THE TERRESTRIAL & FRESHWATER ECOLOGY ASSESSMENTS FOR THE PROPOSED DEVELOPMENT OF ERF 185 OLIFANTSNEK JQ

Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province

May 2022

CLIENT

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a terrestrial and freshwater ecology assessment for the establishment of self-standing units and guest lodge with associated roads on Erf 185 Olifantsnek JQ, Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province for the applicant, The Alpha Grande (Pty) Ltd.

The property of 9 398 m^2 will be cleared of vegetation to allow for the development of five (5) self-standing units on 5 398 m^2 and 20 guest lodge units on 4 000m^2 with associated access roads.

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*" (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the plant sensitivities of the project area as "Low", while the animal sensitivity is rated as "Medium". The aquatic biodiversity theme has been characterised as "Very High" sensitivity.

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, as to the ecological viability of the proposed project.

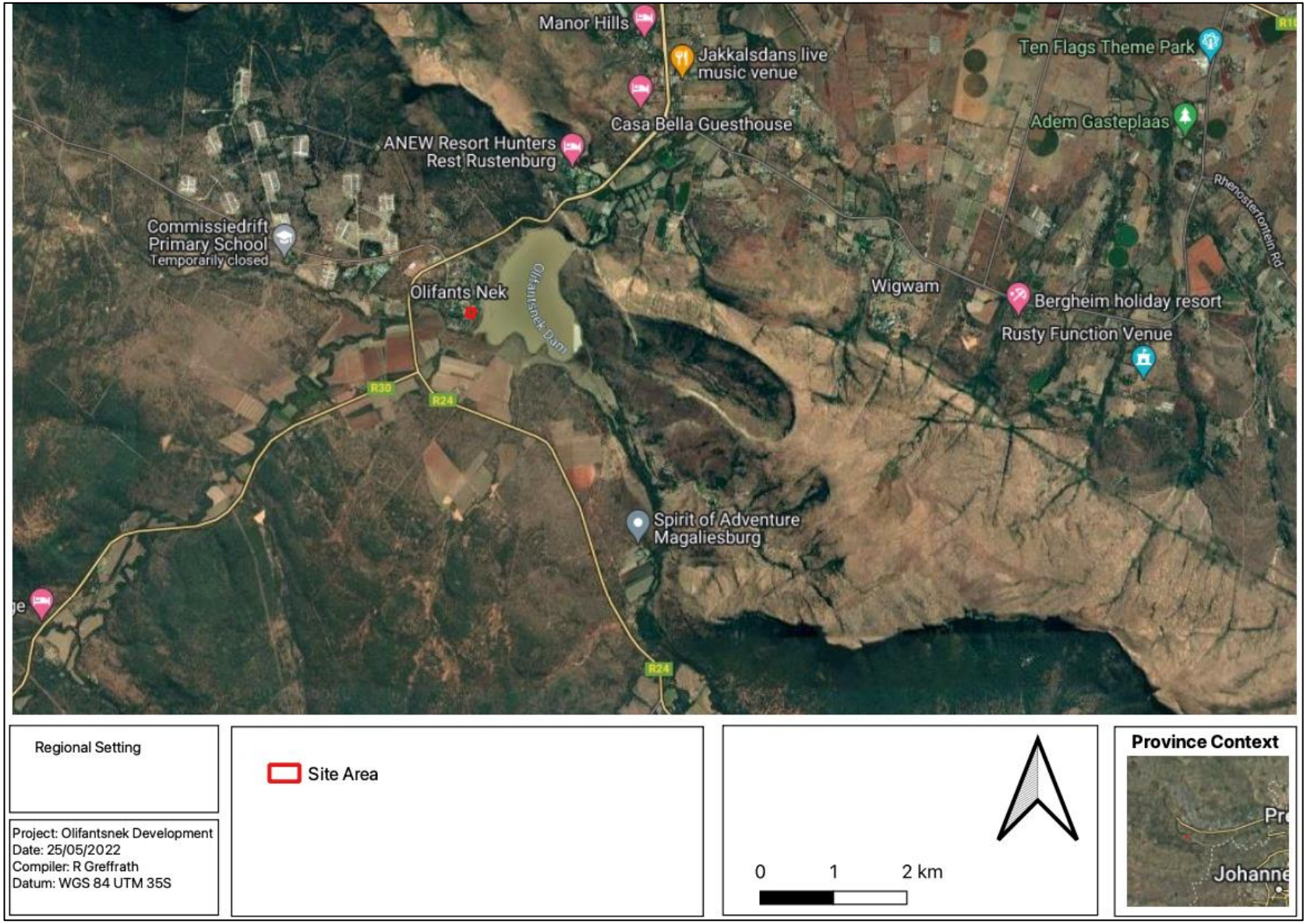
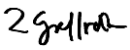


Figure 1-1 Location of the project area in relation to the nearby town of Rustenburg.

1.2 Specialist Details

Report Name	**THE TERRESTRIAL & FRESHWATER ECOLOGY ASSESSMENTS FOR THE PROPOSED DEVELOPMENT OF ERF 185 OLIFANTSNEK JQ**
The Applicant	**The Alpha Grande (Pty) Ltd**
Submitted to	Hydro Science
Report Writer (Fauna and Flora)	**Rudolph Greffrath** 
	Rudolph is a terrestrial ecology specialist with 14 years of experience in biodiversity baseline assessments, biodiversity action planning design and development, biodiversity off-set design and implementation, biodiversity strategy design, conservation management planning and implementation, IFC performance standards best practice, ecological restoration, ecosystems services and environmental impact assessments, across Africa. He is Pr Sci Nat registered (400018/17) in Conservation Science field of practice.
Report Writer / Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

1.3 Scope of Work

The principle aim of the assessment was to provide information to identify the risks stemming from the proposed activity and to identify potential ecological constraints within the project area. This was achieved through the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the project area;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the project area;
- Field survey to ascertain the species composition of the present flora and fauna community within the project area;
- The delineation and functional assessment of water resources within the regulatory zone;
- Delineate and map the habitats and their respective sensitivities that occur within the project area;
- Identify the manner that the proposed project impacts the ecological considerations and evaluate the level of risk of these potential impacts; and
- The prescription of mitigation measures and recommendations for identified risks.

2 Key Legislative Requirements

The legislation listed below in Table 2-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 2-1 A list of key legislative requirements relevant to biodiversity and conservation in the North West Province

Region	Legislation / Guideline
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	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), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	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 (NWA) (Act No. 36 of 1998)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA

	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
Provincial	North West Biodiversity Sector Plan of 2015 (READ, 2015).
	The North West Biodiversity Management Amendment Bill, 2017

3 Methods

3.1 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

3.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- *National Biodiversity Assessment 2018 (Skowno et al, 2019) (NBA)* - The purpose of the NBA is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - *Ecosystem Threat Status* – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - *Ecosystem Protection Level* – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.
- *Protected areas:*
    - *South Africa Protected Areas Database (SAPAD) (DEA, 2021)* – The (SAPAD) Database contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
    - *National Protected Areas Expansion Strategy (NPAES) (SANBI, 2016)* – The NPAES provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- North West Biodiversity Sector Plan - The North West Department of Rural, Environment, and Agricultural Development (READ), as custodian of the environment in the North West, is the

primary implementing agent of the Biodiversity Sector Plan. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines (READ,2015).

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria.

- Hydrological Setting:

    - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

    - National Freshwater Ecosystem Priority Area (NFEPA) (Nel at al, 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

3.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the project area (Figure 3-1). The Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

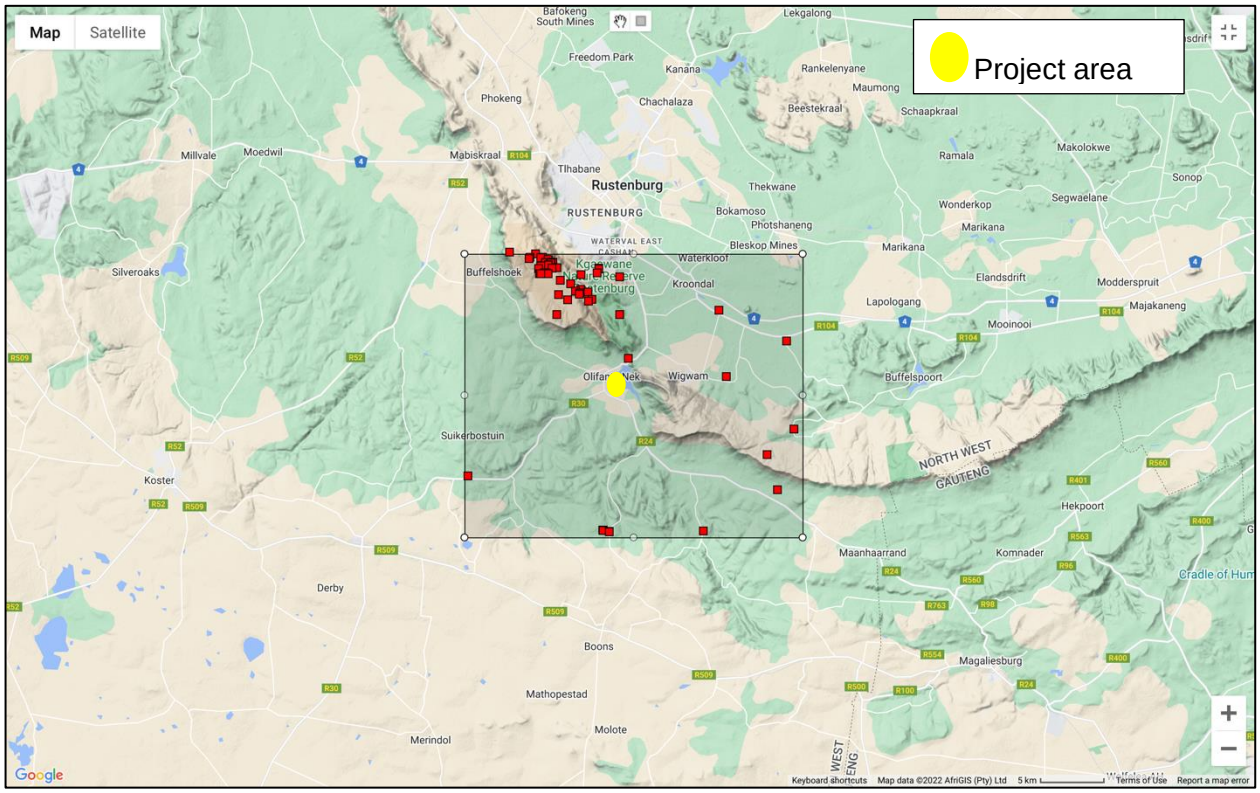


Figure 3-1 ***Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. Yellow dot indicates approximate location of the project area. The red squares are cluster markers of botanical records as per POSA data.***

3.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following, compiling an expected:

- Amphibian list, generated from the IUCN spatial dataset (2017) and AmphibianMap database (Fitzpatrick Institute of African Ornithology, 2021a), using the 2627 quarter degree square;
- Reptile list, generated from the IUCN spatial dataset (2017) and ReptileMap database (Fitzpatrick Institute of African Ornithology, 2021b), using the 2627 quarter degree square;
- Avifauna list, generated for the SABAP2 dataset by looking at pentads 2545_2710, 2545_2715, 2550_2710, 2550_2715, 2540_2710; and
- Mammal list from the IUCN spatial dataset (2017).

3.1.4 Desktop Wetland Baseline

The following spatial datasets were utilised:

- Aerial imagery (Google Earth Pro);
- Land Type Data (Land Type Survey Staff, 1972 - 2006);
- South African Inventory of Inland Aquatic Ecosystems (Van Deventer *et al*., 2019);
- The National Freshwater Ecosystem Priority Areas (Nel *et al*., 2011);
- Contour data (5m);
- NASA Shuttle Radar Topography Mission Global 1 arc second digital elevation data; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al*., 2018).

3.2 Field Assessment

One field survey was undertaken for the project. Table 3-1 summarises the timing and period of the survey undertaken.

Table 3-1 Summary of surveys undertaken for the biodiversity impact assessment

Survey Number	Season	Date/s	Comments
1	Dry (Autumn)	May 2022	Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the project area as well as the footprint of the proposed development. Vegetation and habitat units were also identified.

Effort was made to cover all the different habitat types within the limits of time and access. During the survey, notes were made regarding current impacts, recording of dominant species and any sensitive or important features (e.g., drainage lines, rock outcrops, termite mounds etc.).

3.2.1 Flora Survey

The fieldwork and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) 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, to perform a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora Species of Conservation Concern (SCC) were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed mostly on sensitive habitats overlapping with the proposed project areas.

The timed random meander method is highly efficient for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al.* (1982). Suitable habitat for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site, notes were made regarding current impacts (e.g., livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g., wetlands, outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

3.2.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles), avifauna and mammals. The faunal field survey comprised of the following techniques:

- *Visual and auditory searches* - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed; and listening to species calls;
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.); and
- Utilization of local knowledge.

Relevant field guides and texts consulted for identification purposes included the following:

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al,* 2014);

- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- Smithers' Mammals of Southern Africa (Apps, 2000);
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000);
- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.,* 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.,* 2005).

3.3 Terrestrial Site Ecological Importance

The different habitat types within the project area were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 3-2 and Table 3-3, respectively.

Table 3-2 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 3-3 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches.

	Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 3-4.

Table 3-4 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		**Conservation Importance (CI)**				
		Very high	**High**	**Medium**	**Low**	**Very low**
Functional Integrity (FI)	**Very high**	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 3-5.

Table 3-5 Summary of Resource Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 3-6.

Table 3-6 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	**High**	**Medium**	**Low**	**Very low**
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed project is provided in Table 3-7.

Table 3-7 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter,

justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

3.4 Wetland Baseline Assessment

3.4.1 Wetland Identification and Mapping

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 3-2. The outer edges of the wetland areas were identified by considering the following four specific indicators:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
    - The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation; and
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

Vegetation is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

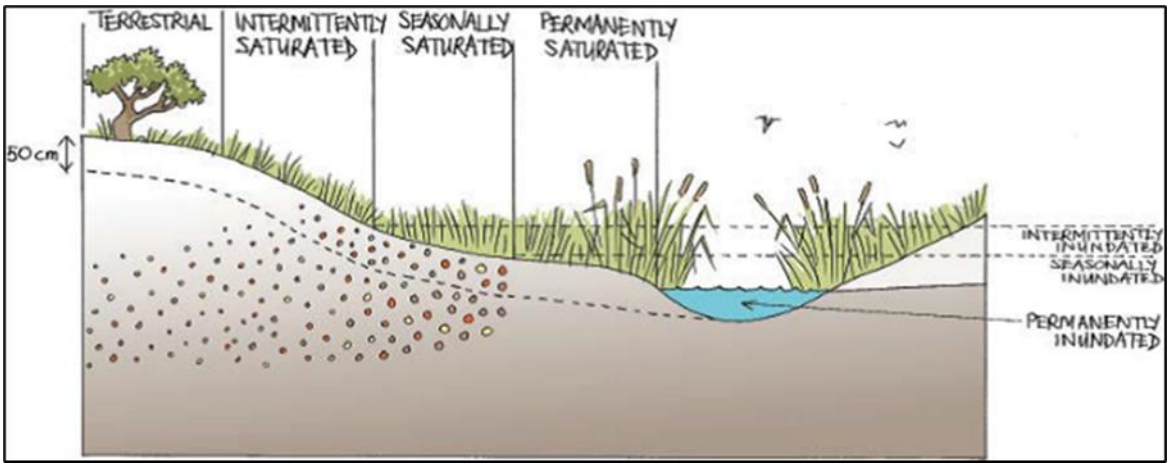


Figure 3-2 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al. 2013)

3.4.2 Delineation

The wetland indicators described above are used to determine the boundaries of the wetlands within the project area. These delineations are then illustrated by means of maps accompanied by descriptions.

3.4.3 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands as well as humans. Eco Services serve as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze *et al*. 2008). An assessment was undertaken that

examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 3-8).

Table 3-8 Classes for determining the likely extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

3.4.4 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 3-9.

Table 3-9 The Present Ecological Status categories (Macfarlane, et al., 2008)

Impact Category	Description	Impact Score Range	PES
None	Unmodified, natural	0 to 0.9	A
Small	Largely Natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.0 to 1.9	B
Moderate	Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2.0 to 3.9	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	Seriously Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	E
Critical	Critical Modification. The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	F

3.4.5 Importance and Sensitivity

The importance and sensitivity of water resources is determined in order to establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category as listed in Table 3-10.

Table 3-10 Description of Importance and Sensitivity categories

IS Category	Range of Mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	**A**
High	2.1 to 3.0	**B**
Moderate	1.1 to 2.0	**C**
Low Marginal	< 1.0	**D**

3.4.6 Ecological Classification and Description

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) will be considered for this study. This system comprises a hierarchical classification

process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, and then also includes structural features at the lower levels of classification (Ollis *et al*., 2013).

3.4.7 Buffer Requirements

The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane *et al.,* 2014) was used to determine the appropriate buffer zone for the proposed activity

3.5 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The area was only surveyed during one short term late wet season survey and therefore, this assessment does not consider temporal trends;
- Whilst every effort is made to cover as much of the site as possible, representative sampling is completed and by its nature, it is possible that some plant and animal species that are present on site were not recorded during the field investigations;
- The only water resources identified and delineated within the regulatory zone was the Olifantsnek Dam. The system is regarded as 'artificial' and no functional assessment was achieved for the system; and
- The GPS used for resource delineations is accurate to within five metres. Therefore, the delineations plotted digitally may be offset by a maximum of five metres to either side.

4 Results & Discussion

4.1 Desktop Assessment

4.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features are summarised in Table 4-1.

Table 4-1 Summary of relevance of the proposed project to ecologically important landscape features.

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Overlaps with a Least Concerned ecosystem	4.1.1.1
Ecosystem Protection Level	Relevant – Overlaps with a Poorly Protected Ecosystem	4.1.1.2
Protected Areas	Relevant – Close to Magaliesburg Protected Natural Environment	4.1.1.5
Critical Biodiversity Area	Relevant – The project area overlaps with an ESA1 areas.	4.1.1.3
National Protected Areas Expansion Strategy	Relevant – The project area is directly adjacent to the NW/Gauteng NPAES protected area	4.1.1.4
Important Bird and Biodiversity Areas	Relevant – Located within the Magaliesburg IBA	4.1.1.6
Coordinated Waterbird Count	Relevant – Adjacent to CWAC site Ollifantsnek Dam	4.1.1.7
Coordinated Avifaunal Road Count	Relevant – Close to 1 known route	4.1.1.8
South African Inventory of Inland Aquatic Ecosystems	Irrelevant – No wetland systems are located within the 500 m regulation zone.	4.1.1.9
National Freshwater Ecosystem Priority Area	Relevant – Close to 1 known route	4.1.1.9

4.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project overlaps with a LC ecosystem (Figure 4-1).

