC	Indigenous
Cyperaceae	*Cyperus congestus*	Vahl	LC	Indigenous
Cyperaceae	*Cyperus obtusiflorus var. obtusiflorus*	Vahl	LC	Indigenous
Lobeliaceae	*Cyphia persicifolia*	C.Presl	LC	Indigenous; Endemic
Solanaceae	*Datura stramonium*	L.		Not indigenous; Naturalised; Invasive
Aizoaceae	*Delosperma sp.*			
Asteraceae	*Denekia capensis*	Thunb.	LC	Indigenous
Fabaceae	*Dichilus lebeckioides*	DC.	LC	Indigenous
Scrophulariaceae	*Diclis rotundifolia*	(Hiern) Hilliard & B.L.Burtt	LC	Indigenous
Poaceae	*Digitaria diagonalis var. diagonalis*	(Nees) Stapf	LC	Indigenous
Poaceae	*Digitaria monodactyla*	(Nees) Stapf	LC	Indigenous
Poaceae	*Digitaria ternata*	(A.Rich.) Stapf	LC	Indigenous

Poaceae	*Diheteropogon amplectens var. amplectens*	(Nees) Clayton	LC	Indigenous
Asteraceae	*Dimorphotheca spectabilis*	Schltr.	LC	Indigenous; Endemic
Ebenaceae	*Diospyros austro-africana var. microphylla*	De Winter	LC	Indigenous
Ebenaceae	*Diospyros lycioides subsp. guerkei*	Desf.	LC	Indigenous
Droseraceae	*Drosera burkeana*	Planch.	LC	Indigenous
Poaceae	*Echinochloa jubata*	Stapf	LC	Indigenous
Fabaceae	*Elephantorrhiza elephantina*	(Burch.) Skeels	LC	Indigenous
Poaceae	*Elionurus muticus*	(Spreng.) Kunth	LC	Indigenous
Poaceae	*Eragrostis capensis*	(Thunb.) Trin.	LC	Indigenous
Poaceae	*Eragrostis curvula*	(Schrad.) Nees	LC	Indigenous
Poaceae	*Eragrostis nindensis*	Ficalho & Hiern	LC	Indigenous
Poaceae	*Eragrostis sclerantha subsp. sclerantha*	Nees	LC	Indigenous
Poaceae	*Eragrostis sp.*			
Poaceae	*Eragrostis stapfii*	De Winter	LC	Indigenous
Poaceae	*Eragrostis tef*	(Zuccagni) Trotter	NE	Not indigenous; Naturalised
Fabaceae	*Eriosema burkei var. burkei*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Erythrina zeyheri*	Harv.	LC	Indigenous
Ebenaceae	*Euclea crispa subsp. crispa*	(Thunb.) Gurke	LC	Indigenous
Poaceae	*Eustachys paspaloides*	(Vahl) Lanza & Mattei	LC	Indigenous
Gentianaceae	*Exochaenium grande*	(E.Mey.) Griseb.	LC	Indigenous
Asteraceae	*Felicia filifolia subsp. filifolia*	(Vent.) Burtt Davy	LC	Indigenous
Cyperaceae	*Fimbristylis complanata*	(Retz.) Link	LC	Indigenous
Cyperaceae	*Fuirena coerulescens*	Steud.	LC	Indigenous
Cyperaceae	*Fuirena pubescens var. pubescens*	(Poir.) Kunth	LC	Indigenous
Asteraceae	*Garuleum woodii*	Schinz	LC	Indigenous
Iridaceae	*Gladiolus papilio*	Hook.f.	LC	Indigenous
Iridaceae	*Gladiolus permeabilis subsp. edulis*	D.Delaroche	LC	Indigenous
Iridaceae	*Gladiolus sericeovillosus subsp. calvatus*	Hook.f.	LC	Indigenous
Iridaceae	*Gladiolus sericeovillosus subsp. sericeovillosus*	Hook.f.	LC	Indigenous
Orchidaceae	*Habenaria bicolor*	Conrath & Kraenzl.	NT	Indigenous
Orchidaceae	*Habenaria epipactidea*	Rchb.f.	LC	Indigenous
Amaryllidaceae	*Haemanthus humilis subsp. humilis*	Jacq.	LC	Indigenous
Poaceae	*Harpochloa falx*	(L.f.) Kuntze	LC	Indigenous
Asteraceae	*Helichrysum aureum var. monocephalum*	(Houtt.) Merr.	NE	Indigenous
Asteraceae	*Helichrysum caespititium*	(DC.) Harv.	LC	Indigenous
Asteraceae	*Helichrysum cephaloideum*	DC.	LC	Indigenous
Asteraceae	*Helichrysum harveyanum*	Wild	LC	Indigenous
Asteraceae	*Helichrysum kraussii*	Sch.Bip.	LC	Indigenous
Asteraceae	*Helichrysum lepidissimum*	S.Moore	LC	Indigenous

