# TERRESTRIAL BIODIVERSITY REPORT FOR SOCIAL HOUSNING DEVELOPMENT AT SOSHANGUVE OF THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY IN THE GAUTENG PROVINCE



21/08/2018

Naledzani Environmental Services
Sustainability is our responsibility

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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 a relevant authority and the applicant.
- I have expertise and experience in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity.
- This document and all information contained herein is and will remain the intellectual property of Naledzani Environmental Services and the specialist investigator responsible for conducting the study. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigator.
- I will comply with the Act, regulations and all other applicable legislation.
- 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.



**Mpho Ramalivhana Pri Sci. Nat** (Hons. Bot.; SAAB; SACNASP)

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# 1. INTRODUCTION

Lambeu Consulting and Training Services (Pty) Ltd has been appointed by Instratin Properties (Pty) Ltd as an Independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Impact Assessment (Basic Assessment Process) for the proposed development of social housing units at Soshanguve under the City of Tshwane Metropolitan Municipality in the Gauteng Province.

As part of the requirements of the EIA process, specific biodiversity surveys were recommended by the environmental consultant. Instratin appointed Naledzani Environmental Services cc (herein after referred to as 'NES') to conduct the biodiversity impact assessment for the proposed development.

## 1.1 Scope of study

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

- To assess the proposed development in order to determine the general ecological state of the proposed project area;
- To survey and delineate environmentally sensitive areas;
- To assess the proposed development in terms of faunal and floral taxa including the potential for species to occur;
- To provide mapping of the environmentally sensitive and critical areas with respect to the proposed development;
- To assess and identify the potential impacts that may arise from the proposed project on the fauna and flora taxa;
- To provide mitigation measures to prevent and/or mitigate identified environmental impacts that may occur due to the proposed project; and
- The provision of an assessment report, indicate findings, recommendations and maps indicating sensitivities and/or no-go areas.

# 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.

| 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 Janeiro, 1992).** | 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) 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** | 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 |

| | |
|---|---|
| **Sustainable Development in South Africa** | 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 Resources Act 43 of 1967** | The intention of this Act is to control the over-utilization of South Africa's 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 categorised 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

- All species included in the plant species list (Appendix A) were observed and recorded in the study area;
- Any comments or observations made in this regard are based on observations, literature review, the expert knowledge and relevant professional experience of the specialist; and
- Naledzani Environmental Services 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 are is situated in Soshanguve township in the northern part of the City of Tshwane Metropolitan Municipality. The site is boarded by the Soutpanspruit on the eastern side, the Soshanguve street (which connects to the M35 to the east) on the southern side, whereas the already built-up area (Soshanguve - DD) surrounds the site on the west and the northern section.

The coordinates for the area of interest is as follows:

- Southing - 25º 29' 17.95"
- Easting - 28º 6' 59.32"

See **figures 1 and 2** below:

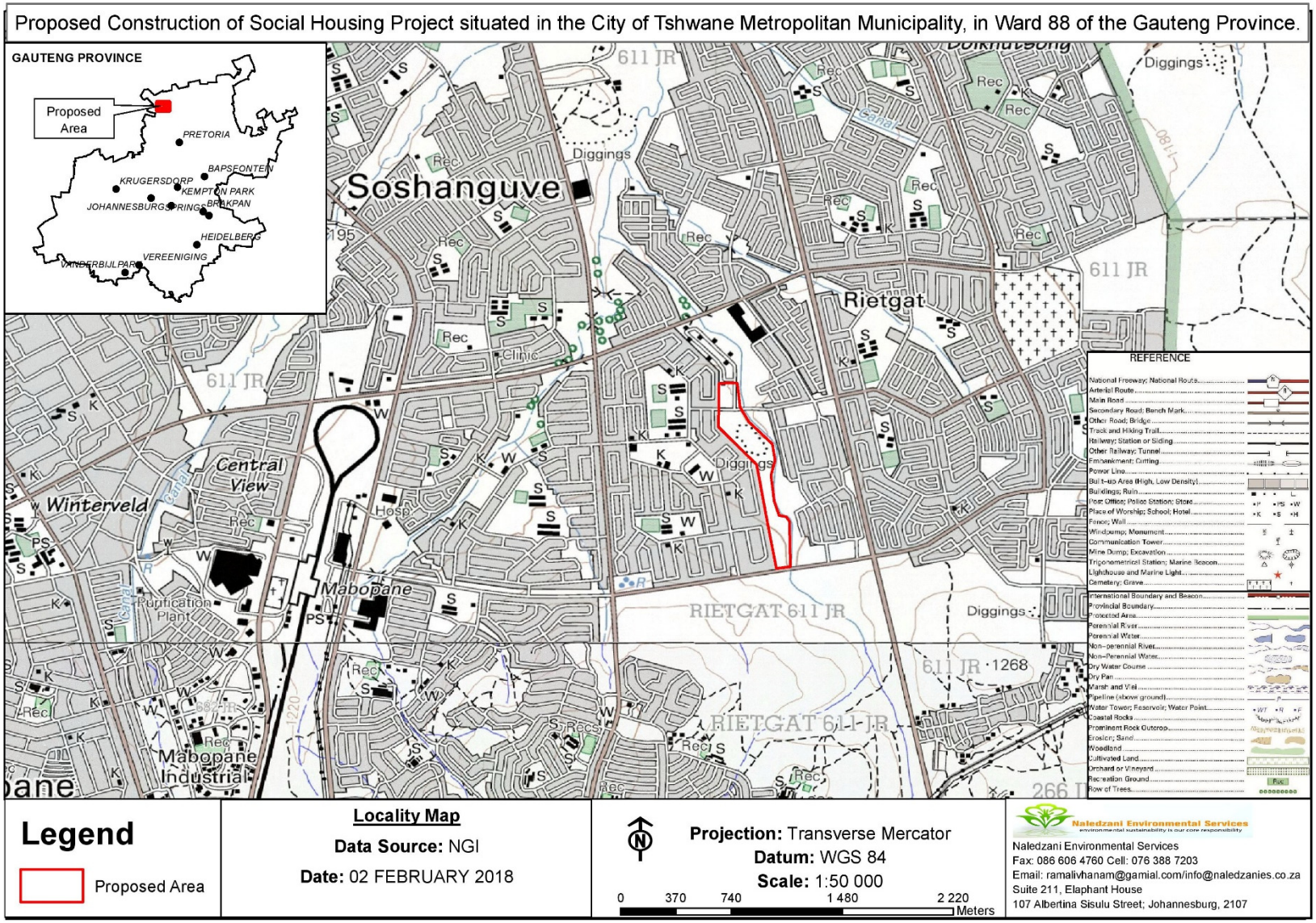



Figure 1: Locality map for the proposed project

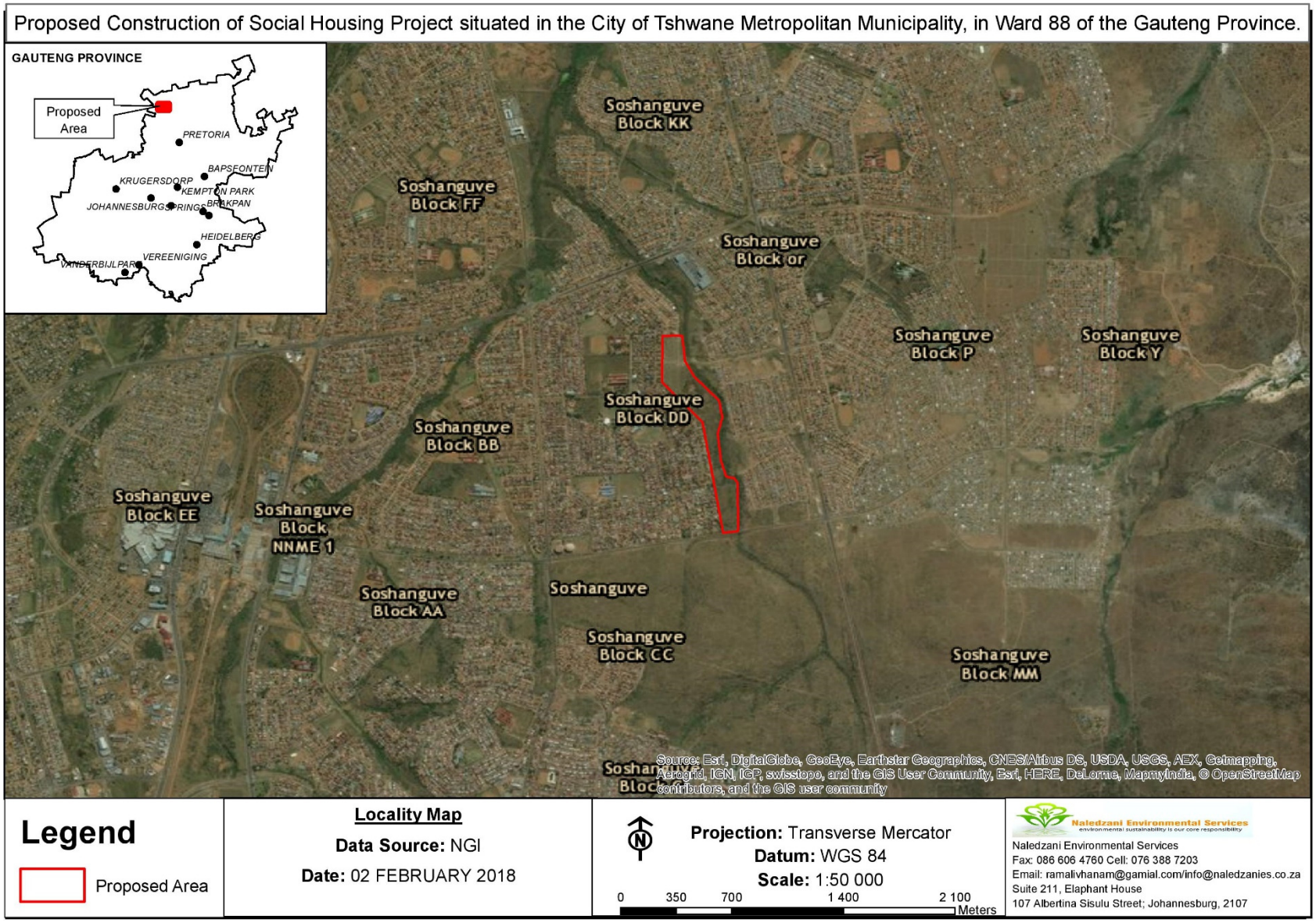



Figure 2: Google earth view for the proposed site

## 4.2. Vegetation

### 4.2.1. Biome type

Rutherford and Westfall (1994) described the project as falling within the Savanna Biome. The Savanna Biome is the largest Biome in southern Africa, occupying 46% of its area, and over one-third the area of South Africa. It is well developed over the lowveld and Kalahari region of South Africa and is also the dominant vegetation in neighbouring Botswana, Namibia and Zimbabwe. It is characterized by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground vegetation may be referred to as Shrubveld, where it is dense as Woodland, and the intermediate stages are locally known as Bushveld.

The environmental factors delimiting the biome are complex: altitude ranges from sea level to 2000 m; rainfall varies from 235 to 1000 mm per year; frost may occur from 0 to 120 days per year; and almost every major geological and soil type occurs within the biome. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper tree layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. Summer rainfall is essential for grass dominance, which, with its fine material, fuels near-annual fires. In fact, almost all species are adapted to survive fires, usually with less than 10% of plants, both in the grass and tree layer, killed by fire. Even with severe burning, most species can re-sprout from the stem bases.

The grass layer is dominated by C 4-type grasses, which are at an advantage where the growing season is hot. But where rainfall has a stronger winter component, C 3-type grasses dominate. The shrub-tree layer may vary from 1 to 20 m in height, but in Bushveld typically varies from 3 to 7 m. The shrub-tree element may come to dominate the vegetation in areas which are being overgrazed.

Most of the Savanna vegetation types are used for grazing, mainly by cattle or game. In the southernmost Savanna types, goats are a major stock. In some areas crops and subtropical fruit are cultivated. These mainly include the Clay Thorn Bushveld, parts of Mixed Bushveld, and Sweet Lowveld Bushveld. Conservation status of Savanna is comparatively good, mainly due to the presence of the Kruger and Kalahari Gemsbok National Parks within the biome. However, the high area conserved in South Africa, belies the fact that half of Savanna vegetation types are inadequately conserved, in having less than 5% of their area in reserves and, much of the area is used for game-farming and can thus be considered effectively preserved, provided that sustainable stocking levels are maintained. The importance of tourism and big game hunting in the conservation of the area must not be underestimated.

### 4.2.2. Broad-Scale vegetation patterns

The study area falls within the **Central Sandy Bushveld (SVcb 12)** which is part of the central bushveld unit. This vegetation is distributed in the Limpopo, Mpumalanga, Gauteng and North-West Provinces on the undulating terrain occurs mainly in a broad arc south of the Springbokvlakte from the Pilanesberg in the west through Hammanskraal and Groblersdal to Ga-Masemola in the east. A generally narrow irregular band along the north-western edge of the Springbokvlakte (including Modimolle) extending into a series of valleys and lower-altitude areas within the Waterberg including the upper Mokolo River Valley near Vaalwater, the corridor between Rankins Pass and the Doorndraai Dam, and the lowlands from the Mabula area to south of the Hoekberge.

It occurs Low undulating areas, sometimes between mountains, and sandy plains and catena's supporting tall, deciduous *Terminalia sericea and Burkea africana* woodland on deep sandy soils (with the former often dominant on the lower slopes of sandy catena's) and low, broad-leaved *Combretum* woodland on shallow rocky or gravelly soils. Species of *Acacia, Ziziphus and Euclea* are found on flats and lower slopes on eutrophic sands and some less sandy soils. *A. tortilis* may dominate some areas along valleys. Grass-dominated herbaceous layer with relatively low basal cover on dystrophic sands.

This vegetation type is considered to be **Vulnerable**. Less than 3% statutorily conserved spread thinly across many nature reserves including the Doorndraai Dam and Skuinsdraai Nature Reserves. An additional 2% conserved in other reserves including the Wallmansthal SANDF Property and a grouping of private reserves, which include most of the Nylsvlei freshwater wetlands. About 24% transformed, including about 19% cultivated and 4% urban and built-up areas.