Figure 4-1 Map illustrating the ecosystem threat status associated with the project area.

4.1.1.2 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a PP ecosystem (Figure 4-2).

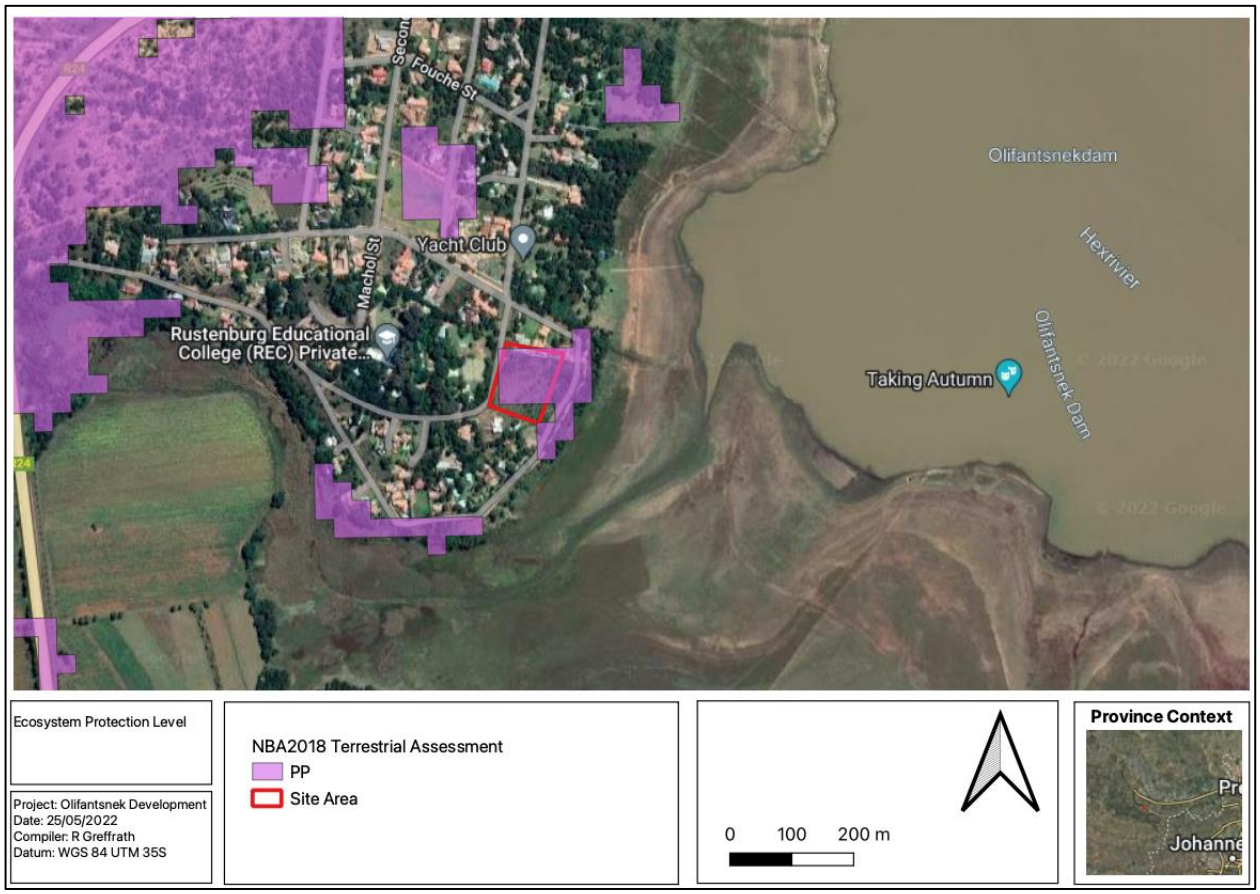


Figure 4-2 Map illustrating the ecosystem protection level associated with the project area

4.1.1.3 Critical Biodiversity Areas and Ecological Support Areas

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The CBA map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and degraded areas that have been irreversibly modified from their natural state.

Figure 4-3 shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with an ESA1 area.

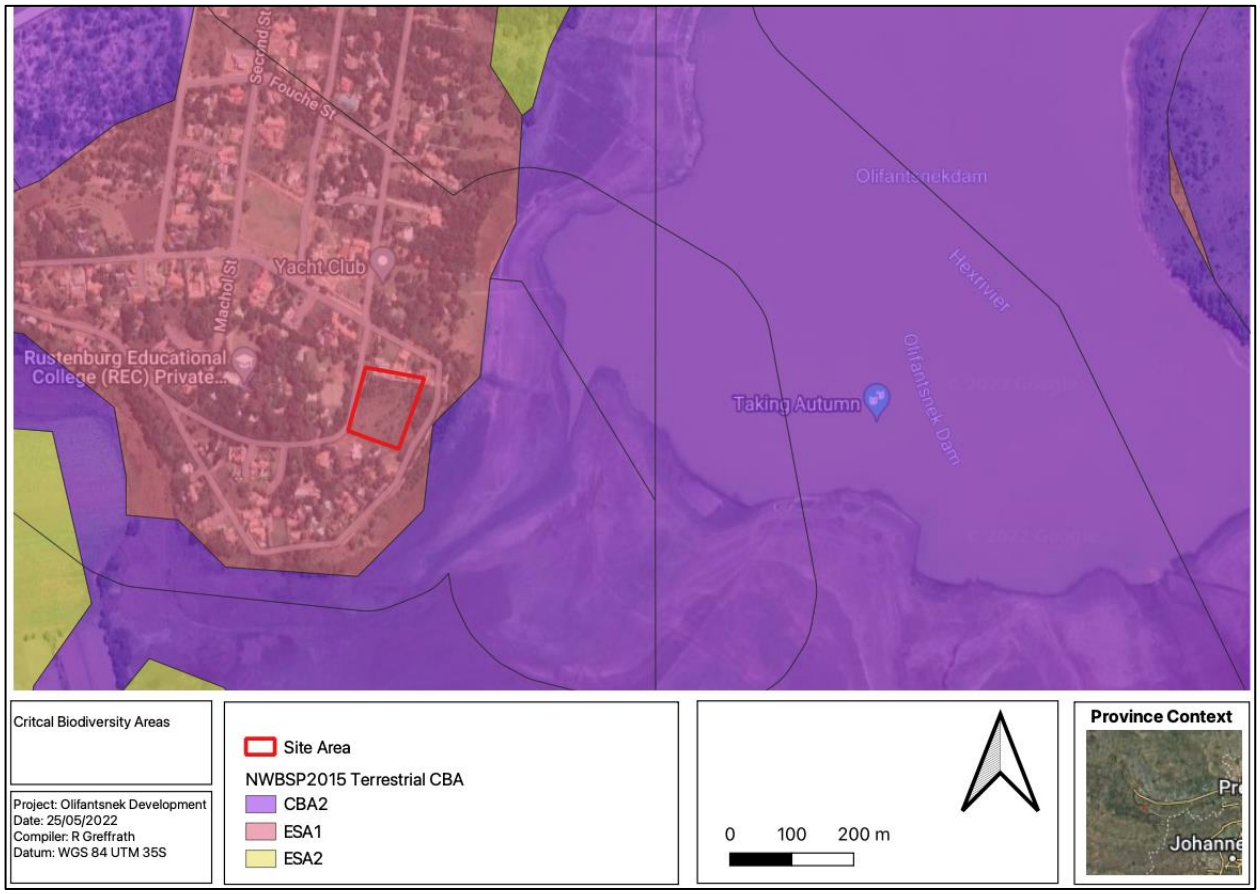


Figure 4-3 Map illustrating the locations of CBAs in the project area

4.1.1.4 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2016 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project area is not within a NPAES protected area as can be seen in Figure 4-4.

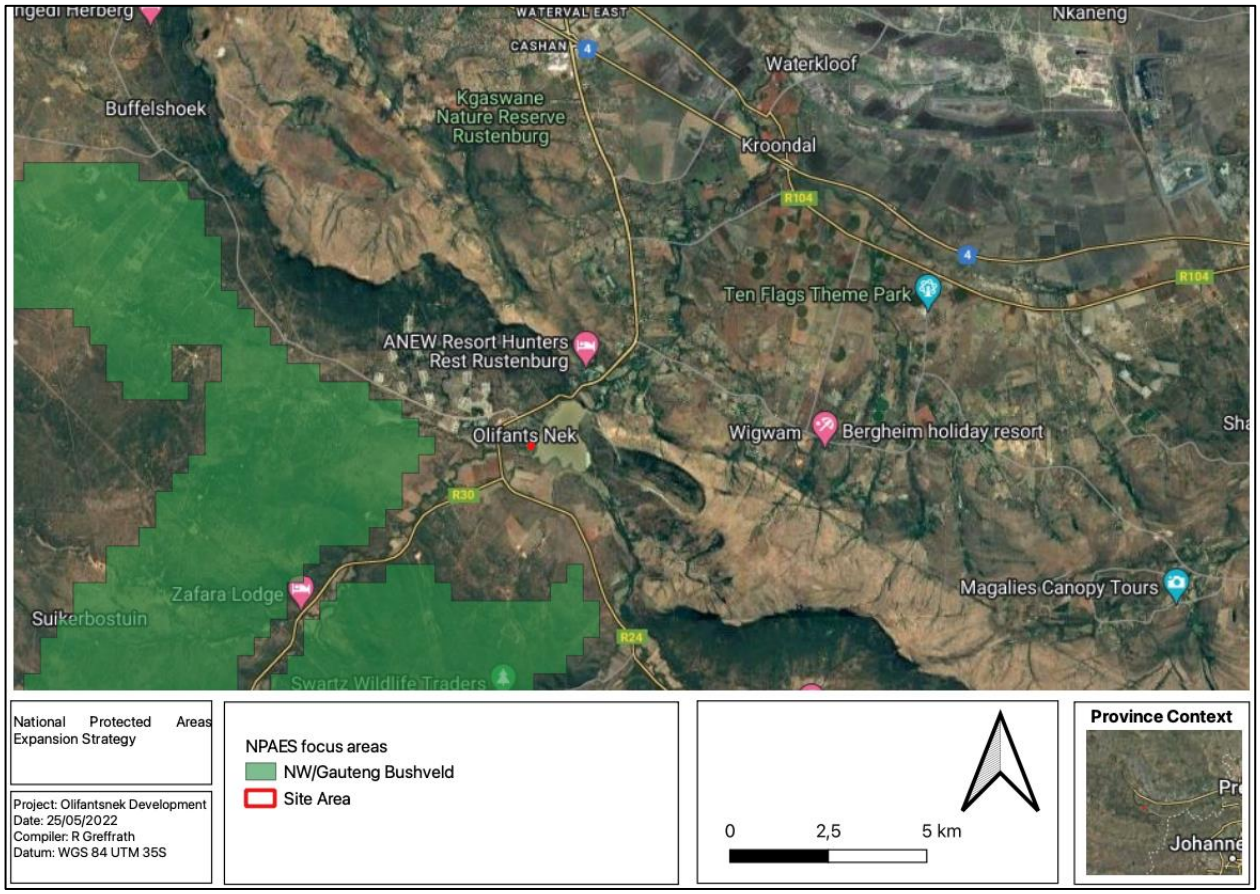


Figure 4-4 The project area in relation to the National Protected Area Expansion Strategy

4.1.1.5 Protected Areas

The Department of Environmental Affairs maintains a spatial database on Protected Areas and Conservation Areas. Protected Areas and Conservation Areas (PACA) Database scheme is used for classifying protected areas (South Africa Protected Areas Database-SAPAD) and conservation areas (South Africa Conservation Areas Database-SACAD) into types and sub-types in South Africa.

The definition of protected areas used in these documents follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the “System of Protected Areas”, which consists of the following kinds of protected areas:

- Special nature reserves:
- National parks:
- Nature reserves and
- Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003);
- World heritage sites declared in terms of the World Heritage Convention Act;
- Marine protected areas declared in terms of the Marine Living Resources Act;
- Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and

- Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

The types of conservation areas that are currently included in the database are the following:

- Biosphere reserves;
- Ramsar sites;
- Stewardship agreements (other than nature reserves and protected environments);
- Botanical gardens;
- Transfrontier conservation areas;
- Transfrontier parks;
- Military conservation areas and
- Conservancies.

The project area falls 1 km from the Magaliesburg Protected Natural Environment, thus the project area is within the protected areas 5 km buffer zones (Figure 4-5).

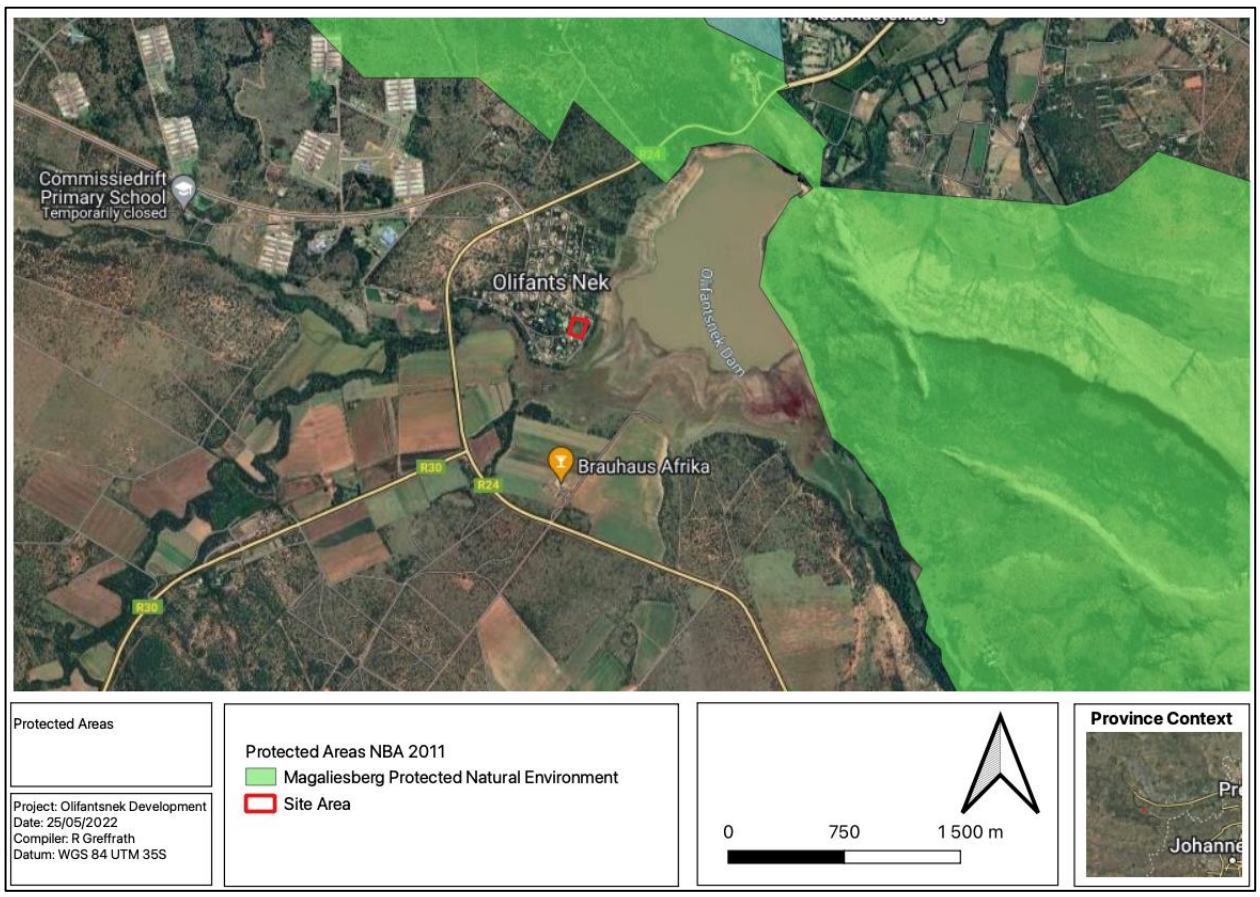


Figure 4-5 Protected Areas in relation to the project site

4.1.1.6 Important Bird & Biodiversity Areas (IBA)

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by

BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels. The project area lies within the Magaliesburg IBA (Figure 4-6).