Asteraceae	*Helichrysum nudifolium var. nudifolium*	(L.) Less.	LC	Indigenous
Asteraceae	*Helichrysum rugulosum*	Less.	LC	Indigenous
Asteraceae	*Helichrysum setosum*	Harv.	LC	Indigenous
Poaceae	*Helictotrichon sp.*			
Malvaceae	*Hermannia coccocarpa*	(Eckl. & Zeyh.) Kuntze	LC	Indigenous
Malvaceae	*Hermannia cordata*	(E.Mey. ex E.Phillips) De Winter	LC	Indigenous; Endemic
Malvaceae	*Hermannia geniculata*	Eckl. & Zeyh.	LC	Indigenous
Malvaceae	*Hermannia grandistipula*	(Buchinger ex Hochst.) K.Schum.	LC	Indigenous
Malvaceae	*Hermannia lancifolia*	Szyszyl.	LC	Indigenous; Endemic
Poaceae	*Heteropogon contortus*	(L.) Roem. & Schult.	LC	Indigenous
Asteraceae	*Hilliardiella hirsuta*	(DC.) H.Rob.	LC	Indigenous
Poaceae	*Hyparrhenia dregeana*	(Nees) Stapf ex Stent	LC	Indigenous
Poaceae	*Hyparrhenia hirta*	(L.) Stapf	LC	Indigenous
Hypericaceae	*Hypericum aethiopicum subsp. sonderi*	Thunb.	LC	Indigenous
Hypoxidaceae	*Hypoxis acuminata*	Baker	LC	Indigenous
Hypoxidaceae	*Hypoxis multiceps*	Buchinger ex Baker	LC	Indigenous
Poaceae	*Imperata cylindrica*	(L.) Raeusch.	LC	Indigenous
Fabaceae	*Indigastrum burkeanum*	(Benth. ex Harv.) Schrire	LC	Indigenous
Fabaceae	*Indigastrum fastigiatum*	(E.Mey.) Schrire	LC	Indigenous
Fabaceae	*Indigofera dimidiata*	Vogel ex Walp.	LC	Indigenous
Fabaceae	*Indigofera hedyantha*	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	*Indigofera hilaris var. hilaris*	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	*Indigofera obscura*	N.E.Br.	LC	Indigenous
Fabaceae	*Indigofera oxytropis*	Benth. ex Harv.	LC	Indigenous
Convolvulaceae	*Ipomoea oblongata*	E.Mey. ex Choisy	LC	Indigenous
Cyperaceae	*Isolepis cernua var. cernua*	(Vahl) Roem. & Schult.	LC	Indigenous
Cyperaceae	*Isolepis costata*	Hochst. ex A.Rich.	LC	Indigenous
Juncaceae	*Juncus exsertus*	Buchenau	LC	Indigenous
Cucurbitaceae	*Kedrostis africana*	(L.) Cogn.	LC	Indigenous
Aizoaceae	*Khadia acutipetala*	(N.E.Br.) N.E.Br.	LC	Indigenous; Endemic
Poaceae	*Koeleria capensis*	(Steud.) Nees	LC	Indigenous
Cyperaceae	*Kyllinga pulchella*	Kunth	LC	Indigenous
Fabaceae	*Lablab purpureus subsp. purpureus*	(L.) Sweet	NE	Not indigenous; Naturalised
Thymelaeaceae	*Lasiosiphon caffer*	Meisn.	LC	Indigenous
Thymelaeaceae	*Lasiosiphon capitatus*	(L.f.) Burtt Davy	LC	Indigenous
Thymelaeaceae	*Lasiosiphon kraussianus*	(Meisn.) Meisn.		Indigenous
Hyacinthaceae	*Ledebouria inquinata*	(C.A.Sm.) Jessop	LC	Indigenous
Poaceae	*Leersia hexandra*	Sw.	LC	Indigenous
Lamiaceae	*Leonotis schinzii*	Gurke	LC	Indigenous

Poaceae	*Leptochloa fusca*	(L.) Kunth	LC	Indigenous
Aizoaceae	*Lithops lesliei subsp. lesliei*	(N.E.Br.) N.E.Br.	NT	Indigenous
Poaceae	*Lolium perenne*	L.	NE	Not indigenous; Naturalised; Invasive
Asteraceae	*Lopholaena coriifolia*	(Sond.) E.Phillips & C.A.Sm.	LC	Indigenous
Fabaceae	*Macrotyloma axillare var. axillare*	(E.Mey.) Verdc.	LC	Indigenous
Malvaceae	*Melhania prostrata*	DC.	LC	Indigenous
Fabaceae	*Melolobium wilmsii*	Harms	LC	Indigenous; Endemic
Sapotaceae	*Mimusops zeyheri*	Sond.	LC	Indigenous
Poaceae	*Miscanthus junceus*	(Stapf) Pilg.	LC	Indigenous
Lobeliaceae	*Monopsis decipiens*	(Sond.) Thulin	LC	Indigenous
Geraniaceae	*Monsonia angustifolia*	E.Mey. ex A.Rich.	LC	Indigenous
Iridaceae	*Moraea pallida*	(Baker) Goldblatt	LC	Indigenous
Iridaceae	*Moraea simulans*	Baker	LC	Indigenous
Fabaceae	*Mundulea sericea subsp. sericea*	(Willd.) A.Chev.	LC	Indigenous
Myrsinaceae	*Myrsine africana*	L.	LC	Indigenous
Lythraceae	*Nesaea schinzii*	Koehne	LC	Indigenous
Asteraceae	*Nidorella anomala*	Steetz	LC	Indigenous
Menyanthaceae	*Nymphoides thunbergiana*	(Griseb.) Kuntze	LC	Indigenous
Asteraceae	*Osteospermum scariosum var. scariosum*	DC.	NE	Indigenous
Santalaceae	*Osyris lanceolata*	Hochst. & Steud.	LC	Indigenous
Apocynaceae	*Pachycarpus schinzianus*	(Schltr.) N.E.Br.	LC	Indigenous
Poaceae	*Panicum maximum*	Jacq.	LC	Indigenous
Poaceae	*Panicum repens*	L.	LC	Indigenous
Poaceae	*Panicum schinzii*	Hack.	LC	Indigenous
Apocynaceae	*Parapodium costatum*	E.Mey.	LC	Indigenous
Poaceae	*Paspalum dilatatum*	Poir.	NE	Not indigenous; Naturalised; Invasive
Poaceae	*Paspalum distichum*	L.	LC	Not indigenous; Naturalised; Invasive
Poaceae	*Pennisetum sphacelatum*	(Nees) T.Durand & Schinz	LC	Indigenous
Rubiaceae	*Pentanisia angustifolia*	(Hochst.) Hochst.	LC	Indigenous
Polygonaceae	*Persicaria madagascariensis*	(Meisn.) S.Ortiz & Paiva		Indigenous
Solanaceae	*Physalis angulata*	L.		Not indigenous; Naturalised; Invasive
Phytolaccaceae	*Phytolacca octandra*	L.		Not indigenous; Naturalised; Invasive
Poaceae	*Poa annua*	L.	NE	Not indigenous; Naturalised
Caryophyllaceae	*Pollichia campestris*	Aiton	LC	Indigenous
Polygalaceae	*Polygala houtboshiana*	Chodat	LC	Indigenous
Polygalaceae	*Polygala illepida*	E.Mey. ex Harv.	LC	Indigenous; Endemic
Potamogetonaceae	*Potamogeton pectinatus*	L.	LC	Indigenous

