

TERRESTRIAL BIODIVERSITY REPORT FOR THE
PROPOSED TOWNSHIP ESTABLISHMENT ON THE
REMAINDER OF FARM FOURIESTRUST 2525
DISTRICT MANGAUNG METROPOLITAN
MUNICIPALITY, BLOEMFONTEIN IN THE FREE
STATE PROVINCE



17/10/2016



Naledzani Environmental Services
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DECLARATION OF INDEPENDENCE

I, Mpho Ramalivhana, declare that I:

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in professional capacity.
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being a member of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse the proposed development, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such relevant authority and the applicant.
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- I will comply with the Act, regulations and all other applicable legislation.
- All the particulars furnished by me in this document are true and correct.

- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.



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1. INTRODUCTION

Natural resource management is also congruent with the concept of sustainable development, a scientific principle that forms a basis for sustainable global land management and environmental governance for utilization of resources in such a manner that optimizes the life of a finite resource (Natural Resource Commission, 2012). Natural resource management specifically focuses on a scientific and technical understanding of resources and ecology and the life-supporting capacity of those resources.

South Africa ranks as the third most biologically diverse country in the world, and contains three of the world's 34 biodiversity hotspots. As such, South Africa is of major global importance for biodiversity management and conservation. While biodiversity is essentially everywhere, some areas are more important than others in terms of the biodiversity that occurs there. South Africa has the benefit of good spatial and non-spatial biodiversity information and experienced systematic biodiversity assessment and planning specialists, which has resulted in the identification of priority areas for biodiversity management and conservation.

As a developing country, there is still high need for the provision of basic services such as water, electricity, houses, *etc.* and this puts a strain on the environment. When projects are rolled out, there always a need is to find a balance between socio-economic growth and environmental sustainability. We need to be mindful of the fact that without the integrity of our natural systems, there will be no sustained long-term economic growth or life.

Thikho Consulting and Projects has been appointed to conduct an Basic Assessment (BA) for the proposed Township Establishment in terms of Spatial Planning and Land Use Management Act 16 Of 2013, on the Remainder of Farm Fouriitrust 2525 District Mangaung Metropolitan Municipality, Bloemfontein Province Free State.

In pursuit to ensure ecological sustainability, Thikho Consulting and Projects appointed Naledzani Environmental Services (Hereinafter referred to as "NES") as an ecological impact specialist for the proposed development. This study should not be read alone but in conjunction with the Basic Assessment Report (BAR) and the Environmental Management Programme (EMPr).

1.1 Scope of study

The terms of reference for this investigation are limited to a Terrestrial Biodiversity Assessment with the following objectives:

- General description of the floristic and faunal component in the study area.
- Mapping of the broad vegetation units (if more than one) identified in the study area.
- Determine the plant species diversity of the study area and compilation of a plant and faunal species list.

- Record the presence of endemic, protected and Red Data species in the study area.
- Comment on the sensitivity of the habitat in the study area from a floristic and faunal point of view.
- Evaluate the impact of the proposed developments against the findings of this report.
- Recommend mitigation measures that can be implemented in order to minimize the impacts of the proposed development.

2. REGULATORY AND LEGISLATIVE OVERVIEW

A summary of the relevant portions of the acts that govern the activities and potential impacts to the environment associated with the development are listed below. It should be noted that these acts are only related to biodiversity studies.

Table 1: Legislative framework associated with the project

| Legislation/Policy | Description |
|--|---|
| National Environmental Management: Biodiversity Act No 10 of 2004 | The Biodiversity Act provides listing threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Protected (Government Gazette, 2011). The main purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction and includes the prevention of further degradation and loss of structure, function and composition of threatened ecosystems. |
| South African Constitution 108 of 1996 | The Constitution is the supreme law of the land and includes the Bill of rights which is the cornerstone of democracy in South Africa and enshrines the rights of people in the country. It includes the right to an environment which is not harmful to human health or well-being and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures. |
| The Convention of Biological Diversity (Rio de | The purpose of the Convention on Biological Diversity is to conserve the variability among living organisms, at all levels (including diversity between species, within species and of ecosystems). Primary objectives include (i) |

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| Janeiro, 1992). | conserving biological diversity, (ii) using biological diversity in a sustainable manner and (iii) sharing the benefits of biological diversity fairly and equitably. |
| National Environmental Management Act 107 of 1998 | This is a fundamentally important piece of legislation and effectively promotes sustainable development and entrenches principles such as the 'precautionary approach', 'polluter pays' principle, and requires responsibility for impacts to be taken throughout the life cycle of a project NEMA provides the legislative backing (Including Impact Assessment Regulations) for regulating development and ensuring that a risk-averse and cautious approach is taken when making decisions about activities. |
| Strategic Framework for Sustainable Development in South Africa | The development of a broad framework for sustainable development was initiated to provide an overarching and guiding National Sustainable Development Strategy. The Draft Strategic Framework for Sustainable Development (SFSD) in South Africa (September 2006) is a goal orientated policy framework aimed at meeting the Millennium Development Goals. Biodiversity has been identified as one of the key crosscutting trends in the SFSD. The lack of sustainable practices in managing natural resources, climate change effects, loss of habitat and poor land management practices were raised as the main threats to biodiversity. |
| Environmental Impact Assessment (EIA) regulations | New regulations have been promulgated in terms of Chapter 5 of NEMA and were published on 08 December 2014 in Government Notice No. R. 985. Development and land use activities which require Environmental Authorisation in terms of the NEMA EIA Regulations, 2014, are in Listing Notice 3 (GG No. R.983, LN3) identified via geographic areas with the intention being that activities only require Environmental Authorisation when located within designated sensitive areas. These sensitive/geographic areas were identified and published for each of the nine (9) Provinces. |
| Conservation of Agricultural | The intention of this Act is to control the over-utilization of South Africa's |

| | |
|--|---|
| Resources Act 43 of 1967 | natural agricultural resources, and to promote the conservation of soil and water resources and natural vegetation. The CARA has categorised a large number of invasive plants together with associated obligations of the land owner, including the requirement to remove categorized invasive plants and taking measures to prevent further spread of alien plants. |
| National Forest Act 84 of 1998 | The protection, sustainable management and use of forests and trees within South Africa are provided for under the National Forests Act (Act 84 of 1998). |
| National Environmental Management: Protected Areas Act 57 of 2003 | This Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It also seeks to provide for the sustainable utilization of protected areas and to promote participation of local communities in the management of protected areas. |
| The protected Areas Act 57 of 2003 | The Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith. |

3. LIMITATIONS AND ASSUMPTION

- It is assumed that species flowering only during specific times of the year could be confused with a very similar species of the same genus.
- Some plant species that emerge and bloom during another time of the year or under very specific circumstances may have been missed entirely.
- The site was surveyed during the Spring season and such those species that flower in summer could only be identified up to genus level.

- All species included in the plant species list (Appendix A) were actually observed and recorded in the study area during the time of the study.
- The avi-faunal species observation was augmented by the desktop species (Appendix B).
- NES reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

4. DESCRIPTION OF THE ENVIRONMENT

4.1. Project Location

The proposed site is located at the remainder of farm Fouriitrust 2525 District Mangaung Metropolitan Municipality, Bloemfontein in the Free State Province. It lies at corner Meadhurst Avenue and Fairhaven Street, in Bloemfontein. The centre coordinates for the proposed site are as follows:

- Southing - 29° 03' 09.57"
- Easting - 26° 04' 44.06"



Figure 1: Google view map of the proposed site

4.2. Scope of the project

The proposed project entails the development of a township on a 15 Hectares size of land. The project covers the development of:

- hectares : sectional title
- 2,5 hectare business complex (including admin block)
- 7 stands - 2100 square metres
- 3 stands - 3000 square metres
- 1 stand - 5000 square metres
- 1 park - 5000 square metres
- The remainder space - 1500 square metres stands and roads (number of stand subject to space consumed by the roads).

4.3. Vegetation

4.3.1. Biome type

Rutherford and Westfall (1994) described the project as falling within the Grassland Biome which is one of nine South African plant Biomes. The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu Natal and the Eastern Cape. This biome (also known locally as Grassveld) is dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

There are two categories of grass plants: sweet grasses have lower fibre content, maintain their nutrients in the leaves in winter and are therefore palatable to stock. Sour grasses have higher fibre content and tend to withdraw their nutrients from the leaves during winter so that they are unpalatable to stock. At higher rainfall and on more acidic soils, sour grasses prevail, with 625 mm per year taken as the level at which unpalatable grasses predominate. C4 grasses dominate throughout the biome, except at the highest altitudes where C3 grasses become prominent.

The Grassland Biome is the cornerstone of the maize crop, and many grassland types have been converted to this crop. Sorghum, wheat and sunflowers are also farmed on a smaller scale. Urbanization is a major additional influence on the loss of natural areas - the Witwatersrand is centred in this biome. The Grassland Biome is considered to have an extremely high biodiversity, second only to the Fynbos Biome. Rare plants are often found in the grasslands, especially in the escarpment area. These rare species are often endangered, comprising mainly endemic geophytes or dicotyledonous herbaceous plants.

4.3.2. Broad-Scale vegetation patterns

The study area falls within the **Bloemfontein Dry Grassland** (Gh 5). The vegetation unit is distributed in the Free State Province Free, South-central part of the province, with Bloemfontein more or less centrally. Extending from Petrusburg in the west to the Rustfontein Dam in the east and from Reddersburg in the south to the Soetdoring Nature Reserve in the north.

The vegetation unit receives summer rainfall with very dry winters. The mean annual precipitation is around 450 mm. Most of the rainfall is of convectional origin and peaks in late summer. Overall mean annual temperature is within warm-temperate ranges (nearly 16°C), with high incidence of frost in winter.

This vegetation unit is classified as ***Endangered*** with a target of 24%. Only a small portion is statutorily conserved in the Soetdoring Nature Reserve. More than 40% already transformed, e.g. for crop production (mainly Ae and Ca land

types) as well as by urban (and related) development (the largest part of this vegetation unit on the Ae land type is situated in the General De Wet military training area, west of Bloemfontein).



4.4. Climate of the study area

Bloemfontein has an average maximum summer temperature of 26 °C and an average maximum winter temperature of 16°C with evening temperatures falling to -2 °C. Bloemfontein lies at an altitude of 1351 meters. The area receives about 407 mm of rain per year, with most rainfall occurring mainly during the summer season. It receives the lowest rainfall (2mm) in June with the highest (68mm) in January.

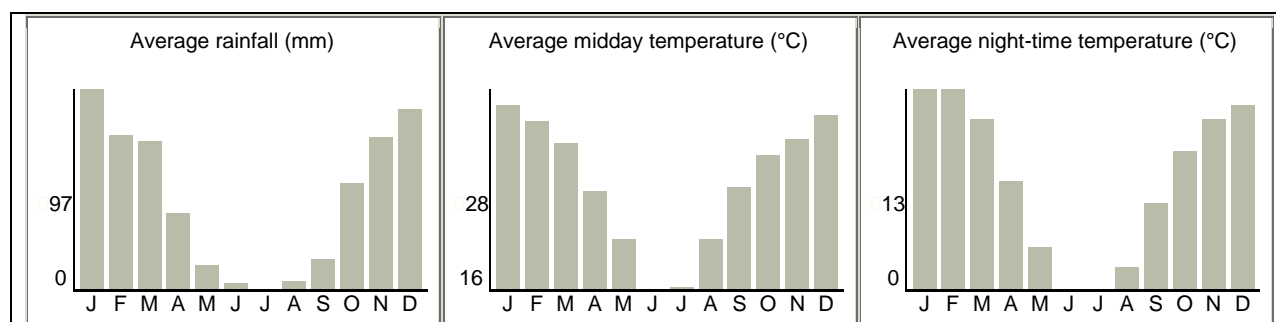


Figure 3: Average temperature and mean annual day and night temperatures

4.5. Surface water

No wetland or any open water system was identified within the proposed site .

4.6. Description of the Free State Biodiversity Plan

Critical Biodiversity Areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI, 2007). These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision making tools.

The primary purpose of CBA's is to inform land-use planning and the land-use guidelines attached to CBA's aim to promote sustainable development by avoiding loss or degradation of important natural habitat and landscapes in these areas and the landscape as a whole. CBA's can also be used to inform protected area expansion and development plans. The use of CBA's here follows the definition laid out in the guideline for publishing bioregional plans (Anon, 2008):

- **“Critical biodiversity areas (CBAs)** are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses”.
- **“Ecological support areas (ESA’s)** are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.”

The systematic conservation planning process resulted in 40% of the province being identified as Critical Biodiversity Areas (CBA1 22% and CBA2 18%). Ecological Support Areas cover a further 22% of the province, of which 16% are intact natural areas (ESA1) and 7% are degraded or areas with no natural remaining which are nevertheless required as they potentially retain some value for supporting ecological processes (ESA2).

The purpose of the Free State Biodiversity Plan is to develop the spatial component of a bioregional plan (i.e. map of Critical Biodiversity Areas and associated land-use guidelines). This conservation plan is consistent with NEMA principles and the Biodiversity Act. It is designed to support integrated development planning and sustainable development by identifying an efficient set of Critical Biodiversity Areas that are required to meet national and provincial biodiversity objectives, in a configuration that is least conflicting with other land uses and activities. Where alternatives are available, the Critical Biodiversity Areas are designed to avoid conflict with existing IDPs, EMFs and SDFs in the region by favoring the selection of sites that are least conflicting with other land-uses. According to the Free State Province Biodiversity Plan, the area within which the proposed site falls is regarded as degraded. Though a small portion/row of trees exists that provides habitat to birds majority of the natural vegetation has been removed as well as those of the surrounding properties.

4.7. Terrestrial threatened ecosystem

The South African National Biodiversity Institute (SANBI), in conjunction with the Department of Environmental Affairs (DEA), released a draft report in 2009 entitled “Threatened Ecosystems in South Africa: Descriptions and Maps”, to provide background information on the List of Threatened Ecosystems (SANBI, 2009). The purpose of this report was

to present a detailed description of each of South Africa's ecosystems and to determine their status using a credible and practical set of criteria. The following criteria were used in determining the status of threatened ecosystems:

- Irreversible loss of natural habitat;
- Ecosystem degradation and loss of integrity;
- Limited extent and imminent threat;
- Threatened plant species associations;
- Threatened animal species associations; and
- Priority areas for meeting explicit biodiversity targets as defined in a systematic conservation plan.

In terms of section 52(1) (a), of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), a new national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011 (Government Notice 1002 (Driver *et. al.*, 2004). The list classified all threatened or protected ecosystems in South Africa in terms of four categories; *Critically Endangered* (CR), *Endangered* (EN), *Vulnerable* (VU), or *Protected*. The purpose of categorizing these ecosystems is to prioritize conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems. It is estimated that threatened ecosystems make up 9.5% of South Africa, with critically endangered and endangered ecosystems accounting for 2.7%, and vulnerable ecosystems 6.8% of the land area. It is therefore vital that Threatened Terrestrial Ecosystems inform proactive and reactive conservation and planning tools, such as Biodiversity Sector Plans, municipal Strategic Environmental Assessments (SEAs) and Environmental Management Frameworks (EMFs), Environmental Impact Assessments (EIAs) and other environmental applications (Mucina *et al.*, 2006).

According to data sourced from South African National Biodiversity Institute (SANBI), the vegetation of the area is **endangered**.

5. METHODOLOGY AND REPORTING

The information provided in this terrestrial biodiversity report is based mainly on the observations that were made during the field survey and a review of the available reports that contain known and predicted biodiversity and ecological information regarding the site. A wide range of spatial data sets were interrogated and relevant information was extracted for the study site. A basic ecological sensitivity analysis was performed to identify areas of special interest or concern. The various approaches used and aspects taken into account are detailed below:

5.1. General

A desktop survey utilising aerial images and photography was undertaken to assemble background information regarding the different features and vegetation communities present within the proposed project footprint. The site was then visited on the 13th October 2016 to ensure that the true floristic reflection of the site is recorded.

5.2. Vegetation

The PRECIS list of plants recorded in the 2926 AA quarter degree grid square was obtained from SANBI. This list was consulted to verify the record of occurrence of the plant species seen on the site. A desk-top study of the habitats of the red-listed and orange-listed species known to occur in the area was done before the site visits. The rapid visual assessment was used to assess the abundance of floral species. The vegetation units of Mucina & Rutherford (2006) were also used as reference but where necessary communities are named according to the recommendations for a standardized South African syntaxonomic nomenclature system. By combining the available literature with the survey results, stratification of vegetation communities was possible.

5.3. Fauna

The faunal assessment is based on desktop analysis and observations that were made during the site visit. Due to low faunal recording, it was then deemed necessary that a desktop analysis be done to explore all different kinds of animals likely to inhabit the area. The occurrence of some key bird species was verified according to the distribution record obtained during the Southern African Bird Atlas period from 1981 to 1993 (Harrison et al., 1997) as well as records from 1974 to 1987 according to Tarboton et al (1987).

5.4. Sensitivity Map

Following the site visit, an ecological sensitivity map of the site has been generated by integrating the information collected on-site with the available biodiversity information available in the literature and various spatial databases as described above. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** - Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within these areas with little ecological impact.

- **Medium** - Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** - Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is highly undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** - Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided at all costs.

6. FINDINGS OF THE ASSESSMENT

6.1. Vegetation

The surrounding of the proposed site that still has natural vegetation gives the feel of a Savanna biome, characterised by grasses and trees. From the site assessment/ inspection it was found that approximately 85 % of the natural vegetation on site has been removed due to the use of the site as a cultivation field. Also it was evident that the region has received no rainfall to little rainfall prior to the site visit due to the dryness noted that has made it difficult to identify the grass layer on site. Even though much of the grass layer was dry or removed, the following grass species were confirmed on site, *Aristida congesta*, *Antheophora pubescens*, *Aristida diffusa*, *Cynodon dactylon*, *Digitaria argyrograpta*, *Setaria sphacelata* and *Themeda triandra*.



Figure 4: General overview of the site

Few herbs were recorded on site and this includes *Datura stramonium*, *Asparagus striatus*, *Nicotianum spp* and *Erharta erecta*, which have dominated the site. A band/row of shrub and tree layer exists on site on the area that has not been ploughed. This area is characterised by species such as *Acacia karroo* (dominant) and the *Acacia tortilis*, *Rhus lancea*, and *Ziziphus mucronata*.



Figure 5: *Datura stramonium* invading the area



Figure 6: Row of trees on site dominated by *Acacia karoo*

An already developed area also exists when entering the site. This area is more dominated by ornamental plants such as *Celtis African*, *Prunus persica*, *Geranium spp.*, *Roses*, *Phragmites australis*, and *Pinus patula*.



Figure 7: *Phragmites australis* recorded on site along the man-made reservoir



Figure 8: Some of the already existing buildings on site

6.2. Species of Conservation Concern

The SANBI POSA data base for the 2926 AA Quarter Degree Square Grid. It is important to note that the PRECIS plant list of SANBI contains only the species of which there are herbarium specimens housed in the National Herbarium. This is therefore not regarded as a totally comprehensive and complete list, though it is considered as an extremely handy data base, containing scientifically based and proven data

A Threatened species and Species of Conservation Concern list for the Grid 2926 AA was obtained from the POSA database on the SANBI website (<http://posa.sanbi.org/specieslist.php>). Threatened species are those that are facing high risk of extinction, indicated by the categories Critically Endangered, Endangered and Vulnerable. Species of Conservation Concern include the Threatened Species, but additionally have the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo et al. 2009). No threatened or protected plant species was recorded on site. This might be due to the degradation that the site has experience due to cultivation.

6.3. Faunal Communities

The habitats observed in the area during the field visit may provide habitat for birds. However, it is unlikely that all 236 species listed on Appendix B will occur in these areas as a result of the disturbance caused by humans. The confirmed bird species include *Estrilda astrild*, *Acrocephalus gracilirostris*, *Charadrius hiaticula*, *Spilopelia senegalensis*, *Gallus gallus domesticus* (Chicken) and *Lanius collaris*. The low reporting rate for these species is evidence of the impact that the surrounding communities are having on the birds that would, under optimum conditions, inhabit these areas. List of bird's species that are likely to utilize the area is attached as appendix B.



Figure 9: One of the birds' nests on site

6.4. Synopsis of the fauna findings

The faunal survey was not a comprehensive specialist survey but rather an overview of the available habitats and their potential to be utilized by fauna. This is because animals are mobile and during the assessment they may not have been seen. However, representative samples of the habitats were well searched for fauna actually present as well as field signs of fauna present. Although the fauna investigation was not comprehensive the findings indicates that the natural habitats on the site provide habitat to all the major fauna taxa, including important and RDL species

7. DISCUSSION AND IMPACT ASSESSMENT

7.1. Assessment and significance criteria

The assessment criteria used in the assessment are described below and are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as from Brownlie (2005).

For each impact the following are described:

- **Nature of the impact.** A description of positive or negative effect of the project on the affected environment, or vice versa. The description includes who or what would be affected, and how.
- **Extent of the impact.** This includes assessing the spatial scale of the impact using the following scale:
 - **On-site** – impacts that are limited to the site boundaries.
 - **Local** – impacts that affect an area in a radius of 5km around the site.
 - **Regional** – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystem.
 - **National** – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences.
 - **Trans-boundary/International** – impacts that affect internationally important resources such as areas protected by international conventions.
- **Duration of the impact.** The lifespan of the impact is assessed as follows:
 - **Temporary** – impacts are predicted to be of short duration and intermittent/occasional.
 - **Short-term** – impacts that are predicted to last only for the duration of the construction period.
 - **Long-term** – impacts that will continue for the life of the Project, but ceases when the Project stops operating.
 - **Permanent** – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.

Certain impacts can also be discontinuous or intermittent (where the impact may only occur during specific climatic conditions or during a particular season of the year).

Intensity or magnitude of the impact: The intensity or severity of the impact would be indicated as either

- **Negligible** – the impact on the environment is not detectable.
- **Low** – the impact affects the environment in such a way that natural functions and processes are not affected.
- **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way.
- **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease.

Potential for impact on irreplaceable resources: This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonization from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.

Probability of occurrence: The likelihood of the impact actually occurring would be indicated as either Improbable (the possibility of the impact materializing is very low as a result of design or historic experience), Probable (there is a distinct possibility that the impact will occur), Highly probable (it is most likely that the impact will occur), or Definite (the impact will occur regardless of the implementation of any prevention measures).

- **Significance of the impact.** Based on a synthesis of the information contained in the criteria above, the potential impact would then be described according to following significance criteria:
- **No significance:** the impacts do not influence the proposed development and/or environment in anyway.
- **Low/Minor significance:** the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Moderate significance:** the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance:** the impacts will have a major influence on the proposed development and/or environment and will result in the “no-go” option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

Table 2: Table used to determine significance based on the likelihood and magnitude of the assessed impact

| | Likelihood | Unlikely | Likely | Definite |
|--|------------|----------|--------|----------|
|--|------------|----------|--------|----------|

| | | | | |
|------------------|------------|------------|------------|----------|
| Magnitude | Negligible | Negligible | Negligible | Minor |
| | Negligible | Negligible | Minor | Minor |
| | Minor | Minor | Moderate | Moderate |
| | Moderate | Moderate | Major | Major |

Confidence: The level of confidence in predicting the impact can be described as:

- **low**, where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving ecosystem, or inadequate information;
- **medium**, where there is a moderate level of confidence in the prediction;
- or **high**, where the impact can be predicted with a high level of confidence.

Cumulative Impact

Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Mitigation

The objective of mitigation is to firstly avoid and minimize impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on vegetation and animal habitats and to maximize re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potential impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested appropriately implemented.

In order to ensure that impacts are avoided as far as possible and to implement effective mitigation at the site, the following mitigation hierarchy is used to prioritize mitigation actions:

- **Avoidance:** Avoiding or reducing at source is essentially 'designing' the project so that a feature causing an impact is designed out (e.g. a waste stream is eliminated) or altered (e.g. reduced waste volume). Often called minimization (most preferred)
- **Reduction:** impact is reduced in magnitude and/or significance
- **Abate on Site:** This involves adding something to the basic design to abate the impact - pollution controls fall within this category. Often called 'end-of-pipe'.
- **Rectification:** impact is mitigated after it has occurred e.g. rehabilitation of areas disturbed by construction
- **Compensation:** providing a substitute resource for a resource that has been lost because of the project (e.g. "conservation offsets")
- **No action** (least preferred)

Table 3: Impact assessment associated with the proposed development

| PRE-CONSTRUCTION PHASE (FLORA AND FAUNA) | | | | | | | | | | | | | |
|--|-------------------|---------|----------|-----------|-----------------|--------------|---|------------------|--------|----------|-----------|-------------|--------------|
| | Before Mitigation | | | | | | Mitigation measures | After Mitigation | | | | | |
| Impact | Nature | Extent | Duration | Intensity | Probability | Significance | | Nature | Extent | Duration | Intensity | Probability | Significance |
| Marking of all protected species on site | Positive | Limited | Short | High | Highly probable | Medium | <p>Should protected species be encountered on site, a vegetation specialist should be involved during the search and rescue operations. All rescued plants should be bagged and kept on a designated nursery, and should be returned to site once all construction is completed. Replanting should only occur in springs or early summer (September to November), once the first rains have fallen, in order to facilitate establishment.</p> <p>Should protected plants be disturbed a permit from the relevant regulatory body should be obtained prior to such disturbance</p> | Positive | Local | Short | Medium | Probable | Low |
| Site demarcation | Positive | Local | Short | High | Probable | Medium | The boundaries of site are to be clearly defined and it should be ensured that all activities remain within defined footprint areas. | Positive | Local | Short | Medium | Probable | Low |
| CONSTRUCTION PHASE (FLORA AND FAUNA) | | | | | | | | | | | | | |
| | Before Mitigation | | | | | | Mitigation measures | After Mitigation | | | | | |

| Impact | Nature | Extent | Duration | Intensity | Probability | Significance | | Nature | Extent | Duration | Intensity | Probability | Significance |
|---|----------|----------|-----------|-----------|-----------------|--------------|--|----------|--------|----------|-----------|-------------|--------------|
| Habitat destruction | Negative | Regional | Permanent | High | Highly probable | Medium | <ul style="list-style-type: none"> Areas designated for vegetation clearing should be identified and visibly marked off. The removed topsoil should be stockpiled and used to rehabilitate disturbed areas. Vegetation clearing in natural areas should be kept to a minimum and restricted to the proposed development footprint only. The most significant way to mitigate the loss of faunal habitat is to limit the footprint of the proposed project | Negative | Local | Short | Medium | Probable | Low |
| Disturbance to animals on site or close to the site | Negative | Local | Short | Medium | Highly probable | Medium | <ul style="list-style-type: none"> Do not disturb nests, breeding sites or young ones. No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. Contract employees must be educated about the value of wild animals and the importance of their conservation. Education and awareness campaigns are advised on respect for fauna as well as potential Red Data List faunal species identification for all staff members and contractors. The ECO must conduct regular site inspections prior to clearing. Employees and contractors should be made aware of the presence of, and rules regarding, flora and fauna through suitable induction training and on-site signage. | Negative | Local | Short | Medium | Probable | Low |

| | | | | | | | | | | | | | |
|---|-------------------|---------|-----------|-----------|-----------------|--------------|--|-------------------|--------|----------|-----------|-------------|--------------|
| Increased soil erosion due to open soil | Negative | Limited | Short | High | Highly probable | Medium | <ul style="list-style-type: none"> Following construction, rehabilitation of disturbed areas is required. Avoid working during rainy days to minimize sediments being eroded to the river | Negative | Local | Short | Medium | Probable | Low |
| Establishment and spread of declared weeds | Negative | Limited | Short | High | Highly probable | Medium | An invasive species control programme must be implemented to monitor and prevent the large scale establishment of exotic species. | Negative | Local | Short | Medium | Probable | Low |
| Wastes generation | Negative | Local | Short | High | Probable | Medium | <ul style="list-style-type: none"> Bins should be made available on site to collect different types of waste No burying of cement or any other waste on site or dumped at the river Non-recyclable waste should be collected and disposed-off at a registered landfill site | Negative | Local | Short | Medium | Probable | Low |
| Destruction of Red Data and protected species of flora and fauna. | Negative | Local | Long term | Medium | Probable | High | An environmental control officer should be contracted to monitor for the presence of Red List and protected species during all vegetation clearing operations. Should such species be identified, clearing should cease until the correct permit has been obtained for their relocation or removal. Relocation may only be undertaken by suitably qualified individuals and under consultation with the correct authority. | Positive | Local | Short | Medium | Probable | Low |
| OPERATIONAL PHASE (FLORA AND FAUNA) | | | | | | | | | | | | | |
| | Before Mitigation | | | | | | Mitigation measures | Before Mitigation | | | | | |
| Impact | Nature | Extent | Duration | Intensity | Probability | Significance | | Nature | Extent | Duration | Intensity | Probability | Significance |

| | | | | | | | | | | | | | |
|--|----------|----------|-------|------|-----------------|--------|--|----------|-------|-------|--------|----------|-----|
| Establishment and spread of declared weeds | Negative | Regional | Short | High | Highly Probable | Medium | <ul style="list-style-type: none"> An alien eradication programme should be implemented in order to reduce the encroachment of exotic invasive species. Ensure that the site is landscaped/ decorate by indigenous plants. | Negative | Local | Short | Medium | Probable | Low |
| Waste pollution | Negative | Regional | Short | High | Highly Probable | Medium | <ul style="list-style-type: none"> All waste generated should be disposed off at a registered landfill site to prevent them ending up at the river or drainage lines. | Negative | Site | Short | Low | Probable | low |

7.2. Cumulative Impacts

Cumulative impacts arise from the combined presence of a number of similar developments within an area which affect ecological processes operating at broader scales or which each have a small impact which becomes significant when combined.

In terms of this study, cumulative impacts that may arise are:

- Further habitat loss for avi-fauna as the area is already cleared off during cultivation,
- The development will contribute towards the increases of alien plants if not controlled properly.
- During construction phase the activity would contribute to cumulative fauna disturbance and disruption in the area, but the impact would be of local extent and not of high significance
- Clearing of vegetation is one of the cumulative impacts that will arise but it is anticipated to be of low significance as the site has already been transformed and thus the ecological value is reduced.

7.3. Recommended Mitigation Measures

It is recommended that:

- Eradication of declared weed and invader populations in the study area should take place under the guidance of a professional in that field. The removal of declared invaders in the riparian zone should be done as a priority and with caution not to destroy natural vegetation.
- Ensure that the area marked as medium sensitive is avoided and conserved as much as possible as it provides habitat for birds.
- Vegetation surrounding the development site must be conserved and the footprint of the construction activities must be minimized as far as possible. The setting of clear rules and restrictions of movement, especially of heavy vehicles and machinery, in and around the construction sites (e.g. no-go-areas) are of high importance.

8. CONCLUSION AND RECOMMENDATIONS

Field surveys were undertaken during October 2016 to ascertain the ecological state of proposed project area. Specific conclusions and recommendations are listed below:

Based on the data presented in this report as well as observations made during the survey and comments above, the following is recommended in conclusion:

- Take note of and as far as possible comply with the mitigation measures and recommendations in section 7 of this report;
- During the construction as well as operational phases all recommendations made and concerns raised in this document should be taken into consideration.

No major objections, from a floristic point of view, are raised against the proposed development. Provided that the mitigation measures as suggested can be implemented, then the overall impact of the development components would be of low overall significance and it is not likely that the development would result in an overall net loss of biodiversity or long-term degradation of the receiving environment.

9. ALIEN MANAGEMENT

Alien species are adept at taking advantage of disturbance. The weedy and annual species noticed on site will take advantage of any disturbance at the site. As a result any activities which result in the loss of plant cover or the disturbance of the soil surface will stimulate the invasion of alien species.

9.1. General clearing and guiding principles

- Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area.
- The lighter infested areas should be cleared first to prevent the build-up of seed banks.
- Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently.
- The current site is relatively small and therefore seed input from adjacent already disturbed areas is likely to be the major source of alien species at the site. Therefore for effective control, a larger area than the site may need to be cleared.

- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

9.2. Clearing methods

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both.
- However care should be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.
- Fire is not a natural phenomenon in the area and fire should not be used for alien control or vegetation management at the site.
- The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website.
<http://www.dwaf.gov.za/wfw/Control>

9.3. Use of herbicides for alien control

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimized by observing the following:

- Area contamination must be minimized by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighboring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following guidelines should be followed: Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.

9.4. Alien Plant management plan

The following management actions are aimed at reducing soil disturbance during the construction and operational phase of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

| Action | Frequency |
|---|-----------|
| The ECO is to provide permission prior to any vegetation being cleared for development | Daily |
| Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be surfaced or prepared immediately afterwards. | Weekly |
| Where cleared areas will be exposed for some time, these areas should be protected with packed brush, or appropriately battered with fascine work. | Weekly |
| Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used | Weekly |
| Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose should be brought onto site. Brush from cleared areas should be used as much as possible. The use of manure or other soil amendments is likely to encourage invasion. | Weekly |

| | |
|--|---|
| Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed. | Weekly |
| Alien vegetation regrowth on areas disturbed by construction must be controlled throughout the entire site | Monthly |
| The alien plant removal and control method guidelines should adhere to best-practice for the species involved. Such information can be obtained from the DWAF Working for Water website. | Monthly |
| Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only. | Monthly |
| No alien species should be cultivated on-site. If vegetation is required for esthetic purposes, then non-invasive, water-wise locally-occurring species should be used. | When necessary |
| Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, should be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level. | When necessary |
| Where areas of natural vegetation have been disturbed by construction activities, revegetation with indigenous, locally occurring species should take place where the natural vegetation is slow to recover or where repeated invasion has taken place following disturbance. | Biannually, but revegetation should take place at the start of the rainy season |

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Appendix A: Plant species list recorded

| Species | Common name | Category |
|-------------------------------|-------------------------------|---------------------|
| <i>Aristida congesta</i> | Buffalo grass | Indigenous |
| <i>Aristida diffusa</i> | Iron grass | Indigenous |
| <i>Asparagus Striatus</i> | Bergappel | Indigenous |
| <i>Asparagus cooperi</i> | Haakdoring | Indigenous |
| <i>Bidens pilosa</i> | Black jack | Naturalized exotics |
| <i>Brachiaria serrata</i> | Red top grass | Indigenous |
| <i>Cineraria lyratiformis</i> | Wild Parsley | Indigenous |
| <i>Commelina africana</i> | Yellow commeliana | Indigenous |
| <i>Datura stramonium</i> | Jimson weed or Devil's snare | Alien invasive |
| <i>Elionurus muticus</i> | Wire grass | Indigenous |
| <i>Eucalyptus globulus</i> | southern blue-gum or blue gum | Alien |
| <i>Setaria sphacelata</i> | Tall African grass | Indigenous |
| <i>Solanum marianum</i> | Bugweed | Alien invasive |

| | | |
|--------------------------------------|-----------------------|----------------|
| <i>Themenda trianda</i> | Red grass | Indigenous |
| <i>Verbena bonariensis</i> | Purple top | Alien invasive |
| <i>Anthehora pubescens</i> | Wool grass | Indigenous |
| <i>Cynodon dactylon</i> | Couch grass | Indigenous |
| <i>Digitaria argyrograpta</i> | Silver finder grass | Indigenous |
| <i>Acacia karroo</i> | Sweet thorn | Indigenous |
| <i>Acacia tortilis</i> | Umdrella thorn | Indigenous |
| <i>Rhus lancea</i> | Karee | Indigenous |
| <i>Ziziphus mucronata</i> | Buffalo thorn | Indigenous |
| <i>Celtis africana</i> | Stinkwood | Indigenous |
| <i>Prunus persica</i> | Peach | |
| <i>Geranium spp</i> | | |
| <i>Nicotianum spp.</i> | | |
| <i>Phragmites australis</i> | Common reed | Alien |
| <i>Pinus patula</i> | spreading-leaved pine | Alien invasive |

Appendix B: Birds Species recorded on the Quarter Degree Grid Cell (2926 AA)

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|----------------------------|-----------------------|--------------------------------|
| 269 | Avocet, Pied | Bontelsie | <i>Recurvirostra avosetta</i> |
| 432 | Barbet, Acacia Pied | Bonthoutkapper | <i>Tricholaema leucomelas</i> |
| 439 | Barbet, Crested | Kuifkophoutkapper | <i>Trachyphonus vaillantii</i> |
| 674 | Batis, Pirit | Piritbosbontrokkie | <i>Batis pririt</i> |
| 404 | Bee-eater, European | Europese Byvreter | <i>Merops apiaster</i> |
| 409 | Bee-eater, White-fronted | Rooikeelbyvreter | <i>Merops bullockoides</i> |
| 808 | Bishop, Southern Red | Rooivink | <i>Euplectes orix</i> |
| 812 | Bishop, Yellow-crowned | Goudgeelvink | <i>Euplectes afer</i> |
| 722 | Bokmakerie, Bokmakerie | Bokmakerie | <i>Telophorus zeylonus</i> |
| 544 | Bulbul, African Red-eyed | Rooioogtiptol | <i>Pycnonotus nigricans</i> |
| 873 | Bunting, Cape | Rooivlerkstreepkoppie | <i>Emberiza capensis</i> |
| 872 | Bunting, Cinnamon-breasted | Klipstreepkoppie | <i>Emberiza tahapisi</i> |
| 874 | Bunting, Golden-breasted | Rooirugstreepkoppie | <i>Emberiza flaviventris</i> |
| 152 | Buzzard, Jackal | Rooiborsjakkalsvoel | <i>Buteo rufofuscus</i> |
| 154 | Buzzard, Steppe | Bruinjakkalsvoel | <i>Buteo vulpinus</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|------------------------------|----------------------|----------------------------------|
| 861 | Canary, Black-headed | Swartkopkanarie | <i>Serinus alario</i> |
| 860 | Canary, Black-throated | Bergkanarie | <i>Crithagra atrogularis</i> |
| 857 | Canary, Cape | Kaapse Kanarie | <i>Serinus canicollis</i> |
| 865 | Canary, White-throated | Witkeelkanarie | <i>Crithagra albogularis</i> |
| 866 | Canary, Yellow | Geelkanarie | <i>Crithagra flaviventris</i> |
| 575 | Chat, Anteater | Swartpiek | <i>Myrmecocichla formicivora</i> |
| 570 | Chat, Familiar | Gewone Spekvreter | <i>Cercomela familiaris</i> |
| 572 | Chat, Sickle-winged | Vlaktespekvreter | <i>Cercomela sinuata</i> |
| 631 | Cisticola, Cloud | Gevlekte Klopkloppie | <i>Cisticola textrix</i> |
| 630 | Cisticola, Desert | Woestynklopkloppie | <i>Cisticola aridulus</i> |
| 638 | Cisticola, Grey-backed | Gysrugtinktinkie | <i>Cisticola subruficapilla</i> |
| 646 | Cisticola, Levallant's | Vleitinktinkie | <i>Cisticola tinniens</i> |
| 629 | Cisticola, Zitting | Landeryklopkloppie | <i>Cisticola juncidis</i> |
| 504 | Cliff-swallow, South African | Familieswael | <i>Hirundo spilodera</i> |
| 212 | Coot, Red-knobbed | Bleshoender | <i>Fulica cristata</i> |
| 50 | Cormorant, Reed | Rietduiker | <i>Phalacrocorax africanus</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|---------------------------|-----------------------|----------------------------------|
| 47 | Cormorant, White-breasted | Witborsduiker | <i>Phalacrocorax carbo</i> |
| 4131 | Coucal, Burchell's | Gewone Vleilorie | <i>Centropus burchellii</i> |
| 1036 | Coucal, White-browed | Gestreepte Vleilorie | <i>Centropus superciliosus</i> |
| 278 | Courser, Double-banded | Dubbelbanddrawwertjie | <i>Rhinoptilus africanus</i> |
| 216 | Crane, Blue | Bloukraanvoel | <i>Anthropoides paradiseus</i> |
| 621 | Crombec, Long-billed | Bosveldstompstert | <i>Sylvietta rufescens</i> |
| 522 | Crow, Pied | Witborskraai | <i>Corvus albus</i> |
| 352 | Cuckoo, Diderick | Diederikkie | <i>Chrysococcyx caprius</i> |
| 348 | Cuckoo, Jacobin | Bontnuwejaarsvoel | <i>Clamator jacobinus</i> |
| 351 | Cuckoo, Klaas's | Meitjie | <i>Chrysococcyx klaas</i> |
| 343 | Cuckoo, Red-chested | Piet-my-vrou | <i>Cuculus solitarius</i> |
| 52 | Darter, African | Slanghalsvoel | <i>Anhinga rufa</i> |
| 317 | Dove, Laughing | Rooiborsduifie | <i>Streptopelia senegalensis</i> |
| 318 | Dove, Namaqua | Namakwaduifie | <i>Oena capensis</i> |
| 314 | Dove, Red-eyed | Grootringduif | <i>Streptopelia semitorquata</i> |
| 940 | Dove, Rock | Tuinduif | <i>Columba livia</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|---------------------------|------------------------|---------------------------------|
| 517 | Drongo, Fork-tailed | Mikstertbyvanger | <i>Dicrurus adsimilis</i> |
| 95 | Duck, African Black | Swarteend | <i>Anas sparsa</i> |
| 103 | Duck, Maccoa | Bloubekeend | <i>Oxyura maccoa</i> |
| 104 | Duck, White-backed | Witruggeend | <i>Thalassornis leuconotus</i> |
| 100 | Duck, White-faced | Nonnetjie-eend | <i>Dendrocygna viduata</i> |
| 96 | Duck, Yellow-billed | Geelbekeend | <i>Anas undulata</i> |
| 139 | Eagle, Booted | Dwergarend | <i>Aquila pennatus</i> |
| 368 | Eagle-owl, Spotted | Gevlekte Ooruil | <i>Bubo africanus</i> |
| 61 | Egret, Cattle | Veereier | <i>Bubulcus ibis</i> |
| 58 | Egret, Great | Grootwitreier | <i>Egretta alba</i> |
| 59 | Egret, Little | Kleinwitreier | <i>Egretta garzetta</i> |
| 60 | Egret, Yellow-billed | Geelbekwitreier | <i>Egretta intermedia</i> |
| 600 | Eremomela, Yellow-bellied | Geelpensbossanger | <i>Eremomela icteropygialis</i> |
| 119 | Falcon, Amur | Oostelike Rooipootvalk | <i>Falco amurensis</i> |
| 114 | Falcon, Lanner | Edelvalk | <i>Falco biarmicus</i> |
| 820 | Finch, Red-headed | Rooikopvink | <i>Amadina erythrocephala</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|---------------------------------|-----------------------|------------------------------------|
| 789 | Finch, Scaly-feathered | Baardmannetjie | <i>Sporopipes squamifrons</i> |
| 837 | Firefinch, Red-billed | Rooibekvuurvinkie | <i>Lagonosticta senegala</i> |
| 707 | Fiscal, Common (Southern) | Fiskaallaksman | <i>Lanius collaris</i> |
| 86 | Flamingo, Greater | Grootflamink | <i>Phoenicopterus ruber</i> |
| 678 | Flycatcher, Fairy | Feevlieievanger | <i>Stenostira scita</i> |
| 665 | Flycatcher, Fiscal | Fiskaalvlieivanger | <i>Sigelus silens</i> |
| 654 | Flycatcher, Spotted | Europese Vlieievanger | <i>Muscicapa striata</i> |
| 176 | Francolin, Grey-winged | Bergpatrys | <i>Scleroptila africanus</i> |
| 179 | Francolin, Orange River | Kalaharipatrys | <i>Scleroptila levaillantoides</i> |
| 89 | Goose, Egyptian | Kolgans | <i>Alopochen aegyptiacus</i> |
| 88 | Goose, Spur-winged | Wildemakou | <i>Plectropterus gambensis</i> |
| 162 | Goshawk, Gabar | Kleinsingvalk | <i>Melierax gabar</i> |
| 165 | Goshawk, Southern Pale Chanting | Bleeksingvalk | <i>Melierax canorus</i> |
| 360 | Grass-owl, African | Grasuil | <i>Tyto capensis</i> |
| 5 | Grebe, Black-necked | Swartnekdoobertjie | <i>Podiceps nigricollis</i> |
| 6 | Grebe, Little | Kleindobbertjie | <i>Tachybaptus ruficollis</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|---------------------------|-------------------|----------------------------|
| 263 | Greenshank, Common | Groenpootruiter | <i>Tringa nebularia</i> |
| 192 | Guineafowl, Helmeted | Gewone Tarentaal | <i>Numida meleagris</i> |
| 288 | Gull, Grey-headed | Gryskopmeeu | <i>Larus cirrocephalus</i> |
| 2042 | Gull, Heuglin's | Heuglinse meeu | <i>Larus heuglini</i> |
| 4136 | Gull, Lesser Black-backed | Kleinswartrugmeeu | <i>Larus fuscus</i> |
| 72 | Hamerkop, Hamerkop | Hamerkop | <i>Scopus umbretta</i> |
| 169 | Harrier, Black | Witkruisvleivalk | <i>Circus maurus</i> |
| 55 | Heron, Black-headed | Swartkopreier | <i>Ardea melanocephala</i> |
| 56 | Heron, Goliath | Reusereier | <i>Ardea goliath</i> |
| 63 | Heron, Green-backed | Groenrugreier | <i>Butorides striata</i> |
| 54 | Heron, Grey | Bloureier | <i>Ardea cinerea</i> |
| 57 | Heron, Purple | Rooireier | <i>Ardea purpurea</i> |
| 62 | Heron, Squacco | Ralreier | <i>Ardeola ralloides</i> |
| 442 | Honeyguide, Lesser | Kleinheuningwyser | <i>Indicator minor</i> |
| 418 | Hoopoe, African | Hoepoep | <i>Upupa africana</i> |
| 507 | House-martin, Common | Huisswael | <i>Delichon urbicum</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|--------------------------|---------------------|---------------------------------|
| 81 | Ibis, African Sacred | Skoorsteenveer | <i>Threskiornis aethiopicus</i> |
| 83 | Ibis, Glossy | Glansibis | <i>Plegadis falcinellus</i> |
| 84 | Ibis, Hadeda | Hadeda | <i>Bostrychia hagedash</i> |
| 122 | Kestrel, Greater | Grootrooivalk | <i>Falco rupicoloides</i> |
| 125 | Kestrel, Lesser | Kleinrooivalk | <i>Falco naumanni</i> |
| 123 | Kestrel, Rock | Kransvalk | <i>Falco rupicolus</i> |
| 402 | Kingfisher, Brown-hooded | Bruinkopvisvanger | <i>Halcyon albiventris</i> |
| 395 | Kingfisher, Giant | Reusevisvanger | <i>Megaceryle maximus</i> |
| 397 | Kingfisher, Malachite | Kuifkopvisvanger | <i>Alcedo cristata</i> |
| 394 | Kingfisher, Pied | Bontvisvanger | <i>Ceryle rudis</i> |
| 130 | Kite, Black-shouldered | Blouvalk | <i>Elanus caeruleus</i> |
| 223 | Korhaan, Blue | Bloukorhaan | <i>Eupodotis caerulescens</i> |
| 1035 | Korhaan, Northern Black | Witvlerkkorhaan | <i>Afrotis afraoides</i> |
| 245 | Lapwing, Blacksmith | Bontkiewiet | <i>Vanellus armatus</i> |
| 242 | Lapwing, Crowned | Kroonkiewiet | <i>Vanellus coronatus</i> |
| 3550 | Lark, Agulhas Clapper | Overbergklappertjie | <i>Mirafrja marjoriae</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|----------------------------|------------------------|---------------------------------|
| 4123 | Lark, Agulhas Long-billed | Overberglangbeklewerik | <i>Certhilauda brevirostris</i> |
| 4124 | Lark, Benguela Long-billed | Kaokolangbeklewerik | <i>Certhilauda benguelensis</i> |
| 4140 | Lark, Cape Clapper | Kaapse Klappertjie | <i>Mirafrapiata</i> |
| 4125 | Lark, Cape Long-billed | Weskuslangbeklewerik | <i>Certhilauda curvirostris</i> |
| 1183 | Lark, Eastern Clapper | Hoeveldklappertjie | <i>Mirafrafasciolata</i> |
| 4126 | Lark, Eastern Long-billed | Grasveldlangbeklewerik | <i>Certhilauda semitorquata</i> |
| 4127 | Lark, Karoo Long-billed | Karoolangbeklewerik | <i>Certhilauda subcoronata</i> |
| 456 | Lark, Melodious | Spotlewerik | <i>Mirafracheniana</i> |
| 490 | Lark, Pink-billed | Pienkbeklewerik | <i>Spizocorys conirostris</i> |
| 488 | Lark, Red-capped | Rooikoplewerik | <i>Calandrella cinerea</i> |
| 458 | Lark, Rufous-naped | Rooineklewerik | <i>Mirafr africana</i> |
| 474 | Lark, Spike-heeled | Vlaktelewerik | <i>Chersomanes albofasciata</i> |
| 703 | Longclaw, Cape | Oranjekeelkalkoentjie | <i>Macronyx capensis</i> |
| 509 | Martin, Brown-throated | Afrikaanse Oewerswael | <i>Riparia paludicola</i> |
| 506 | Martin, Rock | Kransswael | <i>Hirundo fuligula</i> |
| 803 | Masked-weaver, Southern | Swartkeelgeelvink | <i>Ploceus velatus</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|------------------------------|--------------------|-------------------------------|
| 210 | Moorhen, Common | Grootwaterhoender | <i>Gallinula chloropus</i> |
| 392 | Mousebird, Red-faced | Rooiwangmuisvoel | <i>Urocolius indicus</i> |
| 390 | Mousebird, Speckled | Gevlekte Muisvoel | <i>Colius striatus</i> |
| 391 | Mousebird, White-backed | Witkruismuisvoel | <i>Colius colius</i> |
| 734 | Myna, Common | Indiese Spreeu | <i>Acridotheres tristis</i> |
| 637 | Neddicky, Neddicky | Neddikkie | <i>Cisticola fulvicapilla</i> |
| 69 | Night-Heron, Black-crowned | Gewone Nagreier | <i>Nycticorax nycticorax</i> |
| 371 | Nightjar, European | Europese Naguil | <i>Caprimulgus europaeus</i> |
| 373 | Nightjar, Fiery-necked | Afrikaanse Naguil | <i>Caprimulgus pectoralis</i> |
| 372 | Nightjar, Rufous-cheeked | Rooiwangnaguil | <i>Caprimulgus rufigena</i> |
| 1 | Ostrich, Common | Volstruis | <i>Struthio camelus</i> |
| 359 | Owl, Barn | Nonnetjie-uil | <i>Tyto alba</i> |
| 361 | Owl, Marsh | Vlei-uil | <i>Asio capensis</i> |
| 387 | Palm-swift, African | Palmwindswael | <i>Cypsiurus parvus</i> |
| 682 | Paradise-flycatcher, African | Paradysvlieevanger | <i>Terpsiphone viridis</i> |
| 311 | Pigeon, Speckled | Kransduif | <i>Columba guinea</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|-----------------------|-------------------------|----------------------------------|
| 692 | Pipit, African | Gewone Koester | <i>Anthus cinnamomeus</i> |
| 697 | Pipit, African Rock | Klipkoester | <i>Anthus crenatus</i> |
| 693 | Pipit, Long-billed | Nicholsonse Koester | <i>Anthus similis</i> |
| 694 | Pipit, Plain-backed | Donkerkoester | <i>Anthus leucophrys</i> |
| 233 | Plover, Common Ringed | Ringnekstrandkiewiet | <i>Charadrius hiaticula</i> |
| 238 | Plover, Three-banded | Driebandstrandkiewiet | <i>Charadrius tricollaris</i> |
| 102 | Pochard, Southern | Bruineend | <i>Netta erythrophthalma</i> |
| 650 | Prinia, Black-chested | Swartbandlangstertjie | <i>Prinia flavicans</i> |
| 1049 | Prinia, Drakensberg | Drakensberglangstertjie | <i>Prinia hypoxantha</i> |
| 4139 | Prinia, Karoo | Karoolangstertjie | <i>Prinia maculosa</i> |
| 189 | Quail, Common | Afrikaanse Kwartel | <i>Coturnix coturnix</i> |
| 844 | Quailfinch, African | Gewone Kwartelvinkie | <i>Ortygospiza atricollis</i> |
| 805 | Quelea, Red-billed | Rooibekkwelea | <i>Quelea quelea</i> |
| 606 | Reed-warbler, African | Kleinrietsanger | <i>Acrocephalus baeticatus</i> |
| 603 | Reed-warbler, Great | Grootrietsanger | <i>Acrocephalus arundinaceus</i> |
| 581 | Robin-chat, Cape | Gewone Janfrederik | <i>Cossypha caffra</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|------------------------------|--------------------|---------------------------------|
| 412 | Roller, European | Europese Troupant | <i>Coracias garrulus</i> |
| 413 | Roller, Lilac-breasted | Gewone Troupant | <i>Coracias caudatus</i> |
| 256 | Ruff, Ruff | Kemphaan | <i>Philomachus pugnax</i> |
| 258 | Sandpiper, Common | Gewone Ruiter | <i>Actitis hypoleucos</i> |
| 251 | Sandpiper, Curlew | Krombekstrandloper | <i>Calidris ferruginea</i> |
| 262 | Sandpiper, Marsh | Moerasruiter | <i>Tringa stagnatilis</i> |
| 264 | Sandpiper, Wood | Bosruiter | <i>Tringa glareola</i> |
| 421 | Scimitarbill, Common | Swartbekkakelaar | <i>Rhinopomastus cyanomelas</i> |
| 586 | Scrub-robin, Kalahari | Kalahariwipstert | <i>Cercotrichas paena</i> |
| 583 | Scrub-robin, Karoo | Slangverklikker | <i>Cercotrichas coryphoeus</i> |
| 105 | Secretarybird, Secretarybird | Sekretarisvoel | <i>Sagittarius serpentarius</i> |
| 90 | Shelduck, South African | Kopereend | <i>Tadorna cana</i> |
| 94 | Shoveler, Cape | Kaapse Slopeend | <i>Anas smithii</i> |
| 708 | Shrike, Red-backed | Rooiruglaksman | <i>Lanius collurio</i> |
| 250 | Snipe, African | Afrikaanse Snip | <i>Gallinago nigripennis</i> |
| 786 | Sparrow, Cape | Gewone Mossie | <i>Passer melanurus</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|-------------------------------|--------------------|-------------------------------|
| 785 | Sparrow, Great | Grootmossie | <i>Passer motitensis</i> |
| 784 | Sparrow, House | Huismossie | <i>Passer domesticus</i> |
| 3852 | Sparrow, Northern Grey-headed | Witkeelmossie | <i>Passer griseus</i> |
| 4142 | Sparrow, Southern Grey-headed | Gryskopmossie | <i>Passer diffusus</i> |
| 780 | Sparrow-weaver, White-browed | Koringvoel | <i>Plocepasser mahali</i> |
| 485 | Sparrowlark, Grey-backed | Gysruglewerik | <i>Eremopterix verticalis</i> |
| 85 | Spoonbill, African | Lepelaar | <i>Platalea alba</i> |
| 185 | Spurfowl, Swainson's | Bosveldfisant | <i>Pternistis swainsonii</i> |
| 737 | Starling, Cape Glossy | Kleinglansspreeu | <i>Lamprotornis nitens</i> |
| 746 | Starling, Pied | Witgatspreeu | <i>Spreo bicolor</i> |
| 745 | Starling, Red-winged | Rooivlerkspreeu | <i>Onychognathus morio</i> |
| 735 | Starling, Wattled | Lelspreeu | <i>Creatophora cinerea</i> |
| 270 | Stilt, Black-winged | Rooipootelsie | <i>Himantopus himantopus</i> |
| 253 | Stint, Little | Kleinstrandloper | <i>Calidris minuta</i> |
| 576 | Stonechat, African | Gewone Bontrokkie | <i>Saxicola torquatus</i> |
| 78 | Stork, Abdim's | Kleinswartooievaar | <i>Ciconia abdimii</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|-----|--------------------------|---------------------|------------------------------------|
| 79 | Stork, Black | Grootswartooievaar | <i>Ciconia nigra</i> |
| 80 | Stork, White | Witooievaar | <i>Ciconia ciconia</i> |
| 76 | Stork, Yellow-billed | Nimmersat | <i>Mycteria ibis</i> |
| 764 | Sunbird, Dusky | Namakwasuikerbekkie | <i>Cinnyris fuscus</i> |
| 751 | Sunbird, Malachite | Jangroentjie | <i>Nectarinia famosa</i> |
| 763 | Sunbird, White-bellied | Witpenssuikerbekkie | <i>Cinnyris talatala</i> |
| 493 | Swallow, Barn | Europese Swael | <i>Hirundo rustica</i> |
| 502 | Swallow, Greater Striped | Grootstreepswael | <i>Hirundo cucullata</i> |
| 498 | Swallow, Pearl-breasted | PiÅ½relborsswael | <i>Hirundo dimidiata</i> |
| 501 | Swallow, Red-breasted | Rooiborsswael | <i>Hirundo semirufa</i> |
| 495 | Swallow, White-throated | Witkeelswael | <i>Hirundo albigularis</i> |
| 604 | Swamp-warbler, Lesser | Kaapse Rietsanger | <i>Acrocephalus gracilirostris</i> |
| 380 | Swift, African Black | Swartwindswael | <i>Apus barbatus</i> |
| 386 | Swift, Alpine | Witpenswindswael | <i>Tachymarptis melba</i> |
| 384 | Swift, Horus | Horuswindswael | <i>Apus horus</i> |
| 385 | Swift, Little | Kleinwindswael | <i>Apus affinis</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|------------------------------|---------------------|-------------------------------|
| 383 | Swift, White-rumped | Witkruiswindswael | <i>Apus caffer</i> |
| 714 | Tchagra, Brown-crowned | Rooivlerktjagra | <i>Tchagra australis</i> |
| 98 | Teal, Cape | Teeleend | <i>Anas capensis</i> |
| 97 | Teal, Red-billed | Rooibekeend | <i>Anas erythrorhyncha</i> |
| 304 | Tern, White-winged | Witvlerksterretjie | <i>Chlidonias leucopterus</i> |
| 275 | Thick-knee, Spotted | Gewone Dikkop | <i>Burhinus capensis</i> |
| 1104 | Thrush, Karoo | Geelbeklyster | <i>Turdus smithi</i> |
| 1105 | Thrush, Olive | Olyflyster | <i>Turdus olivaceus</i> |
| 514 | Tit, Ashy | Akasiagrysmees | <i>Parus cinerascens</i> |
| 658 | Tit-babbler, Chestnut-vented | Bosveldtjeriktik | <i>Parisoma subcaeruleum</i> |
| 659 | Tit-babbler, Layard's | Grystjeriktik | <i>Parisoma layardi</i> |
| 316 | Turtle-dove, Cape | Gewone Tortelduif | <i>Streptopelia capicola</i> |
| 686 | Wagtail, Cape | Gewone Kwikkie | <i>Motacilla capensis</i> |
| 595 | Warbler, Garden | Tuinsanger | <i>Sylvia borin</i> |
| 619 | Warbler, Rufous-eared | Rooioorlangstertjie | <i>Malcorus pectoralis</i> |
| 599 | Warbler, Willow | Hofsanger | <i>Phylloscopus trochilus</i> |

| Ref | Species name | Afrikaans | Taxonomic name |
|------|--------------------------|--------------------|-------------------------------|
| 839 | Waxbill, Blue | Gewone Blousysie | <i>Uraeginthus angolensis</i> |
| 843 | Waxbill, Common | Rooibeksysie | <i>Estrilda astrild</i> |
| 838 | Waxbill, Orange-breasted | Rooiassie | <i>Amandava subflava</i> |
| 799 | Weaver, Cape | Kaapse Wewer | <i>Ploceus capensis</i> |
| 564 | Wheatear, Mountain | Bergwagter | <i>Oenanthe monticola</i> |
| 1172 | White-eye, Cape | Kaapse Glasogie | <i>Zosterops virens</i> |
| 1171 | White-eye, Orange River | Gariepglasogie | <i>Zosterops pallidus</i> |
| 846 | Whydah, Pin-tailed | Koningrooibekkie | <i>Vidua macroura</i> |
| 847 | Whydah, Shaft-tailed | Pylstertrooibekkie | <i>Vidua regia</i> |
| 818 | Widowbird, Long-tailed | Langstertflap | <i>Euplectes progne</i> |
| 419 | Wood-hoopoe, Green | Rooibekkekelaar | <i>Phoeniculus purpureus</i> |
| 450 | Woodpecker, Cardinal | Kardinaalspeg | <i>Dendropicos fuscescens</i> |
| 453 | Wryneck, Red-throated | Draaihals | <i>Jynx ruficollis</i> |

Appendix C: Sensitivity map as per site inspection