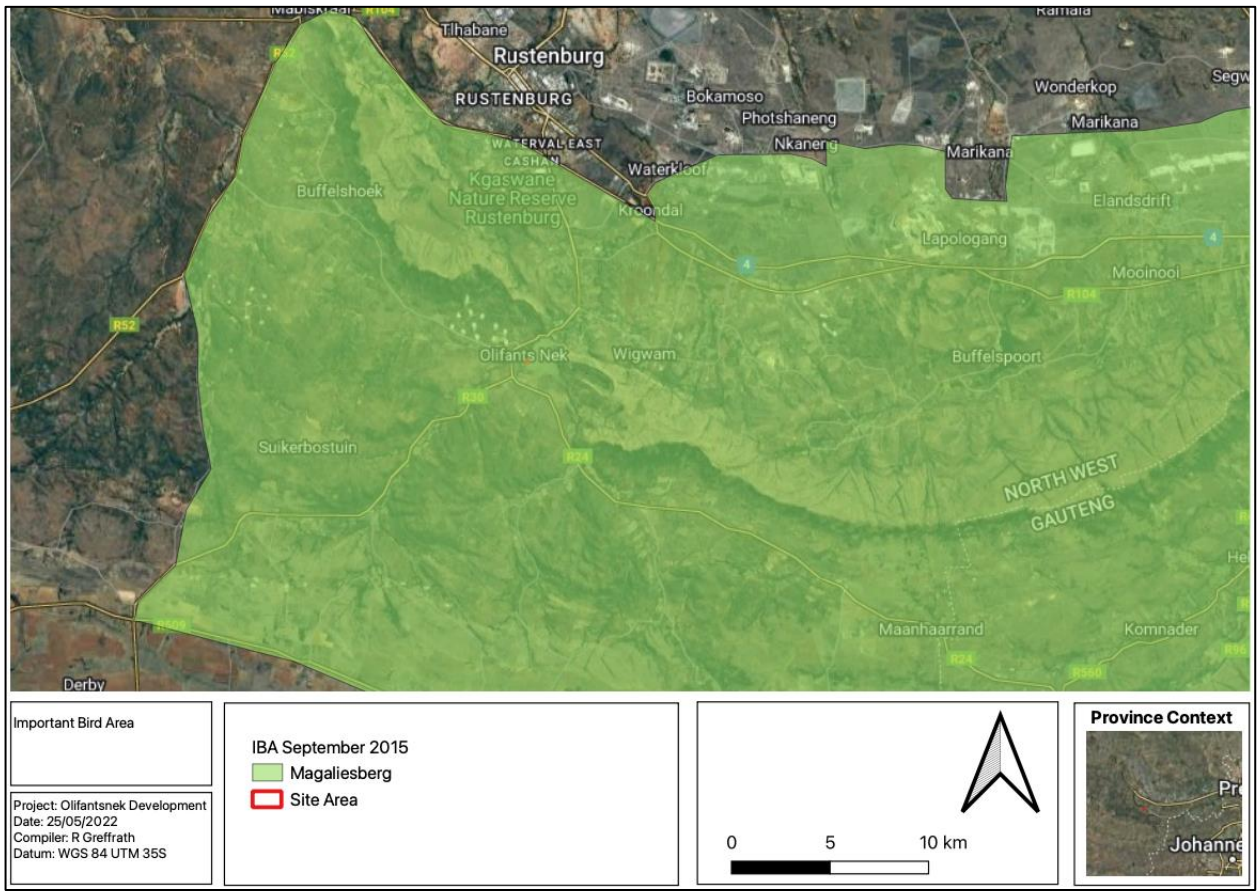


Figure 4-6 Project site in relation to IBA's

4.1.1.7 Coordinated Waterbird Counts

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to International waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the heath of wetlands. For a full description of CWAC please refer to http://cwac.birdmap.africa/about.php. The Olifantsnek Dam (25472715) site is the closest CWAC to the project area. This site was registered in 2008 as a Coordinated Waterbird count site. Forty nine (49) birds have been recorded (Table 4-5).

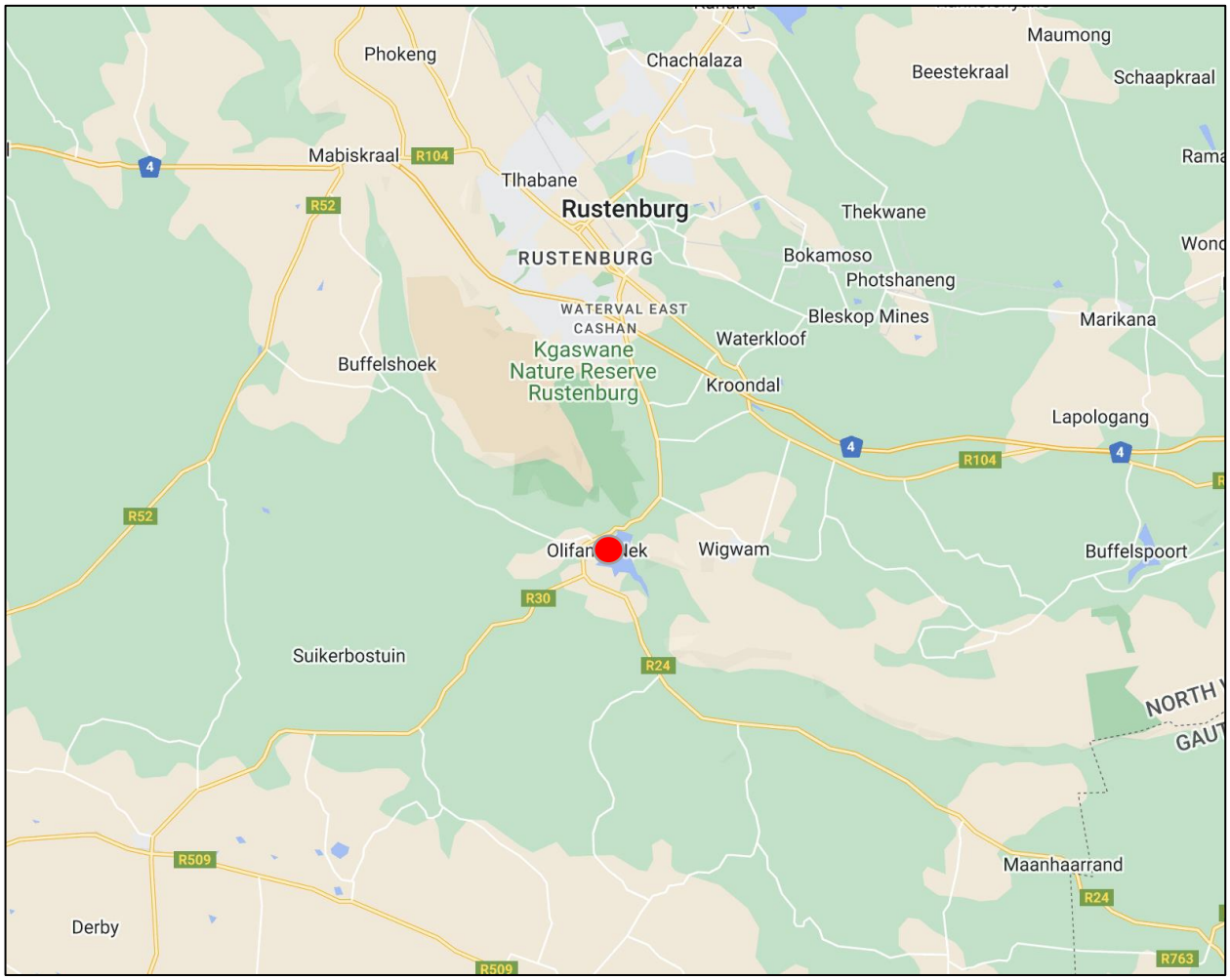


Figure 4-7 The closest Coordinated Waterbird Count site (Olifantsnek Dam (25472715)) to the project area.

4.1.1.8 Coordinated Avifaunal Roadcount (CAR)

The ADU/Cape bird club pioneered avifaunal roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane *Anthropoides paradiseus* and Denham's/Stanley's Bustard *Neotis denhami.* Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km. Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), road counts are carried out using this standardised method. These counts are important for the conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources monitoring of these species is most important (CAR, 2020). Figure 4-8 shows that the project area lies north-east from the Magaliesburg route.

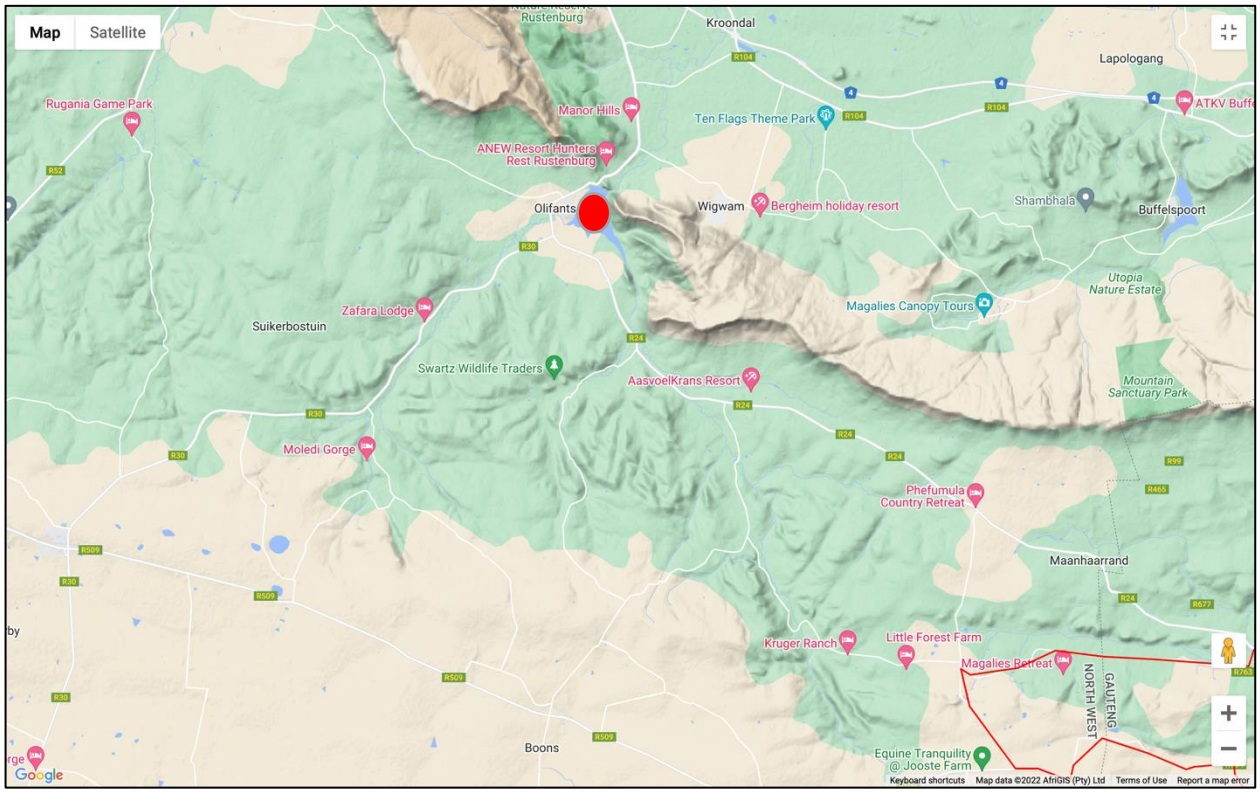


Figure 4-8 The Magaliesburg CAR route in red line, project area within red dot

4.1.1.9 Hydrological Setting

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer *et al*., 2019; Skowno *et al*., 2019). No wetlands are located within the regulatory area (Figure 4-9).

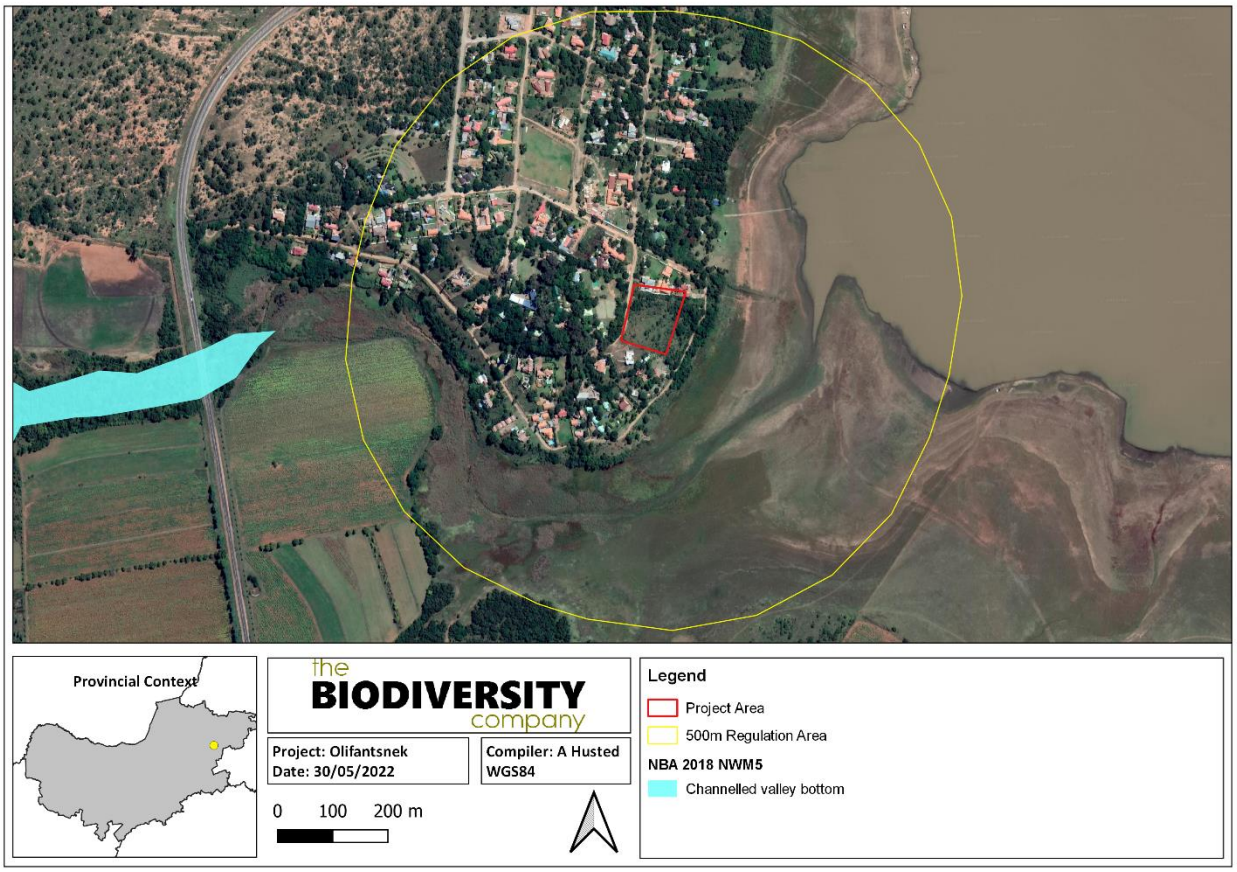


Figure 4-9 Map illustrating the NWM5 proximal to the proposed project area

The National Freshwater Ecosystem Priority Area (NFEPA) database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources. The NFEPA spatial data shows that the 500 m buffer zone of the project area overlaps with a valley bottom NFEPA wetland (Figure 4-10). This classification is incorrect as the designated area is the inundation area of the Olifantsnek Dam.

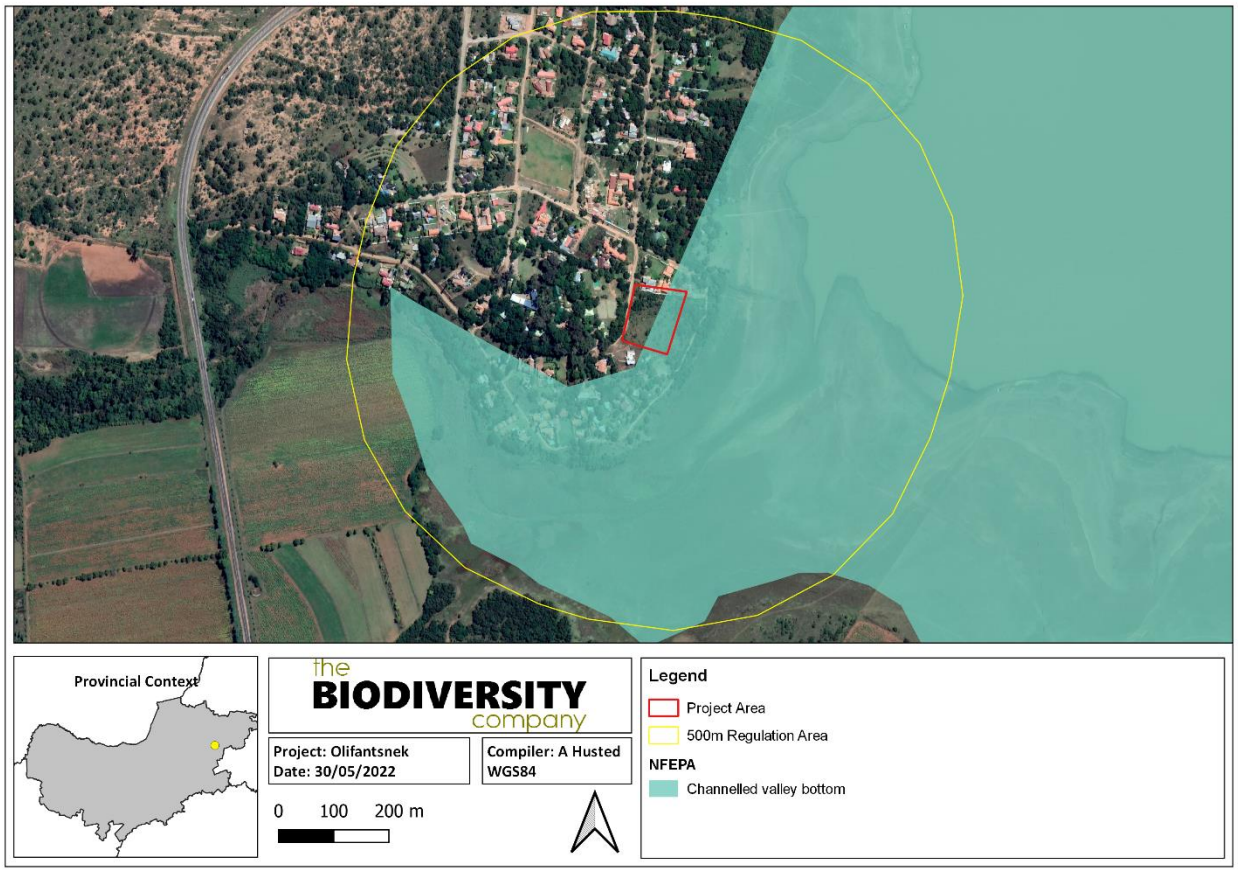


Figure 4-10 Map illustrating the project area in relation to the NFEPA spatial data

4.1.2 Flora Assessment

This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species.

4.1.2.1 Vegetation Type

The project area is situated within the savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

a) Seasonal precipitation; and

b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by a herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Vachellia, Senegalia* and *Albizia*) and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the project area overlaps with the Moot Plains Bushveld vegetation type (Figure 4-11).