Celastraceae	*Pterocelastrus echinatus*	N.E.Br.	LC	Indigenous
Ranunculaceae	*Ranunculus dregei*	J.C.Manning & Goldblatt	LC	Indigenous
Vitaceae	*Rhoicissus tridentata subsp. cuneifolia*	(L.f.) Wild & R.B.Drumm.	NE	Indigenous
Fabaceae	*Rhynchosia adenodes*	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	*Rhynchosia pedunculata*	M.M.le Roux & Moteetee		Indigenous; Endemic
Fabaceae	*Rhynchosia reptabunda*	N.E.Br.	LC	Indigenous
Fabaceae	*Rhynchosia sordida*	(E.Mey.) Schinz	LC	Indigenous
Fabaceae	*Rhynchosia totta var. totta*	(Thunb.) DC.	LC	Indigenous
Euphorbiaceae	*Ricinus communis var. communis*	L.	NE	Not indigenous; Cultivated; Naturalised; Invasive
Rosaceae	*Rubus rigidus*	Sm.	LC	Indigenous
Lamiaceae	*Salvia runcinata*	L.f.	LC	Indigenous
Orchidaceae	*Satyrium hallackii subsp. ocellatum*	Bolus	LC	Indigenous
Asteraceae	*Schistostephium crataegifolium*	(DC.) Fenzl ex Harv.	LC	Indigenous
Asteraceae	*Schkuhria pinnata*	(Lam.) Kuntze ex Thell.		Not indigenous; Naturalised
Cyperaceae	*Scirpoides burkei*	(C.B.Clarke) Goetgh., Muasya & D.A.Simpson	LC	Indigenous
Anacardiaceae	*Searsia discolor*	(E.Mey. ex Sond.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia leptodictya*	(Diels) T.S.Yi, A.J.Mill. & J.Wen	LC	Indigenous
Anacardiaceae	*Searsia magalismontana subsp. magalismontana*	(Sond.) Moffett	LC	Indigenous
Anacardiaceae	*Searsia rigida var. margaretae*	(Mill.) F.A.Barkley	LC	Indigenous; Endemic
Anacardiaceae	*Searsia rigida var. rigida*	(Mill.) F.A.Barkley	LC	Indigenous; Endemic
Scrophulariaceae	*Selago capitellata*	Schltr.	LC	Indigenous; Endemic
Asteraceae	*Senecio coronatus*	(Thunb.) Harv.	LC	Indigenous
Asteraceae	*Senecio hieracioides*	DC.	LC	Indigenous
Asteraceae	*Senecio lydenburgensis*	Hutch. & Burtt Davy	LC	Indigenous
Fabaceae	*Senegalia caffra*	(Thunb.) P.J.H.Hurter & Mabb.	LC	Indigenous
Poaceae	*Setaria nigrirostris*	(Nees) T.Durand & Schinz	LC	Indigenous
Poaceae	*Setaria sphacelata var. torta*	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
Malvaceae	*Sida chrysantha*	Ulbr.	LC	Indigenous
Malvaceae	*Sida rhombifolia subsp. rhombifolia*	L.	LC	Indigenous
Solanaceae	*Solanum campylacanthum*	Hochst. ex A.Rich.		Indigenous
Solanaceae	*Solanum humile*	Lam.		Indigenous
Solanaceae	*Solanum retroflexum*	Dunal	LC	Indigenous
Solanaceae	*Solanum sisymbriifolium*	Lam.		Not indigenous; Naturalised; Invasive
Poaceae	*Sporobolus discosporus*	Nees	LC	Indigenous
Poaceae	*Sporobolus natalensis*	(Steud.) T.Durand & Schinz	LC	Indigenous

Poaceae	*Sporobolus sp.*			
Apocynaceae	*Stenostelma periglossoides*	(Schltr.) Bester & Nicholas		Indigenous; Endemic
Lamiaceae	*Syncolostemon pretoriae*	(Gurke) D.F.Otieno	LC	Indigenous
Asteraceae	*Tagetes minuta*	L.		Not indigenous; Naturalised; Invasive
Fabaceae	*Tephrosia longipes*	Meisn.		Indigenous
Lamiaceae	*Teucrium trifidum*	Retz.	LC	Indigenous
Santalaceae	*Thesium rasum*	(A.W.Hill) N.E.Br.	LC	Indigenous
Asphodelaceae	*Trachyandra erythrorrhiza*	(Conrath) Oberm.	LC	Indigenous; Endemic
Asphodelaceae	*Trachyandra saltii var. saltii*	(Baker) Oberm.	LC	Indigenous
Poaceae	*Trachypogon spicatus*	(L.f.) Kuntze	LC	Indigenous
Poaceae	*Trichoneura grandiglumis*	(Nees) Ekman	LC	Indigenous
Fabaceae	*Trifolium africanum var. africanum*	Ser.	NE	Indigenous
Poaceae	*Tristachya leucothrix*	Trin. ex Nees	LC	Indigenous
Alliaceae	*Tulbaghia leucantha*	Baker	LC	Indigenous
Poaceae	*Urochloa panicoides*	P.Beauv.	LC	Indigenous
Asteraceae	*Ursinia nana subsp. leptophylla*	DC.	LC	Indigenous
Rubiaceae	*Vangueria infausta subsp. infausta*	Burch.	LC	Indigenous
Fabaceae	*Vicia sativa subsp. sativa*	L.	NE	Not indigenous; Naturalised
Fabaceae	*Vigna vexillata var. vexillata*	(L.) A.Rich.	LC	Indigenous
Solanaceae	*Withania somnifera*	(L.) Dunal	LC	Indigenous
Rhamnaceae	*Ziziphus zeyheriana*	Sond.	LC	Indigenous
Fabaceae	*Zornia linearis*	E.Mey.	LC	Indigenous