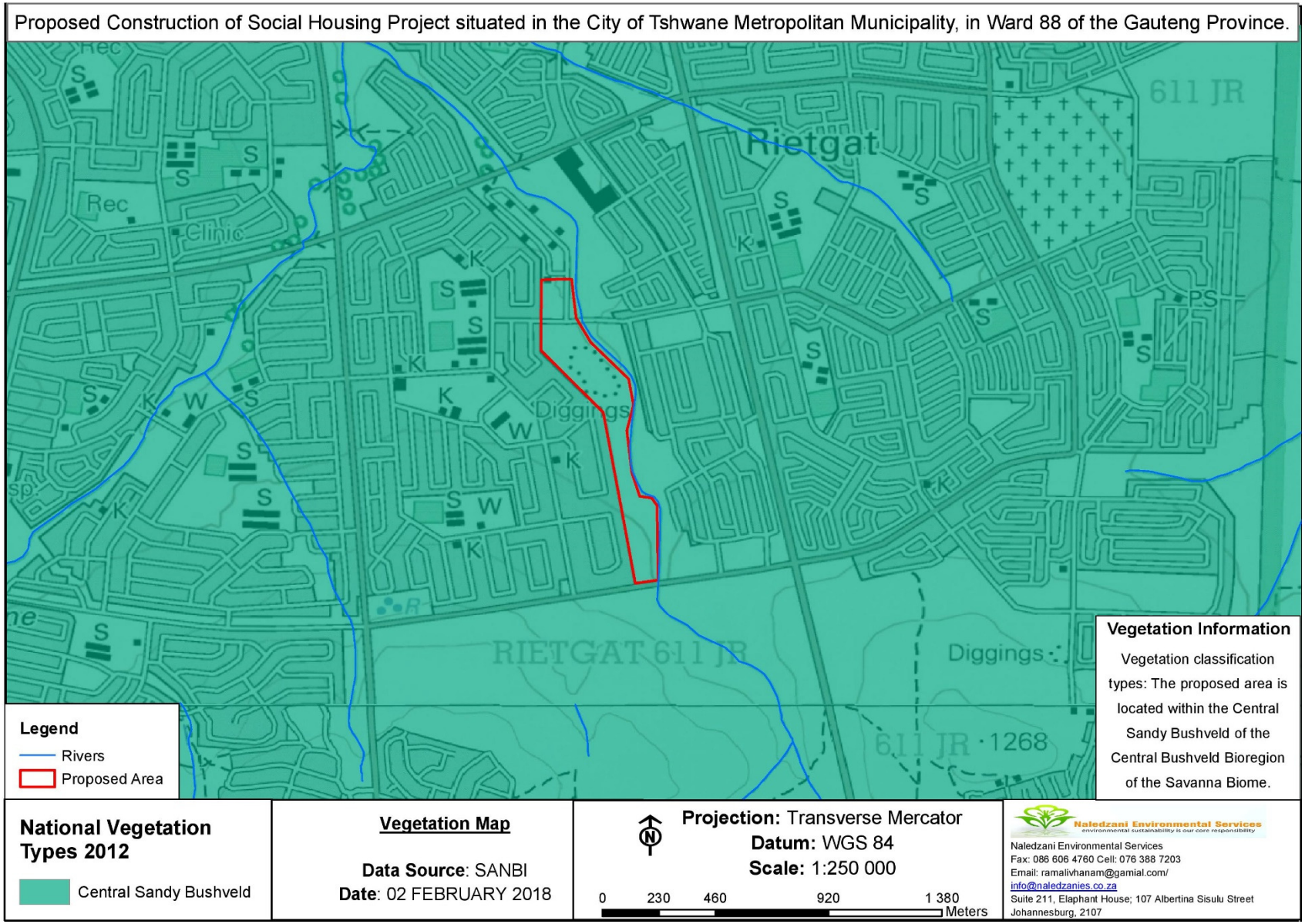



Figure 3: Broad vegetation map for the site

### 4.3. Climate

Soshanguve normally receives about 463mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (0mm) in June and the highest (87mm) in January. The average midday temperatures for Soshanguve range from 19.5°C in June to 28.7°C in January. The region is the coldest during July when the mercury drops to 2°C on average during the night (SAexplorer, 2018).

The region is classified as having a climatic N-value (after Weinert, 1980) of about 2.5, which indicates a more humid part of the country. Chemical weathering is predominant in this part of the country.

### 4.4. Hydrology

The site is located within the A23J quaternary catchment of the Crocodile West Marico WMA Gauteng, the Crocodile (West) catchment (secondary catchment) is one of the most developed catchments in the country. The catchment is characterised by the sprawling urban and industrial areas of northern Johannesburg and Pretoria, extensive irrigation downstream of Hartbeespoort Dam and large mining developments north of the Magaliesberg. Irrigation is the single largest water user in the Crocodile River catchment using approximately 375,5 m3/annum (DWA 2008).

Due to the extensive developments and high level of human activity in the catchment, water use in the catchment exceeds the water available from the local sources. Most of the water used in the catchment is therefore supplied from the Vaal River system via Rand Water, mainly to serve the metropolitan areas and some jus developments. This results in large quantities of effluent from urban and industrial users, most of which is discharged to the river system after treatment, for re-use downstream. In many of the streams and impoundments, water quality is severely compromised by the proportionate large return flows.

The site is thought drained by the Soutpanspruit River that is passing adjacent to the site as well as forming the site boundary.

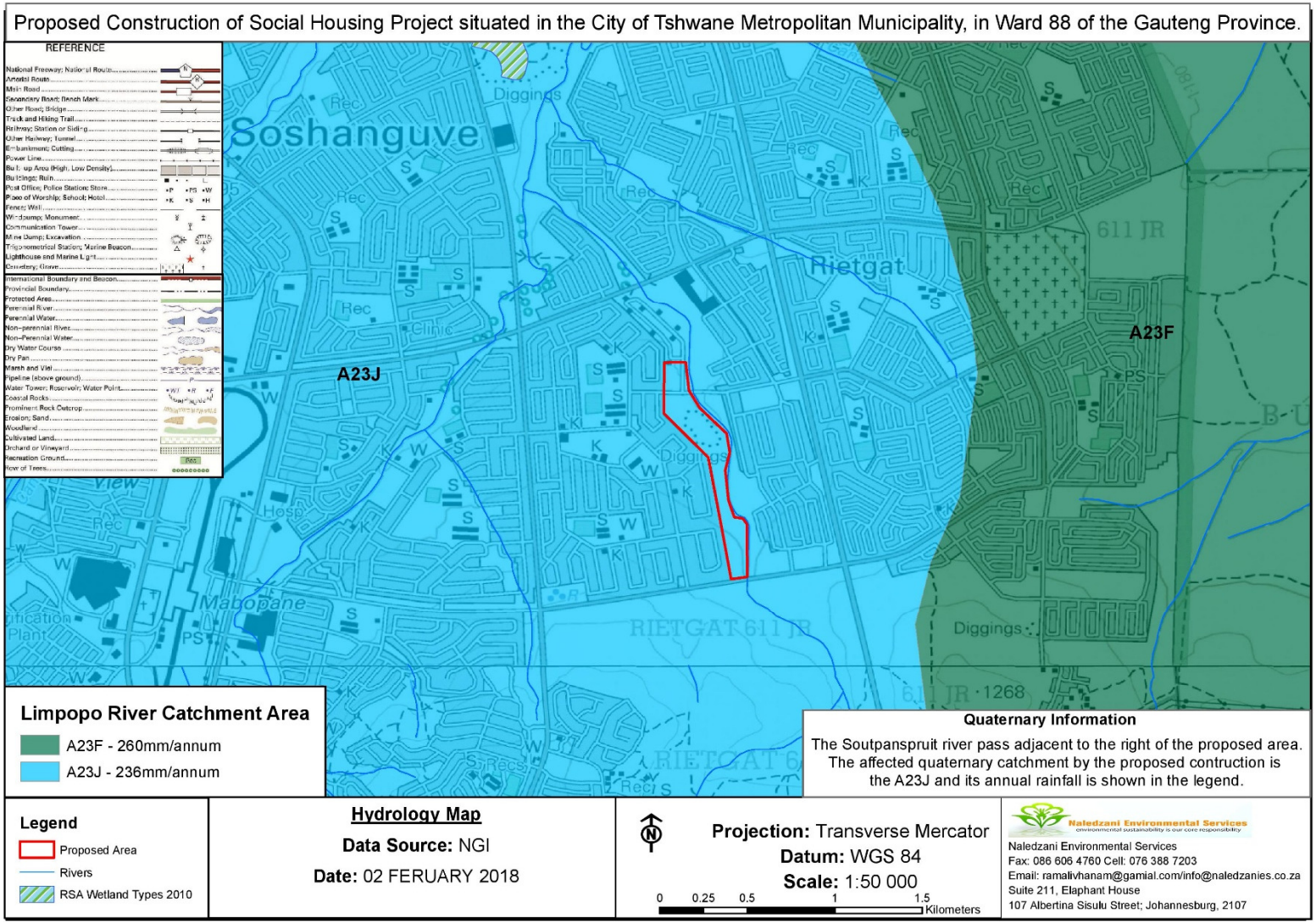



Figure 4: Hydrological map of the site

# 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 on the 22 January 2018 to confirm the boundaries of the site and then the site was fully surveyed on the 26th January 2018 to ensure that the true floristic reflection of the site is recorded.

## 5.2. Vegetation

Information about the Red Data species that occur in the area was obtained from Gauteng Department of Agriculture and Rural Development and also the SANBI website. The Guidelines issued by GDACE (now GDARD) to plant specialists were consulted to ascertain the habitat of the Red Data species concerned. The PRECIS list of plants recorded in the 2528CA 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. During the time on site, no mammals were noticed and it was deemed necessary that a desktop analysis be done to explore all different kinds of animals to habit 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.