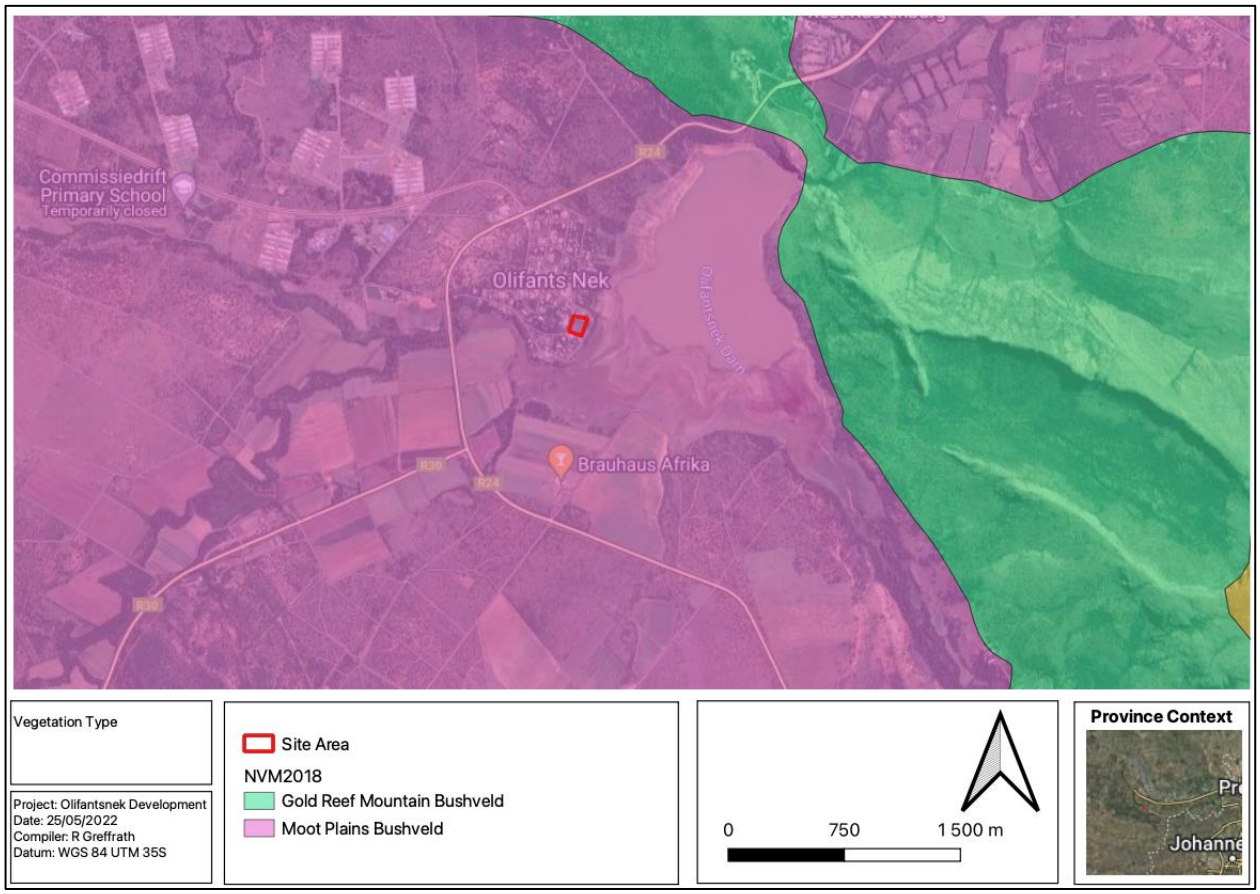


Figure 4-11 Map illustrating the vegetation type associated with the project area

4.1.2.1.1 Moot Plains Bushveld

Distribution:

This vegetation type occurs in the North West and Gauteng Provinces with the main belt occurring immediately south of the Magaliesberg from the Selons River Valley in the west through Maanhaarrand, filling the valley bottom of the Magalies River, proceeding east of the Hartebeestpoort Dam between the Magaliesberg and Daspoort mountain ranges to Pretoria. It also occurs as a narrow belt immediately north of the Magaliesberg from Rustenburg in the west to just east of the Crocodile River in the east: also south of the Swartruggens–Zeerust line. Altitude typically about 1 050–1 450 m.

Vegetation & Landscape Features:

This includes open to closed, low, often thorny savanna dominated by various species of *Vachellia* in the bottomlands and plains as well as woodlands of varying height and density on the lower hillsides. Herbaceous layer is dominated by grasses.

Important Taxa:

Small Trees: *Vachellia nilotica (d), V. tortilis subsp. heteracantha (d), Searsia lancea (d).*

Tall Shrubs*: Buddleja saligna (d), Euclea undulata (d), Olea europaea subsp. africana (d), Grewia occidentalis, Gymnosporia polyacantha, Mystroxylon aethiopicum subsp. burkeanum.*

Low Shrubs*: Aptosimum elongatum, Felicia fascicularis, Lantana rugosa, Teucrium trifidum.*

Succulent Shrub*: Kalanchoe paniculata.*

Woody Climber*: Jasminum breviflorum.*

Herbaceous Climber*: Lotononis bainesii.*

Graminoids*: Heteropogon contortus (d), Setaria sphacelata (d), Themeda triandra (d), Aristida congesta, Chloris virgata, Cynodon dactylon, Sporobolus nitens, Tragus racemosus.*

Herbs*: Achyropsis avicularis, Corchorus asplenifolius, Evolvulus alsinoides, Helichrysum nudifolium, H. undulatum, Hermannia depressa, Osteospermum muricatum, Phyllanthus maderaspatensis*.

Conservation: Vulnerable. Target 19%. Some 13% statutorily conserved mainly in the Magaliesberg Nature Area. About 28% transformed mainly by cultivation and urban and built-up areas. Very scattered occurrences to sometimes dense patches in places of various alien plants including *Cereus jamacaru, Eucalyptus species, Jacaranda mimosifolia, Lantana camara, Melia azedarach* and *Schinus* species. Erosion is mainly very low to low, moderate in some areas.

4.1.2.2 Expected Flora Species

The POSA database indicates that 314 species of indigenous plants are expected to occur within the project area. Appendix A provides the list of species and their respective conservation status and endemism. No SCC are expected, however 66 indigenous species are listed.

4.1.3 Faunal Assessment

4.1.3.1 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 16 amphibian species are expected to occur within the area (Appendix B). None are regarded as threatened.

4.1.3.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 42 reptile species are expected to occur within the area (Appendix C). None are regarded as threatened.

4.1.3.3 Mammals

The IUCN Red List Spatial Data lists 60 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are limited to protected areas. Six (6) of these expected species are regarded as threatened (Table 4-2), three of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.

Table 4-2 Threatened mammal species that are expected to occur within the project area.

Species	Common Name	Regional	Global	Likelihood of Occurrence
Pelea capreolus	Vaal Rhebok	NT	NT	Low
Atelerix frontalis	Southern African Hedgehog	NT	LC	Low
Leptailurus serval	Serval	NT	LC	Moderate
Otomys auratus	Southern African Vlei Rat (Grassland type)	NT	LC	Moderate
Aonyx capensis	African Clawless Otter	NT	NT	Moderate
Miniopterus schreibersii	Schreibers's Long-fingered Bat	NT	VU	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 presence of the wetland on the edge of the project area which could provide suitable habitat, however very seasonal the species were given a moderate likelihood of occurrence.

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. Some areas of suitable habitat can be found in the project area; therefore the likelihood of occurrence is rated as moderate.

Otomys auratus (Southern African Vlei Rat (Grassland type). The species is widely distributed throughout the Highveld grasslands and Drakensberg Escarpment of South Africa, Lesotho and Swaziland, with isolated populations in the Soutpansberg Mountains of northern Limpopo and the Eastern Highlands of Zimbabwe. This species is associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water.

4.1.4 Avifauna

The SABAP2 Data lists 292 avifauna species that could be expected to occur within the area (Appendix E). Twelve (12) of these expected species are regarded as SCC (Table 4-3).

Table 4-3 Threatened avifauna species that are expected to occur within the project area.

Common group	Common species	Genus	Species	Region	Global	Likelihood of Occurrence
Duck	Maccoa	*Oxyura*	*maccoa*	NT	VU	Moderate
Eagle	Verreaux's	*Aquila*	*verreauxii*	VU	LC	Low
Eagle	Tawny	*Aquila*	*rapax*	EN	LC	Low
Eagle	Martial	*Polemaetus*	*bellicosus*	EN	EN	Low
Falcon	Lanner	*Falco*	*biarmicus*	VU	LC	High
Kingfisher	Half-collared	*Alcedo*	*semitorquata*	NT	LC	Low
Pratincole	Black-winged	*Glareola*	*nordmanni*	NT	NT	Low
Stork	Yellow-billed	*Mycteria*	*ibis*	EN	LC	High
Stork	Abdim's	*Ciconia*	*abdimii*	NT	LC	Moderate
Stork	Black	*Ciconia*	*nigra*	VU	LC	Moderate
Tern	Caspian	*Hydroprogne*	*caspia*	VU	LC	Low
	Secretarybird	*Sagittarius*	*serpentarius*	VU	VU	Low

Oxyura maccoa (Maccoa Duck) is listed as NT on a regional scale and VU on a global scale. This species 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 moderate based on the proximity to the Olifantsnek dam.

Falco biarmicus (Lanner Falcon) is listed as VU on a regional scale and LC on a global scale. This species 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 high due to the natural veld condition and the presence of many bird species on which Lanner Falcons may predate.

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 presence of extensive water bodies within the project area creates a high possibility that this species may occur there.

Ciconia abdimii (Abdim's Stork) is listed as NT on a local scale and LC on a global scale. 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 existence of wet areas creates the potential for this species to occur in the area but due to the proximity of the urban footprint, the high human density and the degraded state of the environment the likelihood of occurrence was rated as moderate.

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

4.2 Field Assessment

The following sections provide the results from the field survey for the proposed development that was undertaken on the 17 May 2022.

4.2.1 Flora Assessment

This section is divided into two sections:

- Indigenous flora; and
- Invasive Alien Plants (IAPs).

4.2.1.1 Indigenous Flora

The vegetation assessment was conducted throughout the extent of the project area covered. A total of 70 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment (Table 4-4) Plants listed as Category 1 alien or invasive species under the NEMBA appear in green text. Plants listed in Category 2 or as ‘not indigenous’ or ‘naturalised’ according to NEMBA, appear in blue text. Some of the plant species recorded can be seen in Figure 4-12. The list of plant species recorded is by no means comprehensive, and repeated surveys during different phenological periods not covered, may likely yield up to 20-30% additional flora species for the project area. However, floristic analysis conducted to date is, however, regarded as a sound representation of the local flora for the project area.

Table 4-4 Recorded Plant Species

Scientific Name	Common Name	Ecological Status	Form
Vachellia nilotica	Scented thorn	Medicinal	Tree
Agave sisalana	Sisal	Weed Cat2	Succulent
Aloe maculata	Soap aloe		
Argemone ochroleuca	White flowered mexican poppy	Weed Cat1b	Herb
Aristida congesta congesta	Tassel Tree-awn	Increaser 2 - Pioneer	Grass
Asparagus burchellii	Wild Asparagus		
Asparagus laricinus	Cluster leaved asparagus	Weed Charm	Herb
Bidens pilosa	Common Black-jack	AIP	Herb
Celtis africana	White Stinkwood		Tree
Chloris virgata	Feather top chloris	Pioneer increaser 2	Grass
Digitaria eriantha	Common Finger Grass	Decreaser - Climax	Grass
Euclea crispa	Blue Guarri		Tree
Grewia occidentalis	Crossberry		
Gymnosporia polycantha	Kraal Spike thorn		Shrub
Heteropogon contortus	Spear Grass	Increaser 2 - Subclimax	Grass
Ipomoea purpurea	Common Morning Glory	Alien Invasive	Herb
Lantana camara	Lantana	Alien Invasive 1b	Shrub
Ledebouria revulata	Common squill		
Melia azedarach	Syringa	Invasive Cat1b	Tree
Melinis repens	Natal Red Top		
Morus alba	White Mulberry	NEMBA Category 3	Tree
Nicotiana glauca	Wild Tobacco	Invasive Cat1b	Tree
Polygala virgata	Purple Broom		Shrub
Searsia lancea	Karee	Edible fruit	Tree

Searsia pyroides	Common Wild current		Shrub
Setaria sphacelata var. sphacelata	Bristle Grass	Decreaser - Climax	Grass
Solanum panduriforme	Yellow Bitter-apple	Medicinal	Shrub
Sonchus oleraceus	Sow Thistle	Alien Invasive	Herb
Tagetes minuta	Tall Khaki Weed	Alien Invasive	Herb
Tapinanthus oleifolius	Mistletoe		
Themeda triandra	Red Grass	Decreaser - Climax	Grass
Vachellia karoo	Sweet thorn	Medicinal	Tree
Verbena bonariensis	Tall Verbena	Cat 1b	Herb
Vernonia oligocephala	Bicoloured-leaved Vernonia	Medicinal	Herb
Ziziphus mucronata	Buffalo thorn	Medicinal	Tree

Figure 4-12 ***Photographs illustrating some of the flora recorded within the assessment area. Clockwise from top right: Aloe maculate; Grewia occidentalis; Ziziphus mucronate; Vachellia nilotica.***

4.2.1.2 Invasive Alien Plants

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

NEMBA is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of IAPs was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation calls for the removal and / or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, 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 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 Alien and Invasive Species 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 NEMBA;
    - The relevant invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the NEMBA.

Six (6) listed Category 1b IAP species were recorded within the project area, with one Category 2b. These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. Category 1b species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

4.2.2 Faunal Assessment

Herpetofauna, Avifauna and Mammal observations and recordings fall under this section.

4.2.2.1 Amphibians and Reptiles

No species of reptiles or amphibians were recorded in the project area during survey period. However, there is the possibility of species being present, as certain species are secretive and require long-term surveys to ensure capture.

4.2.2.2 Mammals

One (1) mammal species was observed during the survey of the project area (Table 4-5) based on the presence of visual tracks and signs (Table 4-5). None of the species recorded are regarded as a SCC.

Table 4-5 Summary of mammal species recorded within the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Xerus inauris	Cape Ground Squirrel	LC	LC

4.2.3 Avifauna

Eighteen (18) bird species were recorded in the survey (Table 4-6). None of the species recoded were SCCs.

Table 4-6 Recorded Avifauna species.

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acridotheres tristis	Myna, Common	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Corvus albus	Crow, Pied	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Hirundo cucullata	Swallow, Greater Striped	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC

4.2.4 Freshwater Assessment

The project area is in the A22G-1102 Sub Quaternary Reach (SQR), a tributary of the Rooikloofspruit measuring 22.6 km. According to desktop information available in the DWS (2014) database, the

Rooikloofspruit is a moderately modified watercourse (class C) with a high ecological importance and sensitivity class. Land use in the catchment varies from a wide range of agricultural activities, including irrigated agriculture, impoundments, mining and urban areas.

4.2.4.1 Delineation & Characterisation

A single watercourse was identified and delineated for the project, namely the Olifantsnek Dam (HGM 1). According to Ollis *et al* (2013) a dam is classified as '*an artificial body of water formed by the unnatural accumulation of water behind an artificial barrier that has been constructed across a river channel or an unchannelled valley-bottom wetland'*. Photographs of the Olifantsnek Dam from the project area are presented in Figure 4-13. The delineation of the Olifantsnek Dam in relation to the project area is presented in Figure 4-14. The project area is in excess of 65 m from the delineated dam.

Figure 4-13 Photographs from the project area towards the Olifantsnek Dam

The level 1-4 classification for the HGM unit as per the national wetland classification system (Ollis *et al*., 2013) is presented in (Table 4-7).

Table 4-7 Wetland classification as per SANBI guideline (Ollis et al. 2013)

Wetland System	Level 1	Level 2		Level 3	Level 4		
	System	**DWS Ecoregion/s**	**NFEPA Wet Veg Group/s**	**Landscape Unit**	**4A (HGM)**	**4B**	**4C**
HGM 1	Inland	Western Bankenveld	Central Bushveld Group 5	Valley Floor	Depression	Dammed	With channelled inflow

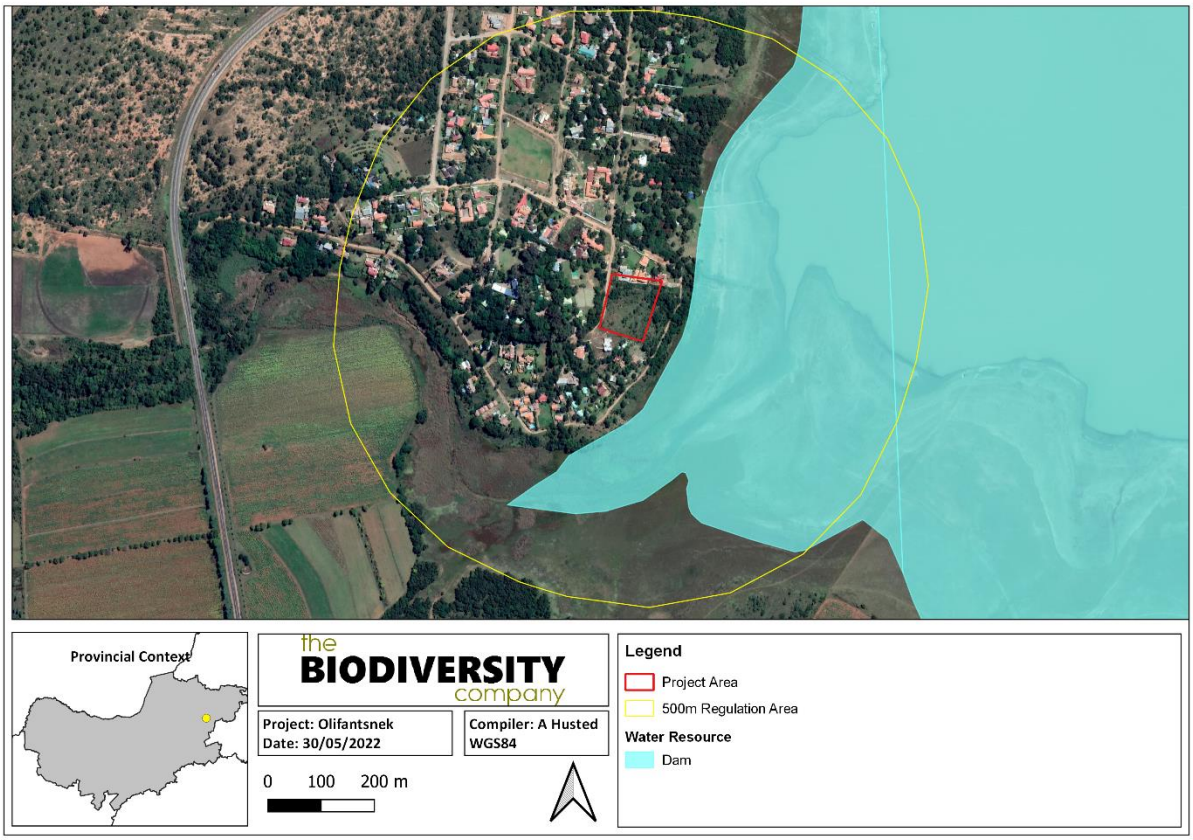


Figure 4-14 The delineated extent of the Olifantsnek Dam

4.2.4.2 Risk Assessment

A risk assessment was conducted in line with Section 21 (c) and (i) of NWA to investigate the level of risk posed by the project, the construction and operation of the development. Table 4-8 lists the potential risks posed by the development next to the Olifantsnek Dam that has the potential to be indirectly impacted by the development. Significance ratings for each identified risk is given for scenarios with mitigation. *In lieu* of more detailed information, it is prudent (and indeed expected of the specialist by DWS) to assume full utilisation of the project area provided following a precautionary principle.