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Accipiter melanoleucus	Sparrowhawk, Black	Unlisted	LC
Accipiter minullus	Sparrowhawk, Little	Unlisted	LC
Accipiter ovampensis	Sparrowhawk, Ovambo	Unlisted	LC
Acridotheres tristis	Myna, Common	Unlisted	LC
Acrocephalus arundinaceus	Reed-warbler, Great	Unlisted	LC
Acrocephalus baeticatus	Reed-warbler, African	Unlisted	Unlisted
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Acrocephalus palustris	Warbler, Marsh	Unlisted	LC
Acrocephalus schoenobaenus	Warbler, Sedge	Unlisted	LC
Actitis hypoleucos	Sandpiper, Common	Unlisted	LC
Actophilornis africanus	Jacana, African	Unlisted	LC
Afrotis afraoides	Korhaan, Northern Black	Unlisted	LC
Agapornis roseicollis	Lovebird, Rosy-faced	Unlisted	LC
Alcedo cristata	Kingfisher, Malachite	Unlisted	Unlisted
Alcedo semitorquata	Kingfisher, Half-collared	NT	LC
Alopochen aegyptiacus	Goose, Egyptian	Unlisted	LC
Amadina erythrocephala	Finch, Red-headed	Unlisted	LC
Amandava subflava	Waxbill, Orange-breasted	Unlisted	Unlisted
Amaurornis flavirostris	Crake, Black	Unlisted	LC
Amblyospiza albifrons	Weaver, Thick-billed	Unlisted	LC
Anas capensis	Teal, Cape	Unlisted	LC
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC
Anas hottentota	Teal, Hottentot	Unlisted	LC
Anas platyrhynchos	Duck, Mallard	Unlisted	LC
Anas smithii	Shoveler, Cape	Unlisted	LC
Anas sparsa	Duck, African Black	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Anastomus lamelligerus	Openbill, African	Unlisted	LC
Anhinga rufa	Darter, African	Unlisted	LC
Anomalospiza imberbis	Finch, Cuckoo	Unlisted	LC
Anser anser	Goose, Domestic	Unlisted	LC
Anthus chloris	Pipit, Yellow-breasted	VU	VU
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Anthus crenatus	Pipit, African Rock	NT	LC
Anthus leucophrys	Pipit, Plain-backed	Unlisted	LC
Anthus lineiventris	Pipit, Striped	Unlisted	LC
Anthus similis	Pipit, Long-billed	Unlisted	LC
Anthus vaalensis	Pipit, Buffy	Unlisted	LC
Apalis thoracica	Apalis, Bar-throated	Unlisted	LC
Apus affinis	Swift, Little	Unlisted	LC
Apus apus	Swift, Common	Unlisted	LC
Apus barbatus	Swift, African Black	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC

Apus horus	Swift, Horus	Unlisted	LC
Aquila pennatus	Eagle, Booted	Unlisted	LC
Aquila verreauxii	Eagle, Verreaux's	VU	LC
Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea goliath	Heron, Goliath	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Ardeola ralloides	Heron, Squacco	Unlisted	LC
Asio capensis	Owl, Marsh	Unlisted	LC
Batis molitor	Batis, Chinspot	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Bradornis mariquensis	Flycatcher, Marico	Unlisted	LC
Bradypterus baboecala	Rush-warbler, Little	Unlisted	LC
Bubo africanus	Eagle-owl, Spotted	Unlisted	LC
Bubo capensis	Eagle-Owl, Cape	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Burhinus capensis	Thick-knee, Spotted	Unlisted	LC
Buteo rufofuscus	Buzzard, Jackal	Unlisted	LC
Buteo vulpinus	Buzzard, Common	Unlisted	Unlisted
Butorides striata	Heron, Green-backed	Unlisted	LC
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Calendulauda sabota	Lark, Sabota	Unlisted	LC
Calidris ferruginea	Sandpiper, Curlew	LC	NT
Calidris minuta	Stint, Little	LC	LC
Camaroptera brevicaudata	Camaroptera, Grey-backed	Unlisted	Unlisted
Campephaga flava	Cuckoo-shrike, Black	Unlisted	LC
Campethera abingoni	Woodpecker, Golden-tailed	Unlisted	LC
Centropus burchellii	Coucal, Burchell's	Unlisted	Unlisted
Cercomela familiaris	Chat, Familiar	Unlisted	LC
Cercomela sinuata	Chat, Sickle-winged	Unlisted	LC
Cercotrichas leucophrys	Scrub-robin, White-browed	Unlisted	LC
Cercotrichas paena	Scrub-robin, Kalahari	Unlisted	LC
Certhilauda semitorquata	Lark, Eastern Long-billed	Unlisted	LC
Ceryle rudis	Kingfisher, Pied	Unlisted	LC
Chalcomitra amethystina	Sunbird, Amethyst	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Chlidonias hybrida	Tern, Whiskered	Unlisted	LC
Chlidonias leucopterus	Tern, White-winged	Unlisted	LC
Chloropeta natalensis	Warbler, Dark-capped Yellow	Unlisted	LC
Chrysococcyx caprius	Cuckoo, Diderick	Unlisted	LC
Chrysococcyx klaas	Cuckoo, Klaas's	Unlisted	LC
Ciconia abdimii	Stork, Abdim's	NT	LC
Ciconia ciconia	Stork, White	Unlisted	LC
Cinnyris talatala	Sunbird, White-bellied	Unlisted	LC