### 5.5. Methodology Adapted in Assessing the Impacts

The significance of the impacts will be assessed considering the following descriptors:

Table 1: Impact assessment table

| **Nature of the impact** |
|---|

| | | |
|---|---|---|
| Positive | + | Impact will be beneficial to the environment (a benefit). |
| Negative | - | Impact will not be beneficial to the environment (a cost). |
| Neutral | 0 | Where a negative impact is offset by a positive impact, or mitigation measures, to have no overall effect. |
| **`Magnitude** | | |
| Minor | 2 | Negligible effects on biophysical or social functions / processes. Includes areas / environmental aspects which have already been altered significantly, and have little to no conservation importance (negligible sensitivity*). |
| Low | 4 | Minimal effects on biophysical or social functions / processes. Includes areas / environmental aspects which have been largely modified, and / or have a low conservation importance (low sensitivity*). |
| Moderate | 6 | Notable effects on biophysical or social functions / processes. Includes areas / environmental aspects which have already been moderately modified, and have a medium conservation importance (medium sensitivity*). |
| High | 8 | Considerable effects on biophysical or social functions / processes. Includes areas / environmental aspects which have been slightly modified and have a high conservation importance (high sensitivity*). |
| Very high | 10 | Severe effects on biophysical or social functions / processes. Includes areas / environmental aspects which have not previously been impacted upon and are pristine, thus of very high conservation importance (very high sensitivity*). |
| **Extent** | | |

| | | |
|---|---|---|
| Site only | 1 | Effect limited to the site and its immediate surroundings. |
| Local | 2 | Effect limited to within 3-5 km of the site. |
| Regional | 3 | Activity will have an impact on a regional scale. |
| National | 4 | Activity will have an impact on a national scale. |
| International | 5 | Activity will have an impact on an international scale. |
| **Duration** | | |
| Immediate | 1 | Effect occurs periodically throughout the life of the activity. |
| Short term | 2 | Effect lasts for a period 0 to 5 years. |
| Medium term | 3 | Effect continues for a period between 5 and 15 years. |
| Long term | 4 | Effect will cease after the operational life of the activity either because of natural process or by human intervention. |
| Permanent | 5 | Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient. |
| **Probability of occurrence** | | |
| Improbable | 1 | Less than 30% chance of occurrence. |

| | | |
|---|---|---|
| Low | 2 | Between 30 and 50% chance of occurrence. |
| Medium | 3 | Between 50 and 70% chance of occurrence. |
| High | 4 | Greater than 70% chance of occurrence. |
| Definite | 5 | Will occur, or where applicable has occurred, regardless or in spite of any mitigation measures. |

Once the impact criteria have been ranked for each impact, the significance of the impacts will be calculated using the following formula:

Significance Points (SP) = (Magnitude + Duration + Extent) x Probability

The significance of the heritage impact is therefore calculated by multiplying the severity rating with the probability rating. The maximum value that can be reached through this impact evaluation process is 100 SP (points). The significance for each impact is rated as High (SP≥60), Medium (SP = 31-60) and Low (SP<30) significance as shown in the Table 2 below.

Table 2: Definition of significance rating

| **Significance of predicted NEGATIVE impacts** | | |
|---|---|---|
| Low | 0-30 | Where the impact will have a relatively small effect on the environment and will require minimum or no mitigation and as such have a limited influence on the decision |
| Medium | 31-60 | Where the impact can have an influence on the environment and should be mitigated and as such could have an influence on the decision unless it is mitigated. |

| | | |
|---|---|---|
| High | 61-100 | Where the impact will definitely have an influence on the environment and must be mitigated, where possible. This impact will influence the decision regardless of any possible mitigation. |
| **Significance of predicted POSITIVE impacts** | | |
| Low | 0-30 | Where the impact will have a relatively small positive effect on the environment. |
| Medium | 31-60 | Where the positive impact will counteract an existing negative impact and result in an overall neutral effect on the environment. |
| High | 61-100 | Where the positive impact will improve the environment relative to baseline conditions. |

# 6. FINDINGS OF THE ASSESSMENT

## 6.1. Vegetation

The study area consists of the open grassland, the open shrubland (covering much of the site) and the dumping area. Vegetation throughout the study area is dominated by shrubs, grasses, forbs and herbs. Refer to Appendix A for a list of species in the study area.

### 6.1.1. Vegetation communities

Three vegetation communities were identified during the site assessment (Figure 5). These were recognized based on physiognomy, moisture regime, and species composition and disturbance characteristics. Vegetation communities include:

- The open grassland,
- The open shrubland and
- The dumping area

The characteristics of each vegetation community are discussed in the following sections.

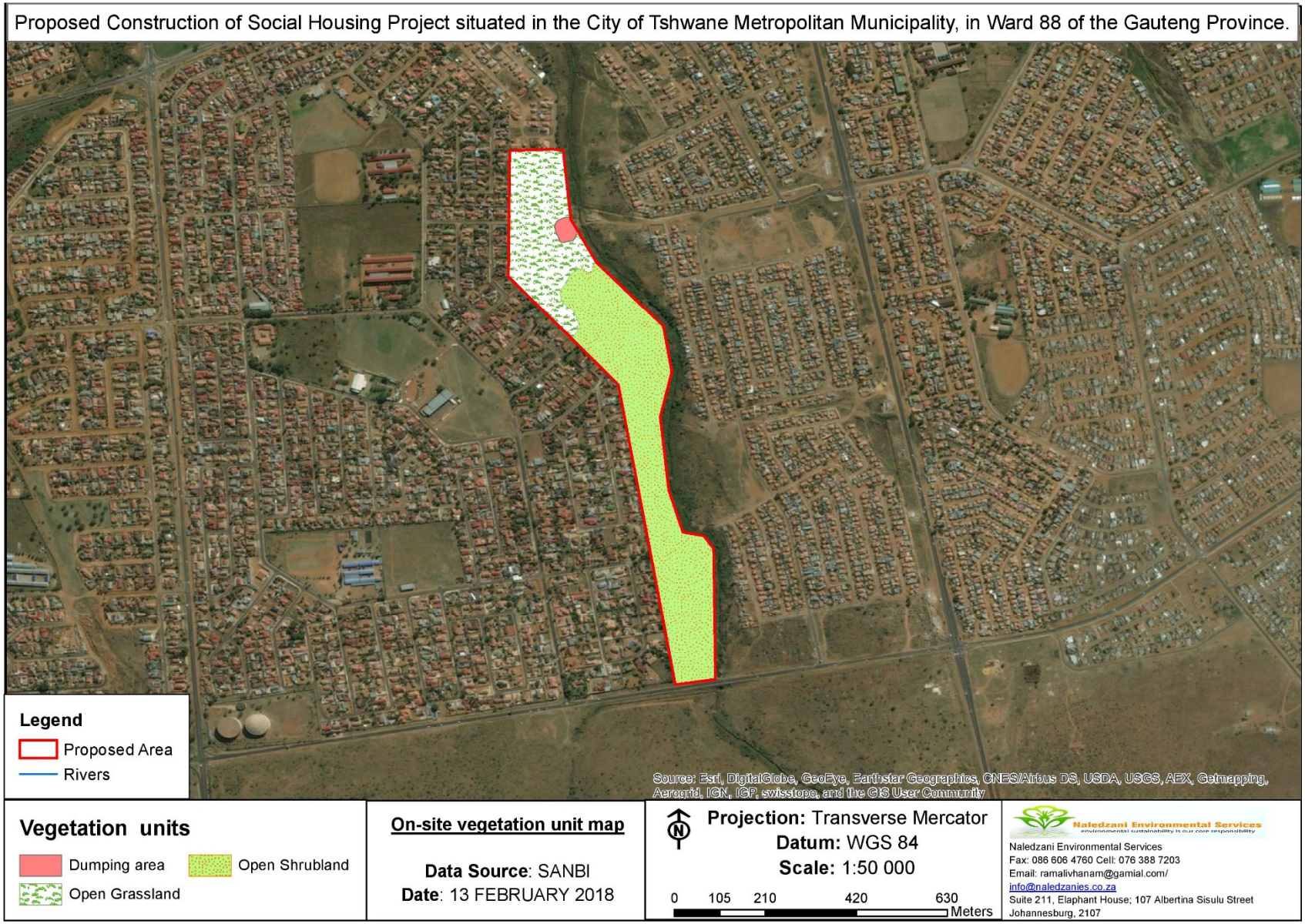



Figure 5: Vegetation unit map of the site

#### 6.1.1.1. The open grassland

This is the second largest unit on site and as the name says it, the unit is dominated by grass species. These include *Hyperthelia dissolute, Panicum maximum, Perotis patens, Anthephora pubescens, Aristida acabrivals, Elionurus muticus, Eragrostis nindensis, Loudetia simplex, Schmidtia papophoroides, Themeda triandra, Trachypogon spicatus*; *Urochloa mosambicens, Melinis repens,* and *Hyparrhenia hirta*.

Few scattered species of Marula tree (*Sclerocarya birrea*) and *Tephrosia capensis* providing tall trees on this unit. Herbs and shrubs such as *Datura stramonium, Argemone Mexicana, Lantana camara, Gymnosporia senegalensis, Lippia javanica, Asparagus cooperi* were recorded.