During construction, the most potentially significant risks to the Olifantsnek Dam centres around altered surface flow characteristics following site clearing, increased bare surfaces accompanied by intensified flood peaks and potential for erosion. During operation, pre-mitigation risks centre on alteration to flow volumes and patterns, continued sedimentation and increased inputs of organic and chemical contaminants. These impacts were assigned a post-mitigation rating of Low taking into account the nature and size of the development.

A number of mitigation measures are provided in Table 4-8 which would, if implemented effectively, reduce the significance of the anticipated impacts to Low. Of these, perhaps the most significant mitigation measures are as follows:

- Clearly demarcate the construction footprint and restrict all construction activities to within the project area;
- Ensure that all blockages in drains are promptly fixed.
- Ensure all sewerage and water services are formalised and no decant into the catchment is enabled;.

- Do not discharge any liquids particularly grey or sewerage water into the catchment unless treated to acceptable standards and approved by the relevant authorities at DWS;
- Prioritise construction for the dry season (May to September) as much is feasible to avoid rainfall run-off;
- Appropriately stockpile topsoil cleared from the project area and ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash;
- All construction material laydown areas must be within the project area;
- Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility;
- Design and implement an effective stormwater management plan;
- Promote water infiltration and incorporate green / soft engineering for the development;
- Release only clean water into the environment;
- Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in); and
- Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species.

Table 4-8 DWS Risk Impact Matrix for the proposed development

No.	Phases	Activity	Aspect	Impact	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures
1	**Construction Phase**	Site clearing as part of the commencement of construction activities within the proposed development footprint area.	Removal of vegetation and disturbances of soil medium.	* Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the catchment area; * Increased sedimentation of the catchment area, leading to smothering of biota and potentially altering surface water quality; and * Decreased ecoservice provision (specifically the recreational value of the catchment area).	2	1	1	4	1	1	5	1	8	**32**	**L**	**80**	* Temporary storage areas and stockpiles to be restricted to the project area; * All development footprint areas to remain as small as possible and vegetation clearing to be limited to what is absolutely essential; * Vehicles to be serviced off-site and all re-fuelling is to take place off-site; * It should be feasible to utilise existing roads to gain access to the construction site; * Sanitation services provided for construction personnel; * All litter must be stored immediately and only in closed dustbins, including cigarette ends, and no litter is to remain behind on site following completion of construction activities.
2		Topography shaping and levelling, excavation of trenches and foundations within the regulated area	*Removal of topsoil; and *Excavation and trenching leading to alteration of the natural soil profile setting, stockpiling of soil within close proximity to the excavated area.	* Disturbances of soils leading to increased alien vegetation proliferation, and in turn to further altered habitat; and * Altered runoff patterns and alteration to flow patterns, leading to increased erosion and sedimentation of the catchment area.	2.5	1	2	5.5	1	2	5	1	9	**50**	**L**	**75**	* During trenching / foundations, the topsoil as well as the vegetation should be removed up to a depth of 150mm and be stockpiled outside watercourse area. The vegetation must be kept moist, until it can be used to rehabilitate the exposed areas as part of the backfilling operation; * Excavated materials (from the trenches/foundations) should not be contaminated and it should be ensured that the minimum surface area is taken up, however the stockpiles may not exceed 2 m in height. Mixture of the lower and upper

3		Installation of sewer services (e.g. sewer pipeline) and stormwater services	*Mixing and casting of concrete: *Placement of bedding material within the excavated trench underneath the pipelines; *Backfilling of trench, where after it will be compacted; and *Miscellaneous activities by construction personnel.	*Erosion of the exposed trench; *Potential sedimentation of the wetland area; *Potential impacts on water quality and contamination of soils within the wetland area; *Potential of backfill material to enter the wetland area, increasing the sediment load within the wetland area; *Potential for over-compaction of soils occurring at the close proximity of the wetland boundary, disrupting the growth medium of the vegetation on the disturbed areas during construction.	2	1	2	5	1	2	5	1	9	**45**	**L**	**80**	layers of the excavated soil should be kept to a minimum, so as for later usage as backfill material; * All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the dam in close proximity to these stockpiles; and * After the areas have been excavated, a bedding layer (such as clean gravel) should be placed and should be spread evenly and compacted uniformly to a firm, but not hard, support. With regards to concrete mixing on site: * No mixed concrete may be deposited outside of the designated construction footprint; * A batter / dagga board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited whilst it awaits placing; and * Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. * Open trenches should be closed immediately, in sections so as to ensure that no open trenches are left open for extensive periods; * Trenches should be backfilled with the stockpiled excavated materials in layers, up to 150 mm below the natural ground level, after which the topsoil is replaced and re-worked and the removed vegetation is reinstated as part of the rehabilitation of the site; * Soil must be recompacted to a depth of 450 mm, and all construction material must be removed from site upon the completion of construction.

4		Potential waste disposal within the vicinity of the dam area.	Disposal of construction-related wastes (such as rubble, hazardous chemicals and litter)	* Altered flow regime as a result of solid wastes at a close proximity of the dam area; and * Altered water quality due to chemical waste disposal.	3	1	1	5	1	1	5	1	8	**40**	**L**	**80**	* Suitable waste disposal facilities should be provided. These facilities should be located within the project area and out of sight (where possible) of the local residents in order to limit the visual impact; * These facilities should regularly be emptied and taken to a registered waste disposal facility; * Emergency Spill Response plan must be developed by the contractor to deal with any spills, especially in sensitive areas near the dam boundary.
5		Potential spillage of contaminants (i.e. oil, diesel etc) from construction vehicles.	Spills / chemical leaks from construction vehicles.	* Possible contamination of soils and surface water, leading to reduced ability to support biodiversity	4	1	1	6	1	1	5	1	8	**48**	**L**	**80**	
6	**Construction/Operational Phase**	Construction, Operation and Maintenance of the stormwater management services.	Development footprint areas at a close proximity of the dam area.	* Reshaping of the landscape and soil compaction of areas near the dam area.	4	1	1	6	1	1	5	2	9	**54**	**L**	**80**	* Correct sizing of stormwater system to contain stormwater runoff of the surrounding area during heavy rainfall events; * Vegetating the stormwater systems with good selection of plant species to aid in pollution infiltering as well as infiltration rate of stormwater runoff
7		Construction, Operation and maintenance of the residential area, access roads including road upgrade and electric services	Footprint areas a close proximity of the dam area.	* Soil compaction and increase of impervious areas, leading to increase of inflow water volumes during rainfall event; * Deposition of contaminated water into the nearby dam.	4	1	4	9	1	1	1	2	5	**45**	**L**	**75**	* All activities should be limited on the planned footprint, not to unnecessarily encroach on to watercourse boundaries where activities are not planned.
8	**Operational Phase**	Vegetation disturbance	Proliferation of alien and invasive species	* Implement alien vegetation control and removal.	2	1	1	4	1	1	5	1	8	**32**	**L**	**80**	* Continue to remove all alien and invasive plant species as they arise (i.e. weedy annuals and other alien forbs).
9		Water management	Increased water inputs	* Implement stormwater management measures.												**80**	* Implement stormwater designs; Include soft / green engineering measures; * Harvest rainwater; and * Create vegetated areas within the project area for infiltration.

4.2.4.3 Regulatory Zone

The following regulatory zone is applicable, and pertains to the project area being within 100 m from the edge of the watercourse (i.e. dam) (Table 4-9).

Table 4-9 The zone of regulation for the project

Regulatory authorisation required	Zone of applicability
Water Use License Application in terms of the National Water Act, 1998 (Act No. 36 of 1998). Department of Water and Sanitation (DWS)	Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21c and 21i is defined as: • the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; • in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or • a 500m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.

5 Habitat Assessment and Site Ecological Importance

5.1 Habitat Assessment

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 5-1. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC.

Figure 5-1 Habitats identified in the project area.

5.1.1 Grassy Woodland

Grassy Woodland includes the entire property, and includes areas of more open grassland features, also more prone to illegal dumping, and wooded areas, where alien trees such as *Melia azedarach* dominate. (Figure 5-2 and Figure 5-3).

Generally, this habitat unit has moderate ecological function attributed to floral communities, not including protected species. The current ecological condition of this habitat is unbalanced due to the current land use and impact. Portions of this unit have been disturbed by the historic and current impacts including illegal dumping. Additionally, the presence of some disturbances such as AIP presence or edge effect impacts on floral communities have resulted in decreased habitat integrity. A condition gradient is present in this habitat with some areas being more disturbed than others, this gradient is dependent on the level of impacts.

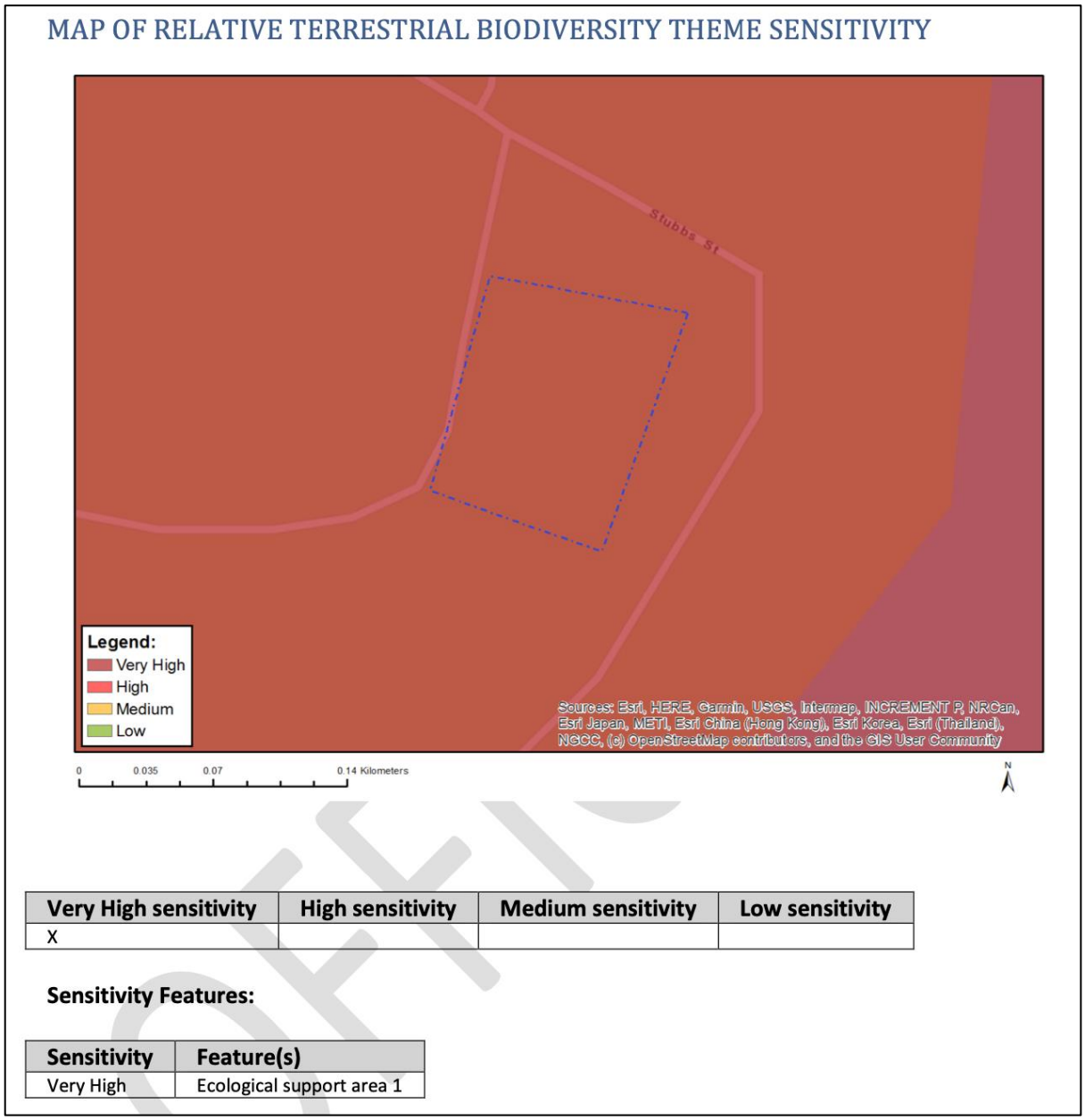
Although the habitat unit is not entirely disturbed, ongoing and historic disturbances have resulted in the plant community no longer being fully representative of the reference vegetation.

Figure 5-2 Example of Grassy Woodland habitat from the project area

Figure 5-3 Example of Grassy Woodland habitat from the project area

5.2 Site Ecological Importance

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, (Figure 5-4) while the fauna sensitivity was rated as 'Medium', and plant sensitivity was rated as 'Low'.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Ecological support area 1

Figure 5-4 Terrestrial Biodiversity Theme Sensitivity, National Web based Environmental Screening Tool.

From a fauna perspective the project area is regarded as having a medium sensitivity due to three species possibly occurring, these are discussed below.

5.2.1 Mammalia

***Crocidura maquassiensis* (VU)**

This is a rare species endemic to South Africa, Swaziland and Zimbabwe, existing in moist grassland habitats in the Savannah and Grassland biomes. Although it has a wide inferred extent of occurrence (284,735 km^2), it appears to be patchily distributed. This species was not recorded in the project area.

Dasymys robertsii

African Marsh Rats are dependent on intact rivers and wetland ecosystems, as they have not been found in artificial or degraded wetlands, and are thus patchily distributed within the assessment region. These species are associated with rivers and wetlands within the northern and southern African savannas from Senegal in the west to Ethiopia in the east and south to the Western Cape Province of South Africa. No wetlands were encountered on the project area and this species was not recorded.

5.2.2 Reptilia

Kinixys lobatsiana

Kinixys lobatsiana was considered to be Vulnerable at a Tortoise and Freshwater Turtle Specialist Group Red Listing workshop in late 2013 (TTWG 2014), but was listed as Least Concern on the IUCN Red List in 2017 based on earlier 2010 and 2013 assessments (Bates *et al.* 2014, Boycott 2014, TTWG 2014). The range of *K. lobatsiana* falls mainly within Limpopo Province of South Africa, for which 15% of land cover is considered developed or degraded (Limpopo Environmental Outlook Report 2016). The remaining 85% of its natural habitat includes Kruger National Park, where *K. lobatsiana* does not occur. This species was not recorded on the project area and sufficient habitat for this species was not encountered.

The location and extent of this habitat is illustrated in Figure 5-1. Based on the criteria provided in Section 3.3 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity category (Table 5-1). The sensitivities of the habitat type delineated are illustrated in Figure 5-5.

Table 5-1 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Grassy Woodland	Low	Low	Low	Medium	Low

Table 5-2 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

Figure 5-5 Sensitivity of the project area

6 Impact Risk Assessment

The section below and associated tables serve to indicate and summarise the significance of perceived impacts on the terrestrial ecology of the project area. Potential impacts were evaluated against the data captured during the desktop and field assessment to identify relevance to the project area. The relevant impacts associated with the proposed construction of the development were then subjected to a prescribed impact assessment methodology and is available on request.

6.1 Biodiversity Risk Assessment

6.1.1 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the project area (Figure 6-1). These include:

- Land modification;
- Litter and illegal dumping;
- Alien and/or Invasive Plants (IAP); and
- Fencing/boundary walls.

Figure 6-1 ***Clockwise from to top left to bottom right, Illegal Dumping and Alien plants; Fences and Alien plants, Excavations; Dumping and Alien plants***

6.1.2 Terrestrial Impact Assessment

Potential impacts were evaluated against the data captured during the desktop and field assessments to identify relevance to the project area. The relevant impacts associated with the proposed development were then subjected to a prescribed impact assessment methodology and is available on request. This impact section includes the impacts to terrestrial ecology.

Anthropogenic activities drive habitat destruction causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

6.1.3 Alternatives Considered

No alternatives were provided for the development.

6.1.4 Loss of Irreplaceable Resources

- ESA could be lost.

6.1.5 Anticipated Impacts

The impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity (Table 6-1).

Table 6-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	Project activities that can cause loss/impacts to habitat (especially with regard to the proposed infrastructure areas):	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species.	Displacement/loss of flora & fauna (including possible SCC)
	Access roads and servitudes	Increased potential for soil erosion
	Soil dust precipitation	Habitat fragmentation
	Dumping of waste products	Increased potential for establishment of alien & invasive vegetation
	Random events such as fire (cooking fires or cigarettes)	Erosion
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of alien and/or invasive species	Vegetation removal	Habitat loss for native flora & fauna (including SCC)
	Vehicles potentially spreading seed	Spreading of potentially dangerous diseases due to invasive and pest species
	Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	Alteration of fauna assemblages due to habitat modification
	Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	
Main Impact	**Project activities that can cause direct mortality of fauna**	**Secondary impacts anticipated**
3. Direct mortality of fauna	Clearing of vegetation	Loss of habitat
		Loss of ecosystem services
	Roadkill due to vehicle collision	Increase in rodent populations and associated disease risk
	Pollution of water resources due to dust effects, chemical spills, etc.	