Circaetus cinereus	Snake-eagle, Brown	Unlisted	LC
Circaetus pectoralis	Snake-eagle, Black-chested	Unlisted	LC
Circus aeruginosus	Marsh-harrier, Western	Unlisted	LC
Circus macrourus	Harrier, Pallid	NT	NT
Circus maurus	Harrier, Black	EN	VU
Circus pygargus	Montagu's Harrier	Unlisted	LC
Circus ranivorus	Marsh-harrier, African	EN	LC
Cisticola aberrans	Cisticola, Lazy	Unlisted	LC
Cisticola aridulus	Cisticola, Desert	Unlisted	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola chiniana	Cisticola, Rattling	Unlisted	LC
Cisticola cinnamomeus	Cisticola, Pale-crowned	Unlisted	LC
Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola lais	Cisticola, Wailing	Unlisted	LC
Cisticola textrix	Cisticola, Cloud	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Clamator glandarius	Cuckoo, Great Spotted	Unlisted	LC
Clamator jacobinus	Cuckoo, Jacobin	Unlisted	LC
Colius colius	Mousebird, White-backed	Unlisted	LC
Colius striatus	Mousebird, Speckled	Unlisted	LC
Columba arquatrix	Olive-pigeon, African	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Coracias caudatus	Roller, Lilac-breasted	Unlisted	LC
Coracias garrulus	Roller, European	NT	LC
Corvus albus	Crow, Pied	Unlisted	LC
Corvus capensis	Crow, Cape	Unlisted	LC
Corythaixoides concolor	Go-away-bird, Grey	Unlisted	LC
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Coturnix delegorguei	Quail, Harlequin	Unlisted	LC
Creatophora cinerea	Starling, Wattled	Unlisted	LC
Crecopsis egregia	Crake, African	Unlisted	LC
Crex crex	Crake, Corn	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Crithagra gularis	Seedeater, Streaky-headed	Unlisted	LC
Crithagra mozambicus	Canary, Yellow-fronted	Unlisted	LC
Cuculus canorus	Cuckoo, Common	Unlisted	LC
Cuculus gularis	Cuckoo, African	Unlisted	LC
Cuculus solitarius	Cuckoo, Red-chested	Unlisted	LC
Cursorius temminckii	Courser, Temminck's	Unlisted	LC
Cypsiurus parvus	Palm-swift, African	Unlisted	LC
Delichon urbicum	House-martin, Common	Unlisted	LC
Dendrocygna bicolor	Duck, Fulvous	Unlisted	LC

Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC
Dendropicos fuscescens	Woodpecker, Cardinal	Unlisted	LC
Dicrurus adsimilis	Drongo, Fork-tailed	Unlisted	LC
Dryoscopus cubla	Puffback, Black-backed	Unlisted	LC
Egretta alba	Egret, Great	Unlisted	LC
Egretta ardesiaca	Heron, Black	Unlisted	LC
Egretta garzetta	Egret, Little	Unlisted	LC
Egretta intermedia	Egret, Yellow-billed	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emberiza capensis	Bunting, Cape	Unlisted	LC
Emberiza flaviventris	Bunting, Golden-breasted	Unlisted	LC
Emberiza impetuani	Bunting, Lark-like	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Eremomela icteropygialis	Eremomela, Yellow-bellied	Unlisted	LC
Eremopterix leucotis	Sparrowlark, Chestnut-backed	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Estrilda erythronotos	Waxbill, Black-faced	Unlisted	LC
Euplectes afer	Bishop, Yellow-crowned	Unlisted	LC
Euplectes albonotatus	Widowbird, White-winged	Unlisted	LC
Euplectes ardens	Widowbird, Red-collared	Unlisted	LC
Euplectes axillaris	Widowbird, Fan-tailed	Unlisted	LC
Euplectes capensis	Bishop, Yellow	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC
Eupodotis caerulescens	Korhaan, Blue	LC	NT
Eupodotis senegalensis	Korhaan, White-bellied	VU	LC
Falco amurensis	Falcon, Amur	Unlisted	LC
Falco biarmicus	Falcon, Lanner	VU	LC
Falco naumanni	Kestrel, Lesser	Unlisted	LC
Falco peregrinus	Falcon, Peregrine	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC
Falco rupicolus	Kestrel, Rock	Unlisted	LC
Falco subbuteo	Hobby, Eurasian	Unlisted	LC
Falco vespertinus	Falcon, Red-footed	NT	NT
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Gallinago nigripennis	Snipe, African	Unlisted	LC
Gallinula angulata	Moorhen, Lesser	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Geocolaptes olivaceus	Woodpecker, Ground	Unlisted	NT
Glareola nordmanni	Pratincole, Black-winged	NT	NT
Halcyon albiventris	Kingfisher, Brown-hooded	Unlisted	LC
Haliaeetus vocifer	Fish-eagle, African	Unlisted	LC
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hippolais icterina	Warbler, Icterine	Unlisted	LC
Hippolais olivetorum	Warbler, Olive-tree	Unlisted	LC
Hirundo abyssinica	Swallow, Lesser Striped	Unlisted	LC

Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo cucullata	Swallow, Greater Striped	Unlisted	LC
Hirundo dimidiata	Swallow, Pearl-breasted	Unlisted	LC
Hirundo fuligula	Martin, Rock	Unlisted	Unlisted
Hirundo rustica	Swallow, Barn	Unlisted	LC
Hirundo semirufa	Swallow, Red-breasted	Unlisted	LC
Hirundo spilodera	Cliff-swallow, South African	Unlisted	LC
Indicator indicator	Honeyguide, Greater	Unlisted	LC
Indicator minor	Honeyguide, Lesser	Unlisted	LC
Ixobrychus minutus	Bittern, Little	Unlisted	LC
Jynx ruficollis	Wryneck, Red-throated	Unlisted	LC
Lagonosticta rhodopareia	Firefinch, Jameson's	Unlisted	LC
Lagonosticta rubricata	Firefinch, African	Unlisted	LC
Lagonosticta senegala	Firefinch, Red-billed	Unlisted	LC
Lamprotornis nitens	Starling, Cape Glossy	Unlisted	LC
Laniarius atrococcineus	Shrike, Crimson-breasted	Unlisted	LC
Laniarius ferrugineus	Boubou, Southern	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lanius collurio	Shrike, Red-backed	Unlisted	LC
Lanius minor	Shrike, Lesser Grey	Unlisted	LC
Larus cirrocephalus	Gull, Grey-headed	Unlisted	LC
Leptoptilos crumeniferus	Stork, Marabou	Unlisted	LC
Lioptilus nigricapillus	Blackcap, Bush	VU	NT
Lophaetus occipitalis	Eagle, Long-crested	Unlisted	LC
Lybius torquatus	Barbet, Black-collared	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Malaconotus blanchoti	Bush-shrike, Grey-headed	Unlisted	LC
Megaceryle maximus	Kingfisher, Giant	Unlisted	Unlisted
Melierax gabar	Goshawk, Gabar	Unlisted	LC
Merops apiaster	Bee-eater, European	Unlisted	LC
Merops bullockoides	Bee-eater, White-fronted	Unlisted	LC
Merops hirundineus	Bee-eater, Swallow-tailed	Unlisted	LC
Merops pusillus	Bee-eater, Little	Unlisted	LC
Milvus aegyptius	Kite, Yellow-billed	Unlisted	Unlisted
Milvus migrans	Kite, Black	Unlisted	LC
Mirafra africana	Lark, Rufous-naped	Unlisted	LC
Mirafra cheniana	Lark, Melodious	LC	NT
Mirafra fasciolata	Lark, Eastern Clapper	Unlisted	LC
Monticola explorator	Rock-thrush, Sentinel	Unlisted	LC
Monticola rupestris	Rock-thrush, Cape	Unlisted	LC
Motacilla aguimp	Wagtail, African Pied	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Motacilla flava	Wagtail, Western Yellow	Unlisted	LC
Muscicapa striata	Flycatcher, Spotted	Unlisted	LC
Mycteria ibis	Stork, Yellow-billed	EN	LC
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC

Nectarinia famosa	Sunbird, Malachite	Unlisted	LC
Netta erythrophthalma	Pochard, Southern	Unlisted	LC
Nilaus afer	Brubru	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Nycticorax nycticorax	Night-Heron, Black-crowned	Unlisted	LC
Oena capensis	Dove, Namaqua	Unlisted	LC
Oenanthe monticola	Wheatear, Mountain	Unlisted	LC
Oenanthe pileata	Wheatear, Capped	Unlisted	LC
Onychognathus morio	Starling, Red-winged	Unlisted	LC
Oriolus larvatus	Oriole, Black-headed	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Oxyura maccoa	Duck, Maccoa	NT	NT
Parisoma subcaeruleum	Tit-babbler, Chestnut-vented	Unlisted	Unlisted
Parus cinerascens	Tit, Ashy	Unlisted	LC
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Pavo cristatus	Peacock, Common	Unlisted	LC
Pelecanus onocrotalus	Pelican, Great White	VU	LC
Pernis apivorus	Honey-buzzard, European	Unlisted	LC
Petronia superciliaris	Petronia, Yellow-throated	Unlisted	LC
Phalacrocorax africanus	Cormorant, Reed	Unlisted	LC
Phalacrocorax capensis	Cormorant, Cape	EN	EN
Phalacrocorax carbo	Cormorant, White-breasted	LC	LC
Philomachus pugnax	Ruff	Unlisted	LC
Phoenicopterus minor	Flamingo, Lesser	NT	NT
Phoenicopterus ruber	Flamingo, Greater	NT	LC
Phoeniculus purpureus	Wood-hoopoe, Green	Unlisted	LC
Phylloscopus trochilus	Warbler, Willow	Unlisted	LC
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus cucullatus	Weaver, Village	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Podiceps cristatus	Grebe, Great Crested	Unlisted	LC
Podiceps nigricollis	Grebe, Black-necked	Unlisted	LC
Polyboroides typus	Harrier-Hawk, African	Unlisted	LC
Porphyrio madagascariensis	Swamphen, African Purple	Unlisted	Unlisted
Porzana pusilla	Crake, Baillon's	Unlisted	LC
Prinia flavicans	Prinia, Black-chested	Unlisted	LC
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC
Prodotiscus regulus	Honeybird, Brown-backed	Unlisted	LC
Psittacula krameri	Parakeet, Rose-ringed	Unlisted	LC
Psophocichla litsipsirupa	Thrush, Groundscraper	Unlisted	Unlisted