Sensitivity aspects

- The mixed-grassland patch has an ecological functioning of low-medium;
- The suitability of this community for Red Data/protected species is considered low.
- Protected plant species was recorded within this unit.



Figure 6: Overview of the grassland vegetation unit



Figure 7: *Sclerocarya birrea* scattered on the grassland unit

#### 6.1.1.2. The dumping area

This area is currently used as a dumping area by locals and as such the natural vegetation has been removed and invasion by invader plants has taken place. Species such *Riccinus communis, Argemone Mexicana, Solanum mariantanum, Amaranthus hybridus, Bidens pilosa, Datura ferox, Datura stramonium Conyza bonariensis, Conyza canadensis, and Cosmos bipinnatus* were recorded.

Sensitivity aspects

- Due to the complete transformation of this area this area has a negligible or low ecological functioning.
- No endemic, Red Data or protected species were recorded in the dumping area and the probability of such species occurring in this vegetation community is considered very-low.
- Accordingly, the conservation importance of dumping area is considered low.



Figure 8: Dumping section on site

#### 6.1.1.3. The open shrubland

This vegetation unit covers the largest unit of the site. It is characterized by both grasses and shrubs. Species such *Combretum zeyheri, Combretum apiculatum, Dichrostachys cinerea, Rhus leptodictya, Acacia robusta, Acacia burkei, Acacia karoo, Terminalia sericea, Sclerocarya birrea, Melia azedarach, Grewia bicolor, Bauhinia galpinii, Rubus idaeus and Tephrosia capensis.*

Herbs such as *Bidens pilosa, Ricinus communis, Lippia javanica, Ipomea purpurea, Aloe greatheadii, Asparagus cooperi, xanthium strumarium, Gymnosporia senegalensis, Xerophyta retinervis* and A*gathisanthemum bojeri.* The grass species include *Melinis repens, Themenda triandra, Panicum coloratum, Sporobolus africanus, Andropogon eucomus, and Urochloa panicoides.*

An excavation exists on site and provides different vegetation on site. Plant species such as *Arundo donax, Typha capensis, Lantana camara, Bauhinia galpinii, Tephrosia capensis,* Cyperus *rupestris, Melia azedarach, Ipomea purpurea, Verbena bonariensis, Acacia burkei, Sclerocarya birrea and Terminalia sericea.*

Grass species including *Andropogon eucomus, Eragrostis plana, Urochloa mosambicens, Panicum coloratum, Sporobolus africanus,* Cyperus *rupestris, Andropogon appendiculatus* and *Setaria incrassata* were all recorded in seasonal and temporary saturation zones.

Sensitivity aspects:

- Sections of the area have been cleared for wood collection and also burning of grasses.
- No endemic, Red Data or protected species were recorded in the area.
- Accordingly, the conservation importance this vegetation unit is considered medium due to the scattered occurrence of protected plant species.



Figure 9: Open shrubland with Marula and *Melia azedarach* on the back



Figure 10: Excavation area that collects storm water from the surrounding residential area

### 6.2. Alien invasive plants

Declared weeds and invaders have the tendency to dominate or replace the herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that all these transformers be eradicated and 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 (Henderson, 2001).

According to the published Alien and Invasive Species regulations in terms of section 97(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) four categories of problem plants are identified as:

- **Category 1a** plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned.
- **Category 1b** plants are widespread invasive species controlled by a management programme.
- **Category 2** plants are invasive species controlled by area. Can be grown under permit conditions in demarcated areas. All breeding, growing, moving, and selling are banned without a permit.
- **Category 3** plants are ornamental and other species that are permitted on a property but may no longer be planted or sold.

Numerous alien plant species were recorded in the study area at the time of the survey; most notably the extensive invasions by species such as *Melia azedarach, Ricinus communis and Argemone mexicana* have the potential to form dense stands. Table 3 lists the alien species as well as the various NEMBA categories for the alien species recorded during the survey.

Table 3: Alien species recorded in the study area.

| Scientific name | Common name | NEMBA Category |
|---|---|---|
| *Lantana camara* | Bird's brandy; cherry pie; tick-berry | 1b |
| *Melia azedarach* | Syringa | 1b |
| *Ricinus communis* | Castor oil plant | 2 |
| *Argemone Mexicana* | Mexican prickly poppy | 1b |
| *Datura Stramonium* | Jimsonweed or devil's snare | 1b |
| *Solanum mariantanum* | Bug weed | 1b |
| *Xanthium strumarium* | Large cocklebur | 1b |

| | | |
|---|---|---|
| *Datura ferox* | Large thorn apple | 1b |
| *Agave sisalana* | Sisal | 2 |
| *Arundo donax* | Giant reed | 1b |
| *Opuntia ficus-indica* | Prickly pear | 1b |

### 6.3. Description of the CBAs

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 guideline for bioregional plans defines three basic CBA categories based on three high-level land management objectives.

Table 4: A framework for linking spatial planning categories (CBAs) to land-use planning and decision-making guidelines based on a set of high-level land biodiversity management objectives.

| CBA category | Land Management Objective |
|---|---|
| PA & CBA 1 | **Natural landscapes**:<br>• Ecosystems and species fully intact and undisturbed<br>• These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost, then targets will not be met.<br>• These are landscapes that are at or past their limits of acceptable change. |
| CBA 2 | **Near-natural landscapes**:<br>• Ecosystems and species largely intact and undisturbed.<br>• Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets.<br>• These are landscapes that are approaching but have not passed their limits of acceptable change. |
| Ecological Support Areas (ESA) | **Functional landscapes**:<br>• Ecosystems moderately to significantly disturbed but still able to maintain basic functionality.<br>• Individual species or other biodiversity indicators may be severely disturbed or reduced.<br>• These are areas with low irreplaceability with respect to biodiversity pattern targets only. |
| Other Natural Areas (ONA) and Transformed | **Production landscapes**: manage land to optimize sustainable utilization of natural resources. |

According to the Gauteng Conservation plan, about 95% of the site is located within an ecological support area with the Soutpanspruit River passing close to the site and also forming the site boundary. The site is part of the ESA due to

it being part of the only remaining vegetation around the Soshanguve area as most of the vegetation was cleared for house construction.

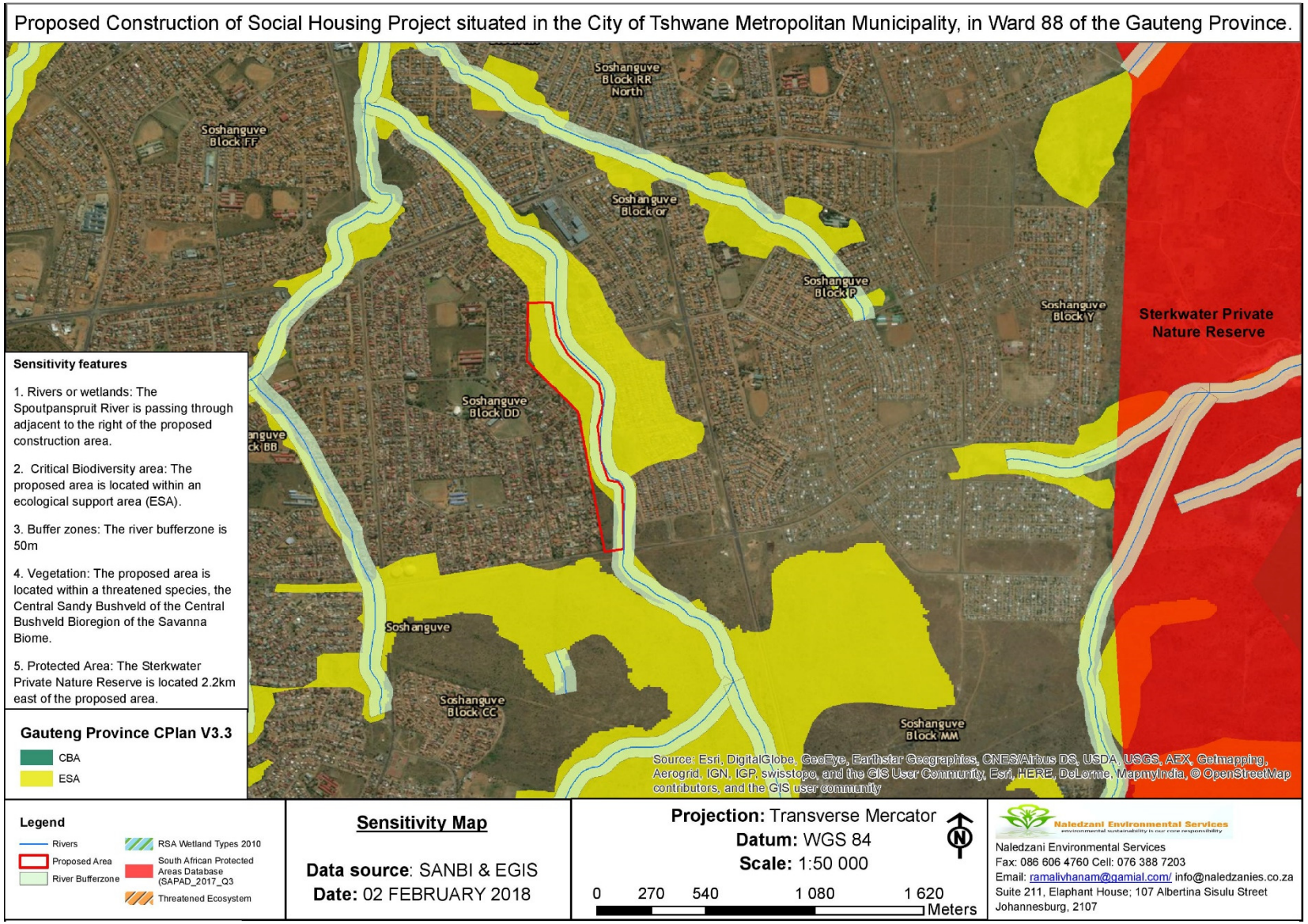



Figure 11: Site sensitivity in relation to the conservation plan

### 6.4. Faunal Communities

The habitat seen on site (more on the open shrubland) does provide habitat for small mammals with the grassland and the open shrubland vegetation units supporting habitat for birds. The open grassland patch may typically attract the Secretary bird, Blue and White-bellied Korhaans and Abdim's Stork. However, it is unlikely that they will occur in these areas as a result of the disturbance caused by human habitation in the surrounding areas as well as pedestrian and road traffic passing through the area on a daily basis.

Small mammal recorded on is only *Rattus norvegicus*. Four other species, *Galago moholi, Procavia capensis, Herpestes sanguineus* and *Chlorocebus pygerythrus* have previously been recorded in the area but none of them were noticed on site.

Three species of frogs are known to occur within the bigger area and these species are *Pyxicephalus adspersus, Amietia sp. and Schismaderma carens.* No frogs were seen during the site survey.

## 7. DISCUSSION AND IMPACT ASSESSMENT

### 7.1. Introduction

The Regulations in terms of Chapter 5 of the National Environmental Management, Act No. 107 of 1998 requires that a description must be given of the potential impacts the proposed development will have on the environment. The details indicated the identified impacts for the area and their proposed mitigation measures.

Table 5: Environmental Impacts assessed by combining the consequences (extent, duration, intensity) with the probability of occurrence before and after mitigation for the proposed project

| Impacts and Mitigation measures relating to the proposed project | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Activity/Aspect** | **Impact** | **Stage** | **Nature** | **Magnitude** | **Extent** | **Duration** | **Probability** | **Significance before mitigation** | **Mitigation measures** | **Significance after mitigation** |
| Vegetation Clearing for construction purpose | Removal of the natural vegetation | Construction | Negative | High (8) | Site only (1) | Long term (4) | Definite (5) | High (65) | • Areas designated for vegetation clearing should be identified and visibly marked off.<br>• Vegetation clearing in natural areas should be kept to a minimum and restricted to the proposed development footprint only.<br>• Exposed areas should be rehabilitated with indigenous plants to the project area as soon as construction is finished. | Medium |
| | Disturbance or clearance of protected plants | Construction | Negative | High (8) | Site only (1) | Long term (4) | Definite (5) | High (65) | • No protected plant should be removed, cut or disturbed without a permit from DAFF<br>• Tall Marula plants should form plant of the layout for the development<br>• All young/small plants should be bagged at an onsite nursery and replanted after completion of the construction phase. | Low |
| | Disturbance to animals on site | Construction | Negative | Low (4) | Site only (1) | Long term (4) | High (4) | Medium (36) | • Do not disturb nests, breeding sites or young ones. Do not attempt to kill or capture snakes unless directly threatening the safety of employees.<br>• Any animal found on site must be taken offsite and released to the Sterkwater nature reserve<br>• The ECO must conduct regular site inspections of removing any snares or traps that have been erected.<br>• 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. | Low |
| | Increased soil erosion, increase in silt loads and sedimentation | Construction | Negative | Moderate (6) | Local (2) | Long term (4) | Definite (5) | High (60) | • Following construction, rehabilitation of disturbed areas is required; especially next to the drainage lines the loop crosses.<br>• Place silt traps during construction to prevent silt from entering the Soutpanspruit River.<br>• Construction should not take place during rainy days | Low |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Establishment and spread of declared weeds | Construction and Maintenance | Negative | High (8) | Site only (1) | Long term (4) | Definite (5) | High (65) | • The best mitigation measure for alien and invasive species is the early detection and eradication of these species which will be ensured with the use of a monitoring programme.<br>• An alien invasive management programme should be developed and implemented in order to control alien invasive species | Low |
| Waste generation | Pollution due to oil and fuel spills, erosion, and ablution facilities. | Construction and Maintenance | Negative | High (8) | Local (2) | Long term (4) | Definite (5) | High (70) | • Proper ablution facilities on site must be provided.<br>• Constant rehabilitation of erosion problems.<br>• Proper storage facilities of construction materials.<br>• Waste management is very important. Proper storage and removal strategy must be in place.<br>• Proper Standard Operating Procedures in place regulating refueling and other potential polluting activities.<br>• Must have rehabilitation strategy as part of EMP such as a clean-up plan/strategy if spills occur and proper facilities (ablution) to ensure no sewerage spills into drainage lines and streams. | Low |
| | Pollution due to construction waste (such as cement paper, steel and rubble) | Construction | Negative | High (8) | Local (2) | Medium Term (3) | Medium (4) | Medium (52) | • Use a licensed waste contractor to dispose of any waste generated on site<br>• Do not bury wastes on-site. | Low |

# 8. CONCLUSION AND RECOMMENDATIONS

Based on Mucina & Rutherford's (2006) classification of South Africa's vegetation, the proposed project area falls in the Central Sandy Bushveld, which according to those authors, is regarded as Vulnerable. A site survey was conducted and the floral and faunal composition of the area determined and it was concluded that major impacts associated with the development are likely to occur during the construction phase of the development, with operational phase impacts generally being very low on account of the low disturbance levels likely to be generated at this time. Many of the construction phase impacts can be fully mitigated as they are unavoidable consequences of the development, but they can be mitigated accordingly.

Important mitigation recommendations associated with the proposed development would include ensuring that the disturbed footprint is kept to a minimum, and ensuring compliance to the recommended mitigation measures by any contractors (project proponent) used on the project. It is recommended that the management measures stipulated in this report be included into the proposed projects official EMP and that these are assessed for efficacy during all phases of the project and adapted accordingly to ensure minimal disturbance of the study areas' ecology.

Other specific conclusions and recommendations are listed below.

- All licenses must be obtained prior to construction;
- All ablution facilities must be placed far away from the water bodies including their buffer zone;
- Where possible, construction along water bodies should proceed during the dry winter months (low or zero flow periods) in order to limit the potential for erosion linked to high runoff rates; and
- Ensure active re-vegetation of cleared areas not used for construction as being important in-order to limit erosion potential.

Provided that the mitigation measures as suggested can be implemented, Naledzani Environmental Services including the author of the report does support the proposed development as the overall impact of the development components would be of low overall significance.

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# APPENDIX A: PLANT SPECIES LIST RECORDED

| Species name | Common name |
|---|---|
| *Acacia burkei* | Black Monkey Thorn |
| *Acacia karoo* | Sweet thorn |
| *Acacia robusta* | Broadpod robust thorn |
| *Agathisanthemum bojeri* | |
| *Agave sisalana* | Sisal |
| *Aloe greatheadii* | Spotted aloe |
| *Amaranthus hybridus* | Slim amaranth |
| *Andropogon appendiculatus* | Vlei bluestem |
| *Andropogon eucomus* | Snowflake Grass |
| *Anthephora pubescens* | Wool grass |
| *Argemone Mexicana* | Mexican prickly poppy |
| *Aristida acabrivals* | Asgaaisteekgras |
| *Arundo donax* | Giant reed |
| *Asparagus cooperi* | Haakdoring |
| *Bauhinia galpinii* | Pride of De Kaap |
| *Bidens Pilosa* | Black jack |

| | |
|---|---|
| *Combretum apiculatum* | Red bushwillow |
| *Combretum zeyheri* | Large-fruited bushwillow |
| *Commelina Africana* | Yellow commelina |
| *Conyza bonariensis* | Horseweed |
| *Conyza canadensis* | Horseweed; Fleabane |
| *Cosmos bipinnatus* | Cosmos |
| Cyperus *rupestris* | Bermuda grass |
| *Datura ferox* | Large thorn apple |
| *Datura Stramonium* | Jimsonweed or devil's snare |
| *Dichrostachys cinerea* | Sickle bush |
| *Elionurus muticus* | Wire lemon grass |
| *Eragrostis curvula* | Love grass |
| *Eragrostis nindensis* | Perennial Love grass |
| *Eragrostis plana* | Tough love grass |
| *Grewia bicolor* | White raisin |
| *Gymnosporia senegalensis* | Spikethorn |
| *Hyparrhenia hirta* | Thatching grass |

| | |
|---|---|
| *Hyperthelia dissolute* | Boontjietamboekiegras |
| *Ipomea purpurea* | Morning glory |
| *Lantana camara* | Bird's brandy; cherry pie; tick-berry |
| *Lippia javanica* | Lemon bush |
| *Loudetia simplex* | Russet grass |
| *Melia azedarach* | Syringa |
| *Melinis repens* | Rose Natal grass, or simply Natal grass |
| *Melinis repens* | Rose Natal grass, or simply Natal grass |
| *Opuntia ficus-indica* | Prickly pear |
| *Panicum coloratum* | Blue panic-grass |
| *Panicum maximum* | Guinea grass |
| *Perotis patens* | Cats tail grass |
| *Rhus leptodictya* | Mountain karee |
| *Ricinus communis* | Castor oil plant |
| *Rubus idaeus* | Red raspberry |
| *Schmidtia papophoroides* | Sand quick grass |
| *Sclerocarya birrea* | Marula |

| | |
|---|---|
| *Setaria incrassate* | Purple pigeon grass |
| *Solanum mariantanum* | Bug weed |
| *Sporobolus africanus* | Parramatta grass |
| *Tephrosia capensis* | Rothmannia |
| *Terminalia sericea* | Silver cluster-leaf |
| *Themeda triandra* | Red grass |
| *Trachypogon spicatus* | Giant spear grass |
| *Typha capensis* | Bulrush |
| *Urochloa mosambicens* | Bushveld signal grass |
| *Verbena bonariensis* | Red grass |
| *Xanthium strumarium* | Large cocklebur |
| *Xerophyta retinervis* | Black-stick lily |

# APPENDIX B: BIRDS SPECIES RECORDED ON THE QUARTER DEGREE GRID CELL (2528 CA)

| Species name | Taxonomic name |
|---|---|
| Apalis, Bar-throated | *Apalis thoracica* |
| Avocet, Pied | *Recurvirostra avosetta* |
| Babbler, Arrow-marked | *Turdoides jardineii* |
| Barbet, Acacia Pied | *Tricholaema leucomelas* |
| Barbet, Black-collared | *Lybius torquatus* |
| Barbet, Crested | *Trachyphonus vaillantii* |
| Batis, Chinspot | *Batis molitor* |
| Bee-eater, Blue-cheeked | *Merops persicus* |
| Bee-eater, European | *Merops apiaster* |
| Bee-eater, Little | *Merops pusillus* |
| Bee-eater, Southern Carmine | *Merops nubicoides* |
| Bee-eater, White-fronted | *Merops bullockoides* |
| Bishop, Southern Red | *Euplectes orix* |

| | |
|---|---|
| Bishop, Yellow | *Euplectes capensis* |
| Bishop, Yellow-crowned | *Euplectes afer* |
| Bittern, Dwarf | *Ixobrychus sturmii* |
| Bokmakierie, Bokmakierie | *Telophorus zeylonus* |
| Boubou, Southern | *Laniarius ferrugineus* |
| Brubru, Brubru | *Nilaus afer* |
| Buffalo-weaver, Red-billed | *Bubalornis niger* |
| Bulbul, African Red-eyed | *Pycnonotus nigricans* |
| Bulbul, Dark-capped | *Pycnonotus tricolor* |
| Bunting, Cape | *Emberiza capensis* |
| Bunting, Cinnamon-breasted | *Emberiza tahapisi* |
| Bunting, Golden-breasted | *Emberiza flaviventris* |
| Bush-shrike, Grey-headed | *Malaconotus blanchoti* |
| Bush-shrike, Orange-breasted | *Telophorus sulfureopectus* |
| Buzzard, Jackal | *Buteo rufofuscus* |

| | |
|---|---|
| Buzzard, Lizard | *Kaupifalco monogrammicus* |
| Buzzard, Steppe | *Buteo vulpinus* |
| Camaroptera, Green-backed | *Camaroptera brachyura* |
| Camaroptera, Grey-backed | *Camaroptera brevicaudata* |
| Canary, Black-throated | *Crithagra atrogularis* |
| Canary, Yellow-fronted | *Crithagra mozambicus* |
| Chat, Anteating | *Myrmecocichla formicivora* |
| Chat, Familiar | *Cercomela familiaris* |
| Cisticola, Cloud | *Cisticola textrix* |
| Cisticola, Desert | *Cisticola aridulus* |
| Cisticola, Lazy | *Cisticola aberrans* |
| Cisticola, Levaillant's | *Cisticola tinniens* |
| Cisticola, Rattling | *Cisticola chiniana* |
| Cisticola, Wailing | *Cisticola lais* |
| Cisticola, Wing-snapping | *Cisticola ayresii* |

| | |
|---|---|
| Cisticola, Zitting | *Cisticola juncidis* |
| Cliff-chat, Mocking | *Thamnolaea cinnamomeiventris* |
| Cliff-swallow, South African | *Hirundo spilodera* |
| Coot, Red-knobbed | *Fulica cristata* |
| Cormorant, Reed | *Phalacrocorax africanus* |
| Cormorant, White-breasted | *Phalacrocorax carbo* |
| Coucal, Burchell's | *Centropus burchellii* |
| Coucal, White-browed | *Centropus superciliosus* |
| Courser, Temminck's | *Cursorius temminckii* |
| Crake, African | *Crecopsis egregia* |
| Crake, Black | *Amaurornis flavirostris* |
| Crane, Blue | *Anthropoides paradiseus* |
| Crombec, Long-billed | *Sylvietta rufescens* |
| Crow, Cape | *Corvus capensis* |
| Crow, Pied | *Corvus albus* |

| | |
|---|---|
| Cuckoo, African | *Cuculus gularis* |
| Cuckoo, Black | *Cuculus clamosus* |
| Cuckoo, Diderick | *Chrysococcyx caprius* |
| Cuckoo, Great Spotted | *Clamator glandarius* |
| Cuckoo, Jacobin | *Clamator jacobinus* |
| Cuckoo, Klaas's | *Chrysococcyx klaas* |
| Cuckoo, Levaillant's | *Clamator levaillantii* |
| Cuckoo, Red-chested | *Cuculus solitarius* |
| Cuckoo-shrike, Black | *Campephaga flava* |
| Darter, African | *Anhinga rufa* |
| Dove, Laughing | *Streptopelia senegalensis* |
| Dove, Namaqua | *Oena capensis* |
| Dove, Red-eyed | *Streptopelia semitorquata* |
| Dove, Rock | *Columba livia* |
| Drongo, Fork-tailed | *Dicrurus adsimilis* |

| | |
|---|---|
| Duck, African Black | *Anas sparsa* |
| Duck, Comb | *Sarkidiornis melanotos* |
| Duck, Fulvous | *Dendrocygna bicolor* |
| Duck, Mallard | *Anas platyrhynchos* |
| Duck, White-backed | *Thalassornis leuconotus* |
| Duck, White-faced | *Dendrocygna viduata* |
| Duck, Yellow-billed | *Anas undulata* |
| Eagle, Booted | *Aquila pennatus* |
| Eagle, Tawny | *Aquila rapax* |
| Eagle, Verreaux's | *Aquila verreauxii* |
| Eagle, Wahlberg's | *Aquila wahlbergi* |
| Eagle-owl, Spotted | *Bubo africanus* |
| Eagle-owl, Verreaux's | *Bubo lacteus* |
| Egret, Cattle | *Bubulcus ibis* |
| Egret, Great | *Egretta alba* |

| | |
|---|---|
| Egret, Little | *Egretta garzetta* |
| Egret, Yellow-billed | *Egretta intermedia* |
| Eremomela, Burnt-necked | *Eremomela usticollis* |
| Eremomela, Yellow-bellied | *Eremomela icteropygialis* |
| Falcon, Amur | *Falco amurensis* |
| Falcon, Lanner | *Falco biarmicus* |
| Falcon, Red-footed | *Falco vespertinus* |
| Finch, Cuckoo | *Anomalospiza imberbis* |
| Finch, Cut-throat | *Amadina fasciata* |
| Finch, Red-headed | *Amadina erythrocephala* |
| Finch, Scaly-feathered | *Sporopipes squamifrons* |
| Firefinch, African | *Lagonosticta rubricata* |
| Firefinch, Jameson's | *Lagonosticta rhodopareia* |
| Firefinch, Red-billed | *Lagonosticta senegala* |
| Fiscal, Common (Southern) | *Lanius collaris* |

| | |
|---|---|
| Fish-eagle, African | *Haliaeetus vocifer* |
| Flamingo, Greater | *Phoenicopterus ruber* |
| Flycatcher, Fairy | *Stenostira scita* |
| Flycatcher, Fiscal | *Sigelus silens* |
| Flycatcher, Marico | *Bradornis mariquensis* |
| Flycatcher, Pale | *Bradornis pallidus* |
| Flycatcher, Southern Black | *Melaenornis pammelaina* |
| Flycatcher, Spotted | *Muscicapa striata* |
| Francolin, Coqui | *Peliperdix coqui* |
| Francolin, Crested | *Dendroperdix sephaena* |
| Francolin, Shelley's | *Scleroptila shelleyi* |
| Go-away-bird, Grey | *Corythaixoides concolor* |
| Goose, Domestic | *Anser* |
| Goose, Egyptian | *Alopochen aegyptiacus* |
| Goose, Spur-winged | *Plectropterus gambensis* |

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|---|---|
| Goshawk, Gabar | *Melierax gabar* |
| Goshawk, Southern Pale Chanting | *Melierax canorus* |
| Grassbird, Cape | *Sphenoeacus afer* |
| Grebe, Great Crested | *Podiceps cristatus* |
| Grebe, Little | *Tachybaptus ruficollis* |
| Green-pigeon, African | *Treron calvus* |
| Greenshank, Common | *Tringa nebularia* |
| Guineafowl, Helmeted | *Numida meleagris* |
| Gull, Grey-headed | *Larus cirrocephalus* |
| Hamerkop, Hamerkop | *Scopus umbretta* |
| Harrier-Hawk, African | *Polyboroides typus* |
| Hawk-eagle, African | *Aquila spilogaster* |
| Hawk-eagle, Ayres's | *Aquila ayresii* |
| Helmet-shrike, White-crested | *Prionops plumatus* |
| Heron, Black | *Egretta ardesiaca* |

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|---|---|
| Heron, Black-headed | *Ardea melanocephala* |
| Heron, Goliath | *Ardea goliath* |
| Heron, Green-backed | *Butorides striata* |
| Heron, Grey | *Ardea cinerea* |
| Heron, Purple | *Ardea purpurea* |
| Heron, Squacco | *Ardeola ralloides* |
| Hobby, Eurasian | *Falco subbuteo* |
| Honeybird, Brown-backed | *Prodotiscus regulus* |
| Honeyguide, Greater | *Indicator* |
| Honeyguide, Lesser | *Indicator minor* |
| Hoopoe, African | *Upupa africana* |
| Hornbill, African Grey | *Tockus nasutus* |
| Hornbill, Damara | *Tockus damarensis* |
| Hornbill, Hybrid Damara/Red-billed | *Tockus damarensis/erythrorhynchus* |
| Hornbill, Red-billed | *Tockus erythrorhynchus* |

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|---|---|
| Hornbill, Southern Yellow-billed | *Tockus leucomelas* |
| House-martin, Common | *Delichon urbicum* |
| Ibis, African Sacred | *Threskiornis aethiopicus* |
| Ibis, Glossy | *Plegadis falcinellus* |
| Ibis, Hadeda | *Bostrychia hagedash* |
| Indigobird, Dusky | *Vidua funerea* |
| Indigobird, Village | *Vidua chalybeata* |
| Jacana, African | *Actophilornis africanus* |
| Kestrel, Greater | *Falco rupicoloides* |
| Kestrel, Lesser | *Falco naumanni* |
| Kestrel, Rock | *Falco rupicolus* |
| Kingfisher, Brown-hooded | *Halcyon albiventris* |
| Kingfisher, Giant | *Megaceryle maximus* |
| Kingfisher, Half-collared | *Alcedo semitorquata* |
| Kingfisher, Malachite | *Alcedo cristata* |

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|---|---|
| Kingfisher, Pied | *Ceryle rudis* |
| Kingfisher, Striped | *Halcyon chelicuti* |
| Kingfisher, Woodland | *Halcyon senegalensis* |
| Kite, Black | *Milvus migrans* |
| Kite, Black-shouldered | *Elanus caeruleus* |
| Kite, Yellow-billed | *Milvus aegyptius* |
| Korhaan, Northern Black | *Afrotis afraoides* |
| Korhaan, Red-crested | *Lophotis ruficrista* |
| Lapwing, African Wattled | *Vanellus senegallus* |
| Lapwing, Blacksmith | *Vanellus armatus* |
| Lapwing, Crowned | *Vanellus coronatus* |
| Lark, Agulhas Long-billed | *Certhilauda brevirostris* |
| Lark, Benguela Long-billed | *Certhilauda benguelensis* |
| Lark, Cape Long-billed | *Certhilauda curvirostris* |
| Lark, Eastern Clapper | *Mirafra fasciolata* |

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|---|---|
| Lark, Eastern Long-billed | *Certhilauda semitorquata* |
| Lark, Fawn-coloured | *Calendulauda africanoides* |
| Lark, Flappet | *Mirafra rufocinnamomea* |
| Lark, Karoo Long-billed | *Certhilauda subcoronata* |
| Lark, Red-capped | *Calandrella cinerea* |
| Lark, Rufous-naped | *Mirafra africana* |
| Lark, Sabota | *Calendulauda sabota* |
| Longclaw, Cape | *Macronyx capensis* |
| Mannikin, Bronze | *Spermestes cucullatus* |
| Marsh-harrier, African | *Circus ranivorus* |
| Martin, Banded | *Riparia cincta* |
| Martin, Brown-throated | *Riparia paludicola* |
| Martin, Rock | *Hirundo fuligula* |
| Martin, Sand | *Riparia* |
| Masked-weaver, Lesser | *Ploceus intermedius* |

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|---|---|
| Masked-weaver, Southern | *Ploceus velatus* |
| Moorhen, Common | *Gallinula chloropus* |
| Mousebird, Red-faced | *Urocolius indicus* |
| Mousebird, Speckled | *Colius striatus* |
| Mousebird, White-backed | *Colius* |
| Myna, Common | *Acridotheres tristis* |
| Neddicky, Neddicky | *Cisticola fulvicapilla* |
| Night-Heron, Black-crowned | *Nycticorax* |
| Nightjar, Fiery-necked | *Caprimulgus pectoralis* |
| Nightjar, Freckled | *Caprimulgus tristigma* |
| Olive-pigeon, African | *Columba arquatrix* |
| Oriole, Black-headed | *Oriolus larvatus* |
| Oriole, Eurasian Golden | *Oriolus* |
| Ostrich, Common | *Struthio camelus* |
| Owl, Barn | *Tyto alba* |

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|---|---|
| Owl, Marsh | *Asio capensis* |
| Owlet, Pearl-spotted | *Glaucidium perlatum* |
| Painted-snipe, Greater | *Rostratula benghalensis* |
| Palm-swift, African | *Cypsiurus