	Loss of nesting sites	
	Intentional killing of fauna for food (hunting)	
	Bird collisions and electrocutions	
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4. Reduced dispersal/migration of fauna	Loss of landscape used as corridor	Reduced dispersal/migration of fauna
		Loss of ecosystem services
	Compacted roads	Reduced plant seed dispersal
	Removal of vegetation	
Main Impact	**Project activities that can cause pollution in watercourses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water runoff, spills from vehicles and erosion	Chemical (organic/inorganic) spills	Pollution in watercourses and the surrounding environment
	Erosion	Faunal mortality (direct and indirectly)
		Groundwater pollution
		Loss of ecosystem services
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance.**	**Secondary impacts anticipated**
6.Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, vehicles)	Disruption/alteration of ecological life cycles due to noise
		Loss of ecosystem services
	Project activities that can cause disruption/alteration of ecological life cycles due to dust	Secondary impacts associated with disruption/alteration of ecological life cycles due to dust
	Vehicles	Loss of ecosystem services
Main Impact	**Project activities that can cause staff to interact directly with potentially dangerous fauna**	**Secondary impacts anticipated**
8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Loss of SCCs

6.1.6 Unplanned Events

The planned activities will have anticipated impacts as discussed; however, unplanned events may occur on any project and may have potential impacts which will need management.

Table 6-2 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 6-2 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural Bushveld and ridge.	Appropriate/Adequate fire management plan need to be implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the road	Storm water management plan must be compiled and implemented.

6.1.7 Identification of Additional Potential Impacts

6.1.7.1 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. The mitigation actions required to lower the risk of the impact are provided in Section 8.1.8 of this report.

6.1.7.2 Construction Phase

The following potential main impacts on the biodiversity (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community;
- Introduction of alien species, specifically plants;
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching);
- Chemical spills.

6.1.7.3 Operation Phase

The operational phase of the impact of daily activities is anticipated to further spread the IAP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts.

The following potential impacts were considered:

- Spread of alien and/or invasive species;
- Reduced dispersal of fauna.

6.1.7.4 Decommissioning Phase

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the operational phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented. Should the residential development not be removed the impacts will persist.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats);
- Spread of alien and/or invasive species.

Table 6-3 Assessment of significance of potential impacts on terrestrial biodiversity associated with the construction phase of the project

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Destruction, fragmentation and degradation of habitats, and ecosystems	5	3	2	2	5		4	2	2	2	4	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Definite	**Moderate**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Highly likely	**Low**
Spread and/or establishment of alien and/or invasive species	5	3	5	3	5		3	2	2	2	3	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Disastrous / ecosystem structure and function seriously to critically altered	Ecology moderately sensitive/ /important	Definite	**High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Mortalities and displacements of fauna and flora SCCs.	3	3	3	4	4		2	2	2	4	3	
	One year to five years:	Local area/ within 1 km	Significant / ecosystem	Ecology highly sensitive /important	Highly likely	**Moderate**		Development specific/	Small / ecosystem	Ecology highly sensitive /important	Likely	**Low**

	Medium Term	of the site boundary / < 5000ha impacted / Linear features affected < 1000m	structure and function moderately altered				One month to one year: Short Term	within the site boundary / < 100 ha impacted / Linear features affected < 100m	structure and function largely unchanged			
Chemical pollution associated with dust suppressants	3	4	4	3	3		2	2	2	2	1	
	One year to five years: Medium Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Highly unlikely	**Absent**

Table 6-4 Assessment of significance of potential impacts on terrestrial biodiversity associated with the operational phase of the project

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Spread and/or further establishment of alien and/or invasive species	4	3	3	3	4		2	2	2	2	3	
	Life of operation or less than 20	Local area/ within 1 km of the site boundary / <	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / <	Small / ecosystem structure and function	Ecology with limited sensitivity/importance	Likely	**Low**

	years: Long Term	5000ha impacted / Linear features affected < 1000m	moderately altered					100 ha impacted / Linear features affected < 100m	largely unchanged			
Reduced dispersal of fauna	4	3	4	3	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Table 6-5 Assessment of significance of potential impacts on terrestrial biodiversity associated with the Decommissioning phase of the project

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued fragmentation and degradation of habitats and ecosystems	3	3	3	3	3		2	3	3	3	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Low**
Spread of alien and/or invasive species	4	3	3	3	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha	Small / ecosystem structure and function	Ecology with limited sensitivity/importance	Likely	**Low**

		Linear features affected < 1000m	moderately altered					impacted / Linear features affected < 100m	largely unchanged			

6.1.7.5 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for fauna and flora. Localised cumulative impacts include the cumulative effects from actions that are close enough to potentially cause additive effects on the environment or sensitive receivers include dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport. From a cumulative impact perspective, the areas surrounding the project area is residential developments, with no natural habitat remaining, except for the Olifantshoek Dam to the east.

6.1.8 Biodiversity Management Plan

The aim of the management outcomes is to present the mitigations in such a way that the can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 6-6 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the Terrestrial and Freshwater Assessment.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities in the vicinity of the project area;
- As far as possible, reduce the negative fragmentation effects of the development and enable safe movement of faunal species;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including occurring and potentially occurring species of conservation concern); and
- Follow the guidelines for interpreting Site Ecological Importance (SEI).

Table 6-6 Mitigation measures including requirements for timeframes, roles and responsibilities for the terrestrial study

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
All activities must be restricted too within the low/medium sensitivity areas. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Construction phase	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing access routes, especially roads must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Construction phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.	Construction phase	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins. This is to ensure good housekeeping' by all staff and contractors.	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments,	Construction Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing

• Signs must be put up to enforce this				
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Life of operation	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Life of operation	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight; • Should the holes overnight they must be covered temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing

Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation

A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation

Management outcome: Dust

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non-environmentally friendly suppressants may be used as this could result in pollution of water sources	Construction Phase	Contractor	Dustfall	Dust monitoring program.

Management outcome: Waste management

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

Management outcome: Environmental awareness training

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. The avoidance and protection of the dam area must be included into a site	Construction Phase	Health and Safety Officer	Compliance to the training.	Ongoing

induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.				
Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion. • Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

7 Conclusion and Impact Statement

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a high confidence in the information provided. The survey ensured that there was suitable ground truth coverage of the assessment area and major habitats and ecosystems were assessed to obtain a general species (fauna (including avifauna) and flora) overview and the major current impacts were observed. The project area is approximately 65 m west of the Olifantsnek Dam.

Regarding the current layout, no project infrastructure is expected to have a significant impact on the area, if the mitigation measures are followed. No faunal component of significance was observed, which further reduced the impact significance of the development on terrestrial biodiversity. The classification of project area as degraded and other natural area is corroborated.

7.1 Recommendations

The following recommendations should be considered for the authorisation:

- A stormwater management plan must be developed and implemented for the project. This plan must advise the return of clean water to the adjacent watercourses.

7.2 Impact Statement

The main expected impacts of the proposed development will include the following:

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts occurring. Considering that the project area has been identified as being of low significance for biodiversity maintenance and ecological processes, development may proceed. All mitigations measures prescribed herein must be considered by the issuing authority for authorisation. No fatal flaws are evident for the proposed project.

A risk assessment was completed for the proposed development project, and the overall residual risk was determined to be Low.

In accordance with the GA in terms of section 39 of the NWA, for water uses as defined in section 21 (c) or section 21 (i) a GA does not apply *"to any water use in terms of section 21 (c) or (i) of the Act associated with the construction, installation or maintenance of any sewer pipelines, pipelines carrying hazardous materials and to raw water and waste water treatment works".* Owing to the fact that this project will include the installation of sewerage services to accommodate the proposed development, a water use license will be required.

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9 Appendix Items

9.1 Appendix A – Flora species expected to occur in the project area.

Genus	Species	IUCN	Ecology
Ficus	*thonningii*		Indigenous
Commelina	*modesta*	LC	Indigenous; Endemic
Riccia	*okahandjana*		Indigenous
Weissia	*latiuscula*		Indigenous
Senegalia	*caffra*	LC	Indigenous
Eragrostis	*superba*	LC	Indigenous
Hilliardiella	*aristata*	LC	Indigenous
Riccia	*atropurpurea*		Indigenous
Afrocanthium	*gilfillanii*	LC	Indigenous; Endemic
Senna	*occidentalis*	NE	Not indigenous; Naturalised; Invasive
Rhoicissus	*tridentata*	NE	Indigenous
Hermannia	*sp.*		
Protea	*caffra*		Indigenous
Fossombronia	*crispa*		Indigenous
Anthospermum	*hispidulum*	LC	Indigenous; Endemic
Crotalaria	*distans*	LC	Indigenous
Strychnos	*usambarensis*	LC	Indigenous
Ozoroa	*paniculosa*	LC	Indigenous
Burmannia	*madagascariensis*	LC	Indigenous
Epilobium	*hirsutum*	LC	Indigenous
Senecio	*venosus*	LC	Indigenous; Endemic
Helichrysum	*nudifolium*	LC	Indigenous
Mundulea	*sericea*	LC	Indigenous
Sida	*dregei*	LC	Indigenous
Aristida	*stipitata*	LC	Indigenous
Fissidens	*rufescens*		Indigenous
Gymnosporia	*buxifolia*	LC	Indigenous
Monopsis	*decipiens*	LC	Indigenous
Eriosema	*squarrosum*	LC	Indigenous; Endemic
Riccia	*volkii*		Indigenous
Indigofera	*arrecta*	LC	Indigenous
Olea	*europaea*		Indigenous
Oldenlandia	*herbacea*	LC	Indigenous
Eustachys	*paspaloides*	LC	Indigenous
Eriobotrya	*japonica*		Not indigenous; Naturalised; Invasive

Sematophyllum	*brachycarpum*		Indigenous
Otiophora	*calycophylla*	LC	Indigenous; Endemic
Tricholaena	*monachne*	LC	Indigenous
Aristida	*spectabilis*	LC	Indigenous; Endemic
Mannia	*capensis*		Indigenous
Acalypha	*glabrata*	LC	Indigenous; Endemic
Helichrysum	*auronitens*	LC	Indigenous
Dysphania	*schraderiana*		Indigenous
Christella	*gueintziana*		Indigenous
Anomobryum	*julaceum*		Indigenous
Fissidens	*plumosus*		Indigenous
Racopilum	*capense*		Indigenous
Euclea	*crispa*	LC	Indigenous
Asterella	*muscicola*		Indigenous
Pentarrhinum	*insipidum*	LC	Indigenous
Tortella	*xanthocarpa*		Indigenous
Setaria	*sphacelata*	LC	Indigenous
Syntrichia	*laevipila*		Indigenous
Khadia	*acutipetala*	LC	Indigenous; Endemic
Ascolepis	*capensis*	LC	Indigenous
Philonotis	*dregeana*		Indigenous
Symphyogyna	*brasiliensis*		Indigenous
Wahlenbergia	*denticulata*	LC	Indigenous
Sematophyllum	*sphaeropyxis*		Indigenous
Commelina	*africana*	LC	Indigenous
Indigastrum	*burkeanum*	LC	Indigenous; Endemic
Asparagus	*angusticladus*	LC	Indigenous
Olea	*capensis*	LC	Indigenous
Pygmaeothamnus	*zeyheri*	LC	Indigenous
Sporobolus	*pectinatus*	LC	Indigenous; Endemic
Faurea	*saligna*	LC	Indigenous
Asplenium	*inaequilaterale*	LC	Indigenous
Aeollanthus	*buchnerianus*	LC	Indigenous
Triumfetta	*pilosa*	NE	Indigenous
Searsia	*pyroides*	LC	Indigenous
Ochna	*pretoriensis*	LC	Indigenous; Endemic
Cymbopogon	*marginatus*	LC	Indigenous; Endemic
Eulophia	*streptopetala*	LC	Indigenous
Diheteropogon	*amplectens*	LC	Indigenous

Freesia	*grandiflora*	LC	Indigenous; Endemic
Drosera	*collinsiae*	LC	Indigenous; Endemic
Lasiosiphon	*sericocephalus*	LC	Indigenous; Endemic
Phylica	*paniculata*	LC	Indigenous
Raphionacme	*velutina*	LC	Indigenous
Ochna	*pulchra*	LC	Indigenous
Viscum	*verrucosum*	LC	Indigenous
Crotalaria	*sphaerocarpa*	LC	Indigenous
Carissa	*bispinosa*	LC	Indigenous
Haemanthus	*humilis*	LC	Indigenous; Endemic
Rothmannia	*capensis*	LC	Indigenous
Xenostegia	*tridentata*	LC	Indigenous
Bryum	*argenteum*		Indigenous
Sphenostylis	*angustifolia*	LC	Indigenous; Endemic
Pelargonium	*luridum*	LC	Indigenous
Kiggelaria	*africana*	LC	Indigenous
Helichrysum	*cerastioides*	LC	Indigenous
Helichrysum	*lepidissimum*	LC	Indigenous
Helichrysum	*callicomum*	LC	Indigenous
Searsia	*magalismontana*	LC	Indigenous
Polydora	*angustifolia*	LC	Indigenous
Obetia	*tenax*	LC	Indigenous
Leucaena	*leucocephala*	NE	Not indigenous; Naturalised
Anacampseros	*subnuda*	LC	Indigenous
Alloteropsis	*semialata*	LC	Indigenous
Adenostemma	*caffrum*	LC	Indigenous
Floscopa	*glomerata*	LC	Indigenous
Orbea	*lutea*	LC	Indigenous
Seriphium	*plumosum*		Indigenous
Barbula	*eubryum*		Indigenous
Trema	*orientalis*	LC	Indigenous
Agelanthus	*natalitius*	LC	Indigenous
Plectranthus	*ramosior*	LC	Indigenous; Endemic
Persicaria	*madagascariensis*		Indigenous
Croton	*gratissimus*	LC	Indigenous
Atrichum	*androgynum*		Indigenous
Kalanchoe	*lanceolata*	LC	Indigenous
Portulaca	*grandiflora*	LC	Indigenous; Endemic
Striga	*bilabiata*	LC	Indigenous

Senecio	*pleistocephalus*	LC	Indigenous
Fissidens	*bryoides*		Indigenous
Solanum	*lichtensteinii*	LC	Indigenous
Lophocolea	*sp.*		
Dombeya	*rotundifolia*	LC	Indigenous
Epilobium	*salignum*	LC	Indigenous
Symphyogyna	*podophylla*		Indigenous
Philonotis	*hastata*		Indigenous
Cynorkis	*kassneriana*	LC	Indigenous
Myrsine	*pillansii*	LC	Indigenous
Babiana	*bainesii*	LC	Indigenous
Apodytes	*dimidiata*	LC	Indigenous
Polygala	*rehmannii*	LC	Indigenous
Sonchus	*dregeanus*	LC	Indigenous
Lophiocarpus	*tenuissimus*	LC	Indigenous
Riccia	*cavernosa*		Indigenous
Andropogon	*chinensis*	LC	Indigenous
Conyza	*podocephala*		Indigenous; Endemic
Talinum	*caffrum*	LC	Indigenous
Peperomia	*tetraphylla*	LC	Indigenous
Alepidea	*setifera*	LC	Indigenous; Endemic
Gymnosporia	*polyacantha*	LC	Indigenous; Endemic
Cyperus	*margaritaceus*	LC	Indigenous
Maytenus	*albata*	LC	Indigenous; Endemic
Psiadia	*punctulata*	LC	Indigenous
Mystroxylon	*aethiopicum*	LC	Indigenous; Endemic
Portulaca	*pilosa*	LC	Not indigenous; Naturalised; Invasive
Drimia	*altissima*	LC	Indigenous
Hermannia	*burkei*	LC	Indigenous; Endemic
Protea	*gaguedi*	LC	Indigenous
Pavonia	*transvaalensis*	LC	Indigenous; Endemic
Osmunda	*regalis*	LC	Indigenous
Nidorella	*hottentotica*	LC	Indigenous; Endemic
Vangueria	*macrocalyx*	LC	Indigenous
Arundinella	*nepalensis*	LC	Indigenous
Empogona	*lanceolata*		Indigenous; Endemic
Fissidens	*sciophyllus*		Indigenous
Ozoroa	*paniculosa*	LC	Indigenous
Athrixia	*elata*	LC	Indigenous; Endemic

Combretum	*molle*	LC	Indigenous
Indigofera	*melanadenia*	LC	Indigenous
Liparis	*bowkeri*	LC	Indigenous
Hesperantha	*coccinea*	LC	Indigenous
Fissidens	*ovatus*		Indigenous
Brachymenium	*acuminatum*		Indigenous
Plagiochasma	*rupestre*		Indigenous
Fissidens	*sp.*		
Striga	*gesnerioides*	LC	Indigenous
Thelypteris	*confluens*	LC	Indigenous
Acalypha	*villicaulis*	LC	Indigenous
Fossombronia	*gemmifera*		Indigenous
Schinus	*molle*	NE	Not indigenous; Naturalised; Invasive
Frithia	*pulchra*	LC	Indigenous; Endemic
Pteris	*vittata*	LC	Indigenous
Euphorbia	*pulcherrima*	NE	Not indigenous; Naturalised
Trematodon	*longicollis*		Indigenous
Cussonia	*transvaalensis*	LC	Indigenous; Endemic
Aristida	*aequiglumis*	LC	Indigenous
Cyperus	*cyperoides*	LC	Indigenous
Pteris	*friesii*	LC	Indigenous
Rosulabryum	*capillare*		Indigenous
Sporobolus	*congoensis*	LC	Indigenous
Oocephala	*staehelinoides*		Indigenous; Endemic
Dicoma	*anomala*	LC	Indigenous
Eriosema	*nutans*	LC	Indigenous
Senecio	*othonniflorus*	LC	Indigenous; Endemic
Schoenoplectus	*brachyceras*	LC	Indigenous
Helichrysum	*epapposum*	LC	Indigenous; Endemic
Searsia	*rigida*	LC	Indigenous; Endemic
Aristida	*congesta*	LC	Indigenous
Utricularia	*welwitschii*	LC	Indigenous
Cirsium	*vulgare*		Not indigenous; Naturalised; Invasive
Ledebouria	*ovatifolia*		Indigenous; Endemic
Mimusops	*zeyheri*	LC	Indigenous
Acalypha	*glabrata*	LC	Indigenous
Afrosolen	*sandersonii*		Indigenous; Endemic
Hermannia	*floribunda*	LC	Indigenous
Pityrogramma	*argentea*	LC	Indigenous