Pternistis natalensis	Spurfowl, Natal	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Pycnonotus nigricans	Bulbul, African Red-eyed	Unlisted	LC
Pycnonotus tricolor	Bulbul, Dark-capped	Unlisted	Unlisted
Pytilia melba	Pytilia, Green-winged	Unlisted	LC
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Rallus caerulescens	Rail, African	Unlisted	LC
Recurvirostra avosetta	Avocet, Pied	Unlisted	LC
Rhinopomastus cyanomelas	Scimitarbill, Common	Unlisted	LC
Riparia cincta	Martin, Banded	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Riparia riparia	Martin, Sand	Unlisted	LC
Rostratula benghalensis	Painted-snipe, Greater	NT	LC
Sagittarius serpentarius	Secretarybird	VU	VU
Sarkidiornis melanotos	Duck, Comb	Unlisted	LC
Sarothrura rufa	Flufftail, Red-chested	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila africanus	Francolin, Grey-winged	Unlisted	LC
Scleroptila levaillantii	Francolin, Red-winged	Unlisted	LC
Scleroptila levaillantoides	Francolin, Orange River	Unlisted	LC
Scopus umbretta	Hamerkop	Unlisted	LC
Serinus canicollis	Canary, Cape	Unlisted	LC
Sigelus silens	Flycatcher, Fiscal	Unlisted	LC
Spermestes cucullatus	Mannikin, Bronze	Unlisted	Unlisted
Sphenoeacus afer	Grassbird, Cape	Unlisted	LC
Spizocorys conirostris	Lark, Pink-billed	Unlisted	LC
Sporopipes squamifrons	Finch, Scaly-feathered	Unlisted	LC
Spreo bicolor	Starling, Pied	Unlisted	LC
Stenostira scita	Flycatcher, Fairy	Unlisted	LC
Sterna caspia	Tern, Caspian	VU	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Struthio camelus	Ostrich, Common	Unlisted	LC
Sturnus vulgaris	Starling, Common	Unlisted	LC
Sylvia borin	Warbler, Garden	Unlisted	LC
Sylvia communis	Whitethroat, Common	Unlisted	LC
Sylvietta rufescens	Crombec, Long-billed	Unlisted	LC
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC
Tachymarptis melba	Swift, Alpine	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Tchagra australis	Tchagra, Brown-crowned	Unlisted	LC
Tchagra senegalus	Tchagra, Black-crowned	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Terpsiphone viridis	Paradise-flycatcher, African	Unlisted	LC
Thalassornis leuconotus	Duck, White-backed	Unlisted	LC

Thamnolaea cinnamomeiventris	Cliff-chat, Mocking	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Tockus leucomelas	Hornbill, Southern Yellow-billed	Unlisted	LC
Tockus nasutus	Hornbill, African Grey	Unlisted	LC
Trachyphonus vaillantii	Barbet, Crested	Unlisted	LC
Treron calvus	Green-pigeon, African	Unlisted	LC
Tricholaema leucomelas	Barbet, Acacia Pied	Unlisted	LC
Tringa glareola	Sandpiper, Wood	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Tringa stagnatilis	Sandpiper, Marsh	Unlisted	LC
Turdoides jardineii	Babbler, Arrow-marked	Unlisted	LC
Turdus libonyanus	Thrush, Kurrichane	Unlisted	Unlisted
Turdus smithi	Thrush, Karoo	Unlisted	LC
Turnix sylvaticus	Buttonquail, Kurrichane	Unlisted	LC
Tyto alba	Owl, Barn	Unlisted	LC
Tyto capensis	Grass-owl, African	VU	LC
Upupa africana	Hoopoe, African	Unlisted	LC
Uraeginthus angolensis	Waxbill, Blue	Unlisted	LC
Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Vanellus senegallus	Lapwing, African Wattled	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC
Vidua paradisaea	Paradise-whydah, Long-tailed	Unlisted	LC
Vidua regia	Whydah, Shaft-tailed	Unlisted	LC
Zosterops virens	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)
Aethomys ineptus	Tete Veld Rat	LC	LC
Aethomys namaquensis	Namaqua rock rat	LC	LC
Alcelaphus buselaphus	Hartebeest	LC	LC
Antidorcas marsupialis	Sclater's Shrew	LC	LC
Aonyx capensis	Cape Clawless Otter	NT	NT
Atelerix frontalis	South Africa Hedgehog	NT	LC
Atilax paludinosus	Water Mongoose	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Caracal caracal	Caracal	LC	LC
Ceratotherium simum	White Rhinoceros	NT	NT
Connochaetes gnou	Black Wildebeest	LC	LC
Connochaetes taurinus	Blue Wildebeest	LC	LC
Crocidura cyanea	Reddish-grey Musk Shrew	LC	LC
Crocidura maquassiensis	Makwassie musk shrew	VU	LC
Crocidura silacea	Lesser Grey-brown Musk Shrew	LC	LC
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Damaliscus pygargus	Blesbok	LC	LC
Desmodillus auricularis	Short-tailed Gerbil	LC	LC
Diceros bicornis	Black Rhinoceros	EN	CR
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT
Elephantulus brachyrhynchus	Short-snouted Sengi	LC	LC
Elephantulus myurus	Eastern Rock Sengi	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Equus quagga	Plains Zebra	LC	NT
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wildcat	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Gerbilliscus brantsii	Highveld Gerbil	LC	LC
Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC
Hydrictis maculicollis	Spotted-necked Otter	VU	NT
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ichneumia albicauda	White-tailed Mongoose	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Kerivoula lanosa	Lesser Woolly Bat	LC	LC
Leptailurus serval	Serval	NT	LC
Lepus saxatilis	Scrub Hare	LC	LC
Lepus victoriae	African Savanna Hare	LC	LC
Mastomys coucha	Multimammate Mouse	LC	LC
Mastomys natalensis	Natal Multimammate Mouse	LC	LC
Mellivora capensis	Honey Badger	LC	LC