Diospyros	*lycioides*	LC	Indigenous; Endemic
Zehneria	*scabra*		Indigenous
Ochna	*holstii*	LC	Indigenous
Sphagnum	*truncatum*		Indigenous
Ursinia	*nana*	LC	Indigenous; Endemic
Aristida	*junciformis*	LC	Indigenous; Endemic
Leersia	*hexandra*	LC	Indigenous
Pogonarthria	*squarrosa*	LC	Indigenous
Cheilanthes	*hirta*	LC	Indigenous
Setaria	*sphacelata*	LC	Indigenous
Valeriana	*capensis*	LC	Indigenous
Helichrysum	*setosum*	LC	Indigenous
Ilex	*mitis*	LC	Indigenous
Ischaemum	*fasciculatum*	LC	Indigenous
Salacia	*rehmannii*	LC	Indigenous; Endemic
Sphagnum	*capense*		Indigenous
Chaenostoma	*leve*	LC	Indigenous; Endemic
Eragrostis	*stapfii*	LC	Indigenous
Berkheya	*carlinopsis*	LC	Indigenous; Endemic
Scolopia	*mundii*	LC	Indigenous; Endemic
Ptisana	*fraxinea*	NE	Indigenous
Cleome	*monophylla*	LC	Indigenous
Polygala	*hottentotta*	LC	Indigenous
Monocymbium	*ceresiiforme*	LC	Indigenous
Pittosporum	*viridiflorum*	LC	Indigenous
Riccia	*crystallina*		Indigenous
Polytrichum	*commune*		Indigenous
Pogonatum	*capense*		Indigenous
Crassula	*swaziensis*	LC	Indigenous
Schizachyrium	*jeffreysii*	LC	Indigenous
Melhania	*acuminata*	LC	Indigenous
Xerophyta	*viscosa*	LC	Indigenous; Endemic
Craterostigma	*wilmsii*	LC	Indigenous; Endemic
Nuxia	*congesta*	LC	Indigenous
Oleandra	*distenta*	LC	Indigenous
Barleria	*pretoriensis*	LC	Indigenous; Endemic
Rhynchosia	*totta*		Indigenous
Quercus	*robur*		Not indigenous; Cultivated; Naturalised; Invasive
Campylopus	*pyriformis*		Indigenous

Huernia	*transvaalensis*	LC	Indigenous; Endemic
Acalypha	*sp.*		
Trichostomum	*brachydontium*		Indigenous
Hilliardiella	*sutherlandii*		Indigenous
Cyperus	*leptocladus*	LC	Indigenous; Endemic
Cucumis	*melo*	LC	Indigenous
Bulbostylis	*contexta*	LC	Indigenous
Antherotoma	*debilis*	LC	Indigenous
Ipomoea	*magnusiana*	LC	Indigenous
Justicia	*betonica*	LC	Indigenous
Delosperma	*sp.*		
Erica	*woodii*	LC	Indigenous
Helichrysum	*harveyanum*	LC	Indigenous
Ficus	*ingens*		Indigenous
Protea	*welwitschii*	LC	Indigenous
Thesium	*utile*	LC	Indigenous; Endemic
Euphorbia	*striata*	LC	Indigenous; Endemic
Gloriosa	*modesta*	LC	Indigenous; Endemic
Eragrostis	*curvula*	LC	Indigenous
Berkheya	*zeyheri*	LC	Indigenous
Hilliardiella	*hirsuta*	LC	Indigenous
Berkheya	*seminivea*	LC	Indigenous; Endemic
Pycnostachys	*reticulata*	LC	Indigenous
Clutia	*pulchella*	LC	Indigenous; Endemic
Canthium	*suberosum*	LC	Indigenous; Endemic
Fuirena	*stricta*	LC	Indigenous
Alsophila	*dregei*	LC	Indigenous
Buddleja	*saligna*	LC	Indigenous
Boophone	*disticha*	LC	Indigenous
Lippia	*javanica*	LC	Indigenous
Sebaea	*bojeri*	LC	Indigenous
Pavetta	*zeyheri*	LC	Indigenous
Loudetia	*simplex*	LC	Indigenous
Riccia	*albolimbata*		Indigenous
Hermannia	*lancifolia*	LC	Indigenous; Endemic
Aloe	*davyana*		Indigenous; Endemic
Trichoneura	*grandiglumis*	LC	Indigenous
Trematodon	*intermedius*		Indigenous
Hibiscus	*sp.*		

Fissidens	*curvatus*		Indigenous
Ditrichum	*difficile*		Indigenous
Solanum	*pseudocapsicum*		Not indigenous; Naturalised; Invasive
Maytenus	*undata*	LC	Indigenous
Pterocelastrus	*echinatus*	LC	Indigenous
Phytolacca	*dioica*		Not indigenous; Naturalised; Invasive
Isolepis	*fluitans*	LC	Indigenous
Dierama	*mossii*	LC	Indigenous; Endemic
Dovyalis	*zeyheri*	LC	Indigenous
Eragrostis	*racemosa*	LC	Indigenous
Clematis	*brachiata*	LC	Indigenous
Ancylobothrys	*capensis*	LC	Indigenous; Endemic
Persicaria	*decipiens*	LC	Indigenous
Cenchrus	*macrourus*	LC	Indigenous
Campylopus	*introflexus*		Indigenous
Lopholaena	*coriifolia*	LC	Indigenous
Kniphofia	*ensifolia*	LC	Indigenous
Eucomis	*montana*	LC	Indigenous; Endemic
Triaspis	*glaucophylla*	LC	Indigenous; Endemic
Dumortiera	*hirsuta*		Indigenous
Eragrostis	*acraea*	LC	Indigenous
Fossombronia	*straussiana*		Indigenous
Helichrysum	*mundtii*	LC	Indigenous
Alloteropsis	*semialata*	LC	Indigenous
Vangueria	*parvifolia*	LC	Indigenous; Endemic
Listia	*heterophylla*	LC	Indigenous
Blechnum	*attenuatum*	LC	Indigenous
Bryum	*apiculatum*		Indigenous
Eragrostis	*gummiflua*	LC	Indigenous
Myrothamnus	*flabellifolius*	DD	Indigenous
Gomphocarpus	*fruticosus*		Indigenous
Rhynchosia	*confusa*	NE	Indigenous
Schizachyrium	*sanguineum*	LC	Indigenous
Diospyros	*lycioides*	LC	Indigenous
Pouzolzia	*mixta*	LC	Indigenous
Dicoma	*anomala*	LC	Indigenous
Fadogia	*homblei*	LC	Indigenous
Portulaca	*quadrifida*	LC	Indigenous
Cyphia	*persicifolia*	LC	Indigenous; Endemic

Cleome	*maculata*	LC	Indigenous
Anthospermum	*rigidum*	LC	Indigenous
Targionia	*hypophylla*		Indigenous
Myrsine	*africana*	LC	Indigenous
Thesium	*magalismontanum*	LC	Indigenous; Endemic
Coccinia	*adoensis*	LC	Indigenous
Nemesia	*fruticans*	LC	Indigenous
Morella	*pilulifera*	LC	Indigenous
Helichrysum	*rugulosum*	LC	Indigenous; Endemic
Gunnera	*perpensa*	LC	Indigenous
Helichrysum	*acutatum*	LC	Indigenous
Berula	*repanda*	LC	Indigenous
Bulbostylis	*burchellii*	LC	Indigenous
Bulbine	*capitata*	LC	Indigenous
Plectranthus	*hereroensis*	LC	Indigenous
Helichrysum	*kraussii*	LC	Indigenous
Geigeria	*burkei*	NE	Indigenous
Burkea	*africana*	LC	Indigenous
Monsonia	*angustifolia*	LC	Indigenous
Sporobolus	*festivus*	LC	Indigenous
Funaria	*rottleri*		Indigenous
Lipocarpha	*chinensis*	LC	Indigenous

9.2 Appendix B – Amphibian species expected to occur in the project area

Family	Scientific name	Common name	Red list Category
Bufonidae	*Poyntonophrynus fenoulheti*	Northern Pygmy Toad	LC
Bufonidae	*Schismaderma carens*	Red Toad	LC
Bufonidae	*Sclerophrys sp.*		LC
Bufonidae	*Sclerophrys capensis*	Raucous Toad	LC
Bufonidae	*Sclerophrys garmani*	Olive Toad	LC
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	LC
Bufonidae	*Sclerophrys poweri*	Power's Toad	LC
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC
Phrynobatrachidae	*Phrynobatrachus natalensis*	Snoring Puddle Frog	LC
Pipidae	*Xenopus laevis*	Common Platanna	LC
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	LC
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	LC
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog	LC
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	LC
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	LC

9.3 Appendix C – Reptile species expected to occur in the project area

Scientific name	Common name	Red list category
Acanthocercus atricollis	Southern Tree Agama	LC
Agama aculeata distanti	Distant's Ground Agama	LC
Agama atra	Southern Rock Agama	LC
Chamaeleo dilepis	Common Flap-neck Chameleon	LC
Crotaphopeltis hotamboeia	Red-lipped Snake	LC
Dasypeltis scabra	Rhombic Egg-eater	LC
Dispholidus typus viridis	Northern Boomslang	NE
Philothamnus occidentalis	Western Natal Green Snake	LC
Telescopus semiannulatus semiannulatus	Eastern Tiger Snake	LC
Thelotornis capensis capensis	Southern Twig Snake	LC
Cordylus vittifer	Common Girdled Lizard	LC
Pseudocordylus melanotus melanotus	Common Crag Lizard	LC
Hemachatus haemachatus	Rinkhals	LC
Naja annulifera	Snouted Cobra	LC
Naja mossambica	Mozambique Spitting Cobra	LC
Lygodactylus capensis	Common Dwarf Gecko	LC
Pachydactylus sp.		LC
Pachydactylus affinis	Transvaal Gecko	LC
Pachydactylus capensis	Cape Gecko	LC
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC
Aparallactus capensis	Black-headed Centipede-eater	LC
Boaedon capensis	Brown House Snake	LC
Lycodonomorphus rufulus	Brown Water Snake	LC
Lycophidion capense capense	Cape Wolf Snake	LC
Prosymna sundevallii	Sundevall's Shovel-snout	LC
Psammophis brevirostris	Short-snouted Grass Snake	LC
Psammophylax tritaeniatus	Striped Grass Snake	LC
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	LC
Pelomedusa galeata	South African Marsh Terrapin	NE
Acontias occidentalis	Western Legless Skink	LC
Mochlus sundevallii	Sundevall's Writhing Skink	LC
Panaspis wahlbergii	Wahlberg's Snake-eyed Skink	LC
Trachylepis capensis	Cape Skink	LC
Trachylepis laevigata	Striped Variable Skink	LC
Trachylepis punctatissima	Speckled Rock Skink	LC
Trachylepis sp. (Transvaal varia)	Skink sp. 1	LC

Trachylepis varia sensu lato	Common Variable Skink Complex	LC
Kinixys lobatsiana	Lobatse Hinged Tortoise	LC
Stigmochelys pardalis	Leopard Tortoise	LC
Afrotyphlops bibronii	Bibron's Blind Snake	LC
Varanus niloticus	Water Monitor	LC
Causus rhombeatus	Rhombic Night Adder	LC

9.4 Appendix D – Mammal species expected to occur within the project area

Scientific name	Common name	Red list category
Cryptomys hottentotus	Southern African Mole-rat	LC
Chlorocebus pygerythrus	Vervet Monkey	LC
Chlorocebus pygerythrus pygerythrus	Vervet Monkey (subspecies pygerythrus)	LC
Papio ursinus	Chacma Baboon	LC
Taphozous (Taphozous) mauritianus	Mauritian Tomb Bat	LC
Atelerix frontalis	Southern African Hedgehog	NT
Caracal caracal	Caracal	LC
Felis catus	Domestic Cat	Introduced
Leptailurus serval	Serval	NT
Panthera pardus	Leopard	VU
Graphiurus (Graphiurus) murinus	Forest African Dormouse	LC
Atilax paludinosus	Marsh Mongoose	LC
Cynictis penicillata	Yellow Mongoose	LC
Herpestes sanguineus	Slender Mongoose	LC
Ichneumia albicauda	White-tailed Mongoose	LC
Mungos mungo	Banded Mongoose	LC
Hyaena brunnea	Brown Hyena	NT
Hystrix africaeaustralis	Cape Porcupine	LC
Lepus sp.	Hares	
Lepus capensis	Cape Hare	LC
Lepus saxatilis	Scrub Hare	LC
Pronolagus sp.	Rock-hares	
Pronolagus randensis	Jameson's Red Rock Hare	LC
Elephantulus myurus	Eastern Rock Elephant Shrew	LC
Smutsia temminckii	Ground Pangolin	VU
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC
Aethomys ineptus	Tete Veld Aethomys	LC
Aethomys namaquensis	Namaqua Rock Mouse	LC
Gerbilliscus brantsii	Highveld Gerbil	LC
Lemniscomys rosalia	Single-Striped Lemniscomys	LC
Mastomys sp.	Multimammate Mice	
Mastomys natalensis	Natal Mastomys	LC
Otomys angoniensis	Angoni Vlei Rat	LC
Otomys auratus	Southern African Vlei Rat (Grassland type)	NT
Rattus rattus	Roof Rat	LC
Rhabdomys pumilio	Xeric Four-striped Grass Rat	LC

Aonyx capensis	African Clawless Otter	NT
Ictonyx striatus	Striped Polecat	LC
Malacothrix typica	Large-eared African Desert Mouse	LC
Nycteris thebaica	Egyptian Slit-faced Bat	LC
Orycteropus afer	Aardvark	LC
Procavia capensis	Cape Rock Hyrax	LC
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC
Rhinolophus darlingi	Darling's Horseshoe Bat	LC
Rhinolophus simulator	Bushveld Horseshoe Bat	LC
Paraxerus cepapi	Smith's Bush Squirrel	LC
Xerus inauris	South African Ground Squirrel	LC
Crocidura fuscomurina	Bicolored Musk Shrew	LC
Crocidura hirta	Lesser Red Musk Shrew	LC
Myosorex varius	Forest Shrew	LC
Phacochoerus africanus	Common Warthog	LC
Thryonomys swinderianus	Greater Cane Rat	LC
Eptesicus (Eptesicus) hottentotus	Long-tailed Serotine	LC
Glauconycteris sp.	Butterfly Bats	
Miniopterus natalensis	Natal Long-fingered Bat	LC
Miniopterus schreibersii	Schreibers's Long-fingered Bat	NT
Scotophilus dinganii	Yellow-bellied House Bat	LC
Genetta maculata	Common Large-spotted Genet	LC
Genetta genetta	Common Genet	LC
Genetta tigrina	Cape Genet (Cape Large-spotted Genet)	LC

9.5 Appendix E - Avifauna Species expected to occur within the project area

Common group	Common species	Genus	Species
Apalis	Bar-throated	*Apalis*	*thoracica*
Babbler	Arrow-marked	*Turdoides*	*jardineii*
Babbler	Southern Pied	*Turdoides*	*bicolor*
Barbet	Black-collared	*Lybius*	*torquatus*
Barbet	Acacia Pied	*Tricholaema*	*leucomelas*
Barbet	Crested	*Trachyphonus*	*vaillantii*
Batis	Chinspot	*Batis*	*molitor*
Bee-eater	European	*Merops*	*apiaster*
Bee-eater	White-fronted	*Merops*	*bullockoides*
Bee-eater	Little	*Merops*	*pusillus*
Bishop	Southern Red	*Euplectes*	*orix*
Bishop	Yellow-crowned	*Euplectes*	*afer*
Bittern	Little	*Ixobrychus*	*minutus*
Boubou	Southern	*Laniarius*	*ferrugineus*
Bulbul	African Red-eyed	*Pycnonotus*	*nigricans*
Bulbul	Dark-capped	*Pycnonotus*	*tricolor*
Bunting	Lark-like	*Emberiza*	*impetuani*
Bunting	Cinnamon-breasted	*Emberiza*	*tahapisi*
Bunting	Cape	*Emberiza*	*capensis*
Bunting	Golden-breasted	*Emberiza*	*flaviventris*
Bushshrike	Orange-breasted	*Chlorophoneus*	*sulfureopectus*
Bushshrike	Grey-headed	*Malaconotus*	*blanchoti*
Bustard	White-bellied	*Eupodotis*	*senegalensis*
Buzzard	Jackal	*Buteo*	*rufofuscus*
Buzzard	Common	*Buteo*	*buteo*
Camaroptera	Grey-backed	*Camaroptera*	*brevicaudata*
Canary	Yellow-fronted	*Crithagra*	*mozambica*
Canary	Black-throated	*Crithagra*	*atrogularis*
Canary	Yellow	*Crithagra*	*flaviventris*
Chat	Familiar	*Oenanthe*	*familiaris*
Chat	Mocking Cliff	*Thamnolaea*	*cinnamomeiventris*
Chat	Ant-eating	*Myrmecocichla*	*formicivora*
Cisticola	Zitting	*Cisticola*	*juncidis*
Cisticola	Desert	*Cisticola*	*aridulus*
Cisticola	Cloud	*Cisticola*	*textrix*
Cisticola	Wing-snapping	*Cisticola*	*ayresii*
Cisticola	Wailing	*Cisticola*	*lais*

Cisticola	Tinkling	*Cisticola*	*rufilatus*
Cisticola	Rattling	*Cisticola*	*chiniana*
Cisticola	Levaillant's	*Cisticola*	*tinniens*
Cisticola	Lazy	*Cisticola*	*aberrans*
Coot	Red-knobbed	*Fulica*	*cristata*
Cormorant	White-breasted	*Phalacrocorax*	*lucidus*
Cormorant	Reed	*Microcarbo*	*africanus*
Coucal	Burchell's	*Centropus*	*burchellii*
Courser	Temminck's	*Cursorius*	*temminckii*
Courser	Double-banded	*Rhinoptilus*	*africanus*
Crake	African	*Crecopsis*	*egregia*
Crake	Black	*Zapornia*	*flavirostra*
Crombec	Long-billed	*Sylvietta*	*rufescens*
Crow	Pied	*Corvus*	*albus*
Crow	Cape	*Corvus*	*capensis*
Cuckoo	African	*Cuculus*	*gularis*
Cuckoo	Red-chested	*Cuculus*	*solitarius*
Cuckoo	Black	*Cuculus*	*clamosus*
Cuckoo	Great Spotted	*Clamator*	*glandarius*
Cuckoo	Levaillant's	*Clamator*	*levaillantii*
Cuckoo	Jacobin	*Clamator*	*jacobinus*
Cuckoo	Klaas's	*Chrysococcyx*	*klaas*
Cuckoo	Diederik	*Chrysococcyx*	*caprius*
Cuckoo-Hawk	African	*Aviceda*	*cuculoides*
Cuckooshrike	Black	*Campephaga*	*flava*
Darter	African	*Anhinga*	*rufa*
Dove	Red-eyed	*Streptopelia*	*semitorquata*
Dove	Cape Turtle	*Streptopelia*	*capicola*
Dove	Laughing	*Spilopelia*	*senegalensis*
Dove	Namaqua	*Oena*	*capensis*
Dove	Emerald-spotted Wood	*Turtur*	*chalcospilos*
Dove	Rock	*Columba*	*livia*
Drongo	Fork-tailed	*Dicrurus*	*adsimilis*
Duck	Knob-billed	*Sarkidiornis*	*melanotos*
Duck	African Black	*Anas*	*sparsa*
Duck	Yellow-billed	*Anas*	*undulata*
Duck	White-faced Whistling	*Dendrocygna*	*viduata*
Duck	Maccoa	*Oxyura*	*maccoa*
Duck	White-backed	*Thalassornis*	*leuconotus*

Eagle	Verreaux's	*Aquila*	*verreauxii*
Eagle	Tawny	*Aquila*	*rapax*
Eagle	Wahlberg's	*Hieraaetus*	*wahlbergi*
Eagle	Long-crested	*Lophaetus*	*occipitalis*
Eagle	Booted	*Hieraaetus*	*pennatus*
Eagle	Martial	*Polemaetus*	*bellicosus*
Eagle	Brown Snake	*Circaetus*	*cinereus*
Eagle	Black-chested Snake	*Circaetus*	*pectoralis*
Eagle	African Fish	*Haliaeetus*	*vocifer*
Eagle-Owl	Cape	*Bubo*	*capensis*
Eagle-Owl	Spotted	*Bubo*	*africanus*
Eagle-Owl	Verreaux's	*Bubo*	*lacteus*
Egret	Great	*Ardea*	*alba*
Egret	Little	*Egretta*	*garzetta*
Egret	Intermediate	*Ardea*	*intermedia*
Egret	Western Cattle	*Bubulcus*	*ibis*
Eremomela	Yellow-bellied	*Eremomela*	*icteropygialis*
Eremomela	Burnt-necked	*Eremomela*	*usticollis*
Falcon	Peregrine	*Falco*	*peregrinus*
Falcon	Lanner	*Falco*	*biarmicus*
Falcon	Amur	*Falco*	*amurensis*
Finch	Red-headed	*Amadina*	*erythrocephala*
Finch	Cut-throat	*Amadina*	*fasciata*
Finch	Cuckoo	*Anomalospiza*	*imberbis*
Firefinch	African	*Lagonosticta*	*rubricata*
Firefinch	Jameson's	*Lagonosticta*	*rhodopareia*
Firefinch	Red-billed	*Lagonosticta*	*senegala*
Fiscal	Southern	*Lanius*	*collaris*
Flufftail	Red-chested	*Sarothrura*	*rufa*
Flycatcher	Spotted	*Muscicapa*	*striata*
Flycatcher	Marico	*Melaenornis*	*mariquensis*
Flycatcher	Pale	*Melaenornis*	*pallidus*
Flycatcher	Southern Black	*Melaenornis*	*pammelaina*
Flycatcher	Fiscal	*Melaenornis*	*silens*
Flycatcher	Fairy	*Stenostira*	*scita*
Flycatcher	African Paradise	*Terpsiphone*	*viridis*
Francolin	Coqui	*Peliperdix*	*coqui*
Francolin	Crested	*Dendroperdix*	*sephaena*
Francolin	Shelley's	*Scleroptila*	*shelleyi*

Francolin	Red-winged	*Scleroptila*	*levaillantii*
Francolin	Orange River	*Scleroptila*	*gutturalis*
Go-away-bird	Grey	*Crinifer*	*concolor*
Goose	Spur-winged	*Plectropterus*	*gambensis*
Goose	Egyptian	*Alopochen*	*aegyptiaca*
Goshawk	Gabar	*Micronisus*	*gabar*
Goshawk	Pale Chanting	*Melierax*	*canorus*
Grassbird	Cape	*Sphenoeacus*	*afer*
Grebe	Great Crested	*Podiceps*	*cristatus*
Grebe	Little	*Tachybaptus*	*ruficollis*
Greenshank	Common	*Tringa*	*nebularia*
Guineafowl	Helmeted	*Numida*	*meleagris*
Gull	Grey-headed	*Chroicocephalus*	*cirrocephalus*
Harrier-Hawk	African	*Polyboroides*	*typus*
Hawk-eagle	African	*Aquila*	*spilogaster*
Helmetshrike	White-crested	*Prionops*	*plumatus*
Heron	Grey	*Ardea*	*cinerea*
Heron	Black-headed	*Ardea*	*melanocephala*
Heron	Goliath	*Ardea*	*goliath*
Heron	Purple	*Ardea*	*purpurea*
Heron	Squacco	*Ardeola*	*ralloides*
Heron	Striated	*Butorides*	*striata*
Heron	Black	*Egretta*	*ardesiaca*
Heron	Black-crowned Night	*Nycticorax*	*nycticorax*
Hobby	Eurasian	*Falco*	*subbuteo*
Honey-buzzard	European	*Pernis*	*apivorus*
Honeybird	Brown-backed	*Prodotiscus*	*regulus*
Honeyguide	Greater	*Indicator*	*indicator*
Honeyguide	Lesser	*Indicator*	*minor*
Hoopoe	African	*Upupa*	*africana*
Hornbill	African Grey	*Lophoceros*	*nasutus*
Hornbill	Southern Yellow-billed	*Tockus*	*leucomelas*
Ibis	African Sacred	*Threskiornis*	*aethiopicus*
Ibis	Glossy	*Plegadis*	*falcinellus*
Ibis	Hadada	*Bostrychia*	*hagedash*
Indigobird	Dusky	*Vidua*	*funerea*
Indigobird	Purple	*Vidua*	*purpurascens*
Indigobird	Village	*Vidua*	*chalybeata*
Jacana	African	*Actophilornis*	*africanus*

Kestrel	Greater	*Falco*	*rupicoloides*
Kestrel	Rock	*Falco*	*rupicolus*
Kestrel	Lesser	*Falco*	*naumanni*
Kingfisher	Pied	*Ceryle*	*rudis*
Kingfisher	Giant	*Megaceryle*	*maxima*
Kingfisher	Half-collared	*Alcedo*	*semitorquata*
Kingfisher	Malachite	*Corythornis*	*cristatus*
Kingfisher	African Pygmy	*Ispidina*	*picta*
Kingfisher	Woodland	*Halcyon*	*senegalensis*
Kingfisher	Brown-hooded	*Halcyon*	*albiventris*
Kingfisher	Striped	*Halcyon*	*chelicuti*
Kite	Black	*Milvus*	*migrans*
Kite	Yellow-billed	*Milvus*	*aegyptius*
Kite	Black-winged	*Elanus*	*caeruleus*
Korhaan	Red-crested	*Lophotis*	*ruficrista*
Korhaan	Northern Black	*Afrotis*	*afraoides*
Lapwing	Crowned	*Vanellus*	*coronatus*
Lapwing	Blacksmith	*Vanellus*	*armatus*
Lapwing	African Wattled	*Vanellus*	*senegallus*
Lark	Melodious	*Mirafra*	*cheniana*
Lark	Monotonous	*Mirafra*	*passerina*
Lark	Rufous-naped	*Mirafra*	*africana*
Lark	Fawn-colored	*Calendulauda*	*africanoides*
Lark	Sabota	*Calendulauda*	*sabota*
Lark	Flappet	*Mirafra*	*rufocinnamomea*
Lark	Spike-heeled	*Chersomanes*	*albofasciata*
Lark	Red-capped	*Calandrella*	*cinerea*
Lark	Eastern Clapper	*Mirafra*	*fasciolata*
Lark	Eastern Long-billed	*Certhilauda*	*semitorquata*
Longclaw	Cape	*Macronyx*	*capensis*
Mannikin	Bronze	*Spermestes*	*cucullata*
Martin	Rock	*Ptyonoprogne*	*fuligula*
Martin	Common House	*Delichon*	*urbicum*
Martin	Brown-throated	*Riparia*	*paludicola*
Martin	Banded	*Riparia*	*cincta*
Masked-weaver	Lesser	*Ploceus*	*intermedius*
Moorhen	Common	*Gallinula*	*chloropus*
Mousebird	Speckled	*Colius*	*striatus*
Mousebird	White-backed	*Colius*	*colius*

Mousebird	Red-faced	*Urocolius*	*indicus*
Myna	Common	*Acridotheres*	*tristis*
Nightjar	European	*Caprimulgus*	*europaeus*
Nightjar	Rufous-cheeked	*Caprimulgus*	*rufigena*
Nightjar	Fiery-necked	*Caprimulgus*	*pectoralis*
Nightjar	Freckled	*Caprimulgus*	*tristigma*
Oriole	Black-headed	*Oriolus*	*larvatus*
Osprey	Western	*Pandion*	*haliaetus*
Ostrich	Common	*Struthio*	*camelus*
Owl	Western Barn	*Tyto*	*alba*
Owl	Marsh	*Asio*	*capensis*
Owl	African Scops	*Otus*	*senegalensis*
Owl	Southern White-faced Scops	*Ptilopsis*	*granti*
Owlet	Pearl-spotted	*Glaucidium*	*perlatum*
Oxpecker	Red-billed	*Buphagus*	*erythrorynchus*
Peafowl	Indian	*Pavo*	*cristatus*
Pigeon	Speckled	*Columba*	*guinea*
Pigeon	African Olive	*Columba*	*arquatrix*
Pigeon	African Green	*Treron*	*calvus*
Pipit	African	*Anthus*	*cinnamomeus*
Pipit	Long-billed	*Anthus*	*similis*
Pipit	Plain-backed	*Anthus*	*leucophrys*
Pipit	Buffy	*Anthus*	*vaalensis*
Pipit	Striped	*Anthus*	*lineiventris*
Pipit	Tree	*Anthus*	*trivialis*
Pipit	Bushveld	*Anthus*	*caffer*
Pipit	Nicholson's	*Anthus*	*nicholsoni*
Plover	Kittlitz's	*Charadrius*	*pecuarius*
Plover	Three-banded	*Charadrius*	*tricollaris*
Pochard	Southern	*Netta*	*erythrophthalma*
Pratincole	Black-winged	*Glareola*	*nordmanni*
Prinia	Tawny-flanked	*Prinia*	*subflava*
Prinia	Black-chested	*Prinia*	*flavicans*
Puffback	Black-backed	*Dryoscopus*	*cubla*
Pytilia	Green-winged	*Pytilia*	*melba*
Quail	Common	*Coturnix*	*coturnix*
Quelea	Red-billed	*Quelea*	*quelea*
Rail	African	*Rallus*	*caerulescens*
Robin-Chat	Cape	*Cossypha*	*caffra*

Robin-Chat	White-throated	*Cossypha*	*humeralis*
Roller	Lilac-breasted	*Coracias*	*caudatus*
Sandpiper	Common	*Actitis*	*hypoleucos*
Sandpiper	Wood	*Tringa*	*glareola*
Scimitarbill	Common	*Rhinopomastus*	*cyanomelas*
Scrub Robin	Kalahari	*Cercotrichas*	*paena*
Scrub Robin	White-browed	*Cercotrichas*	*leucophrys*
Seedeater	Streaky-headed	*Crithagra*	*gularis*
Shrike	Lesser Grey	*Lanius*	*minor*
Shrike	Red-backed	*Lanius*	*collurio*
Shrike	Crimson-breasted	*Laniarius*	*atrococcineus*
Shrike	Magpie	*Urolestes*	*melanoleucus*
Snipe	African	*Gallinago*	*nigripennis*
Sparrow	House	*Passer*	*domesticus*
Sparrow	Great	*Passer*	*motitensis*
Sparrow	Cape	*Passer*	*melanurus*
Sparrow	Yellow-throated Bush	*Gymnoris*	*superciliaris*
Sparrow	Southern Grey-headed	*Passer*	*diffusus*
Sparrow-Weaver	White-browed	*Plocepasser*	*mahali*
Sparrowhawk	Ovambo	*Accipiter*	*ovampensis*
Sparrowhawk	Little	*Accipiter*	*minullus*
Sparrowhawk	Black	*Accipiter*	*melanoleucus*
Spoonbill	African	*Platalea*	*alba*
Spurfowl	Natal	*Pternistis*	*natalensis*
Spurfowl	Swainson's	*Pternistis*	*swainsonii*
Starling	Wattled	*Creatophora*	*cinerea*
Starling	Violet-backed	*Cinnyricinclus*	*leucogaster*
Starling	Cape	*Lamprotornis*	*nitens*
Starling	Red-winged	*Onychognathus*	*morio*
Starling	Pied	*Lamprotornis*	*bicolor*
Stilt	Black-winged	*Himantopus*	*himantopus*
Stint	Little	*Calidris*	*minuta*
Stonechat	African	*Saxicola*	*torquatus*
Stork	Yellow-billed	*Mycteria*	*ibis*
Stork	Abdim's	*Ciconia*	*abdimii*
Stork	Black	*Ciconia*	*nigra*
Stork	White	*Ciconia*	*ciconia*
Sunbird	Malachite	*Nectarinia*	*famosa*
Sunbird	Marico	*Cinnyris*	*mariquensis*

Sunbird	Greater Double-collared	*Cinnyris*	*afer*
Sunbird	White-bellied	*Cinnyris*	*talatala*
Sunbird	Amethyst	*Chalcomitra*	*amethystina*
Swallow	Barn	*Hirundo*	*rustica*
Swallow	White-throated	*Hirundo*	*albigularis*
Swallow	Pearl-breasted	*Hirundo*	*dimidiata*
Swallow	Red-breasted	*Cecropis*	*semirufa*
Swallow	Greater Striped	*Cecropis*	*cucullata*
Swallow	Lesser Striped	*Cecropis*	*abyssinica*
Swallow	South African Cliff	*Petrochelidon*	*spilodera*
Swamphen	African	*Porphyrio*	*madagascariensis*
Swift	Common	*Apus*	*apus*
Swift	African Black	*Apus*	*barbatus*
Swift	White-rumped	*Apus*	*caffer*
Swift	Horus	*Apus*	*horus*
Swift	Little	*Apus*	*affinis*
Swift	Alpine	*Tachymarptis*	*melba*
Swift	African Palm	*Cypsiurus*	*parvus*
Tchagra	Brown-crowned	*Tchagra*	*australis*
Tchagra	Black-crowned	*Tchagra*	*senegalus*
Teal	Red-billed	*Anas*	*erythrorhyncha*
Teal	Blue-billed	*Spatula*	*hottentota*
Tern	Caspian	*Hydroprogne*	*caspia*
Tern	White-winged	*Chlidonias*	*leucopterus*
Tern	Whiskered	*Chlidonias*	*hybrida*
Thick-knee	Spotted	*Burhinus*	*capensis*
Thrush	Kurrichane	*Turdus*	*libonyana*
Thrush	Groundscraper	*Turdus*	*litsitsirupa*
Thrush	Cape Rock	*Monticola*	*rupestris*
Thrush	Short-toed Rock	*Monticola*	*brevipes*
Thrush	Karoo	*Turdus*	*smithi*
Tinkerbird	Yellow-fronted	*Pogoniulus*	*chrysoconus*
Tit	Ashy	*Melaniparus*	*cinerascens*
Tit	Southern Black	*Melaniparus*	*niger*
Tit-Flycatcher	Grey	*Myioparus*	*plumbeus*
Vulture	Cape	*Gyps*	*coprotheres*
Vulture	White-backed	*Gyps*	*africanus*
Wagtail	African Pied	*Motacilla*	*aguimp*
Wagtail	Cape	*Motacilla*	*capensis*

Warbler	Garden	*Sylvia*	*borin*
Warbler	Icterine	*Hippolais*	*icterina*
Warbler	Willow	*Phylloscopus*	*trochilus*
Warbler	Great Reed	*Acrocephalus*	*arundinaceus*
Warbler	Lesser Swamp	*Acrocephalus*	*gracilirostris*
Warbler	African Reed	*Acrocephalus*	*baeticatus*
Warbler	Marsh	*Acrocephalus*	*palustris*
Warbler	Little Rush	*Bradypterus*	*baboecala*
Warbler	Chestnut-vented	*Curruca*	*subcoerulea*
Waxbill	Swee	*Coccopygia*	*melanotis*
Waxbill	Orange-breasted	*Amandava*	*subflava*
Waxbill	Blue	*Uraeginthus*	*angolensis*
Waxbill	Violet-eared	*Granatina*	*granatina*
Waxbill	Black-faced	*Brunhilda*	*erythronotos*
Waxbill	Common	*Estrilda*	*astrild*
Weaver	Scaly-feathered	*Sporopipes*	*squamifrons*
Weaver	Red-headed	*Anaplectes*	*rubriceps*
Weaver	Village	*Ploceus*	*cucullatus*
Weaver	Cape	*Ploceus*	*capensis*
Weaver	Southern Masked	*Ploceus*	*velatus*
Weaver	Thick-billed	*Amblyospiza*	*albifrons*
Wheatear	Mountain	*Myrmecocichla*	*monticola*
Wheatear	Capped	*Oenanthe*	*pileata*
White-eye	Cape	*Zosterops*	*virens*
Whitethroat	Common	*Curruca*	*communis*
Whydah	Pin-tailed	*Vidua*	*macroura*
Whydah	Shaft-tailed	*Vidua*	*regia*
Whydah	Long-tailed Paradise	*Vidua*	*paradisaea*
Widowbird	Red-collared	*Euplectes*	*ardens*
Widowbird	White-winged	*Euplectes*	*albonotatus*
Widowbird	Long-tailed	*Euplectes*	*progne*
Wood Hoopoe	Green	*Phoeniculus*	*purpureus*
Woodpecker	Bennett's	*Campethera*	*bennettii*
Woodpecker	Golden-tailed	*Campethera*	*abingoni*
Woodpecker	Cardinal	*Dendropicos*	*fuscescens*
Woodpecker	Bearded	*Chloropicus*	*namaquus*
Wren-Warbler	Barred	*Calamonastes*	*fasciolatus*
Wryneck	Red-throated	*Jynx*	*ruficollis*
	Hamerkop	*Scopus*	*umbretta*

	Secretarybird	*Sagittarius*	*serpentarius*
	Neddicky	*Cisticola*	*fulvicapilla*
	Bokmakierie	*Telophorus*	*zeylonus*
	Brubru	*Nilaus*	*afer*
	Quailfinch	*Ortygospiza*	*atricollis*
	Mallard	*Anas*	*platyrhynchos*