Mungos mungo	Banded Mongoose	LC	LC
Mus musculus	House Mouse	Unlisted	LC
Myotis tricolor	Temminck's Hairy Bat	LC	LC
Myotis welwitschii	Welwitsch's Hairy Bat	LC	LC
Mystromys albicaudatus	White-tailed Rat	VU	EN
Neoromicia capensis	Cape Serotine Bat	LC	LC
Neoromicia zuluensis	Aloe Bat	LC	LC
Nycteris thebaica	Egyptian Slit-faced Bat	LC	LC
Orycteropus afer	Aardvark	LC	LC
Otomys angoniensis	Angoni Vlei Rat	LC	LC
Otomys irroratus	Vlei Rat (Fynbos type)	LC	LC
Ourebia ourebi	Oribi	EN	LC
Panthera pardus	Leopard	VU	VU
Papio ursinus	Chacma Baboon	LC	LC
Parahyaena brunnea	Brown Hyaena	NT	NT
Pedetes capensis	Springhare	LC	LC
Pelea capreolus	Grey Rhebok	NT	LC
Phacochoerus africanus	Common Warthog	LC	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Procavia capensis	Rock Hyrax	LC	LC
Pronolagus randensis	Jameson's Red Rock Rabbit	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rattus rattus	House Rat	Exotic (Not listed)	LC
Redunca fulvorufula	Mountain Reedbuck	EN	LC
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC	LC
Rhinolophus darlingi	Darling's Horseshoe Bat	LC	LC
Saccostomus campestris	Pouched Mouse	LC	LC
Sauromys petrophilus	Flat-headed Free-tail Bat	LC	LC
Scotophilus dinganii	Yellow House Bat	LC	LC
Steatomys krebsii	Krebs's Fat Mouse	LC	LC
Steatomys pratensis	Fat Mouse	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC
Suricata suricatta	Suricate	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Syncerus caffer	African Buffalo	LC	LC
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	LC
Taphozous mauritianus	Mauritian Tomb Bat	LC	LC
Tragelaphus oryx	Common Eland	LC	LC
Vulpes chama	Cape Fox	LC	LC

APPENDIX D: *Reptile species expected to occur within the project area*

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acontias gracilicauda	Thin-tailed Legless Skink	LC	LC
Afroedura nivaria	Drankensberg Flat Gecko	LC	LC
Afrotyphlops bibronii	Bibron's Blind Snake	LC	LC
Agama aculeata distanti	Eastern Ground Agama	LC	LC
Agama atra	Southern Rock Agama	LC	LC
Aparallactus capensis	Black-headed Centipede-eater	LC	LC
Atractaspis bibronii	Bibron's Stiletto Snake	LC	Unlisted
Bitis arietans arietans	Puff Adder	LC	Unlisted
Boaedon capensis	Brown House Snake	LC	LC
Bradypodion ventrale	Eastern Cape Dwarf Chameleon	LC	LC
Causus rhombeatus	Rhombic Night Adder	LC	LC
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC
Cordylus vittifer	Common Girdled Lizard	LC	LC
Crotaphopeltis hotamboeia	Red-lipped Snake	LC	Unlisted
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Dendroaspis polylepis	Black Mamba	LC	LC
Duberria lutrix	Common Slug-eater	LC	LC
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC	Unlisted
Hemachatus haemachatus	Rinkhals	LC	LC
Hemidactylus mabouia	Common Tropical House Gecko	LC	Unlisted
Homoroselaps dorsalis	Striped Harlequin Snake	NT	LC
Homoroselaps lacteus	Spotted Harlequin Snake	LC	LC
Lamprophis aurora	Aurora House Snake	LC	LC
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	LC	Unlisted
Lycodonomorphus inornatus	Olive House Snake	LC	LC
Lycodonomorphus rufulus	Brown Water Snake	LC	Unlisted
Lycophidion capense capense	Cape Wolf Snake	LC	Unlisted
Lygodactylus capensis capensis	Common Dwarf Gecko	LC	Unlisted
Naja mossambica	Mozambique Spitting Cobra	LC	Unlisted
Nucras lalandii	Delalande's Sandveld Lizard	LC	LC
Pachydactylus affinis	Transvaal Gecko	LC	LC
Pachydactylus capensis	Cape Gecko	LC	Unlisted
Panaspis wahlbergi	Wahlberg's Snake-eyed Skink	LC	Unlisted
Pedioplanis burchelli	Burchell's Sand Lizard	LC	LC
Pelomedusa galeata	South African Marsh Terrapin	Not evaluated	Unlisted
Pelomedusa subrufa	Central Marsh Terrapin	LC	Unlisted
Prosymna ambigua	Angolan Shovel-snout	Unlisted	LC
Prosymna sundevallii	Sundevall's Shovel-snout	LC	LC
Psammophis brevirostris	Short-snouted Grass Snake	LC	Unlisted

Psammophis crucifer	Cross-marked Grass Snake	LC	LC
Psammophis subtaeniatus	Stripe-bellied Sand Snake	LC	LC
Psammophylax rhombeatus	Spotted Grass Snake	LC	Unlisted
Psammophylax tritaeniatus	Striped Grass Snake	LC	LC
Pseudaspis cana	Mole Snake	LC	Unlisted
Pseudocordylus melanotus melanotus	Common Crag Lizard	LC	LC
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	LC	Unlisted
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Trachylepis capensis	Cape Skink	LC	Unlisted
Trachylepis punctatissima	Speckled Rock Skink	LC	LC
Trachylepis varia	Variable Skink	LC	LC

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

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Amietia delalandii	Delalande's River Frog	LC	Unlisted
Amietia fuscigula	Common River Frog	LC	LC
Amietia poyntoni	Poynton's River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Phrynobatrachus natalensis	Snoring Puddle Frog	LC	LC
Pyxicephalus adspersus	Giant Bullfrog	NT	LC
Schismaderma carens	African Red Toad	LC	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Sclerophrys garmani	Olive Toad	LC	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Sclerophrys poweri	Power's Toad	LC	LC
Semnodactylus wealii	Rattling Frog	LC	LC
Strongylopus fasciatus	Striped Stream Frog	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna natalensis	Natal Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Xenopus laevis	Common Platanna	LC	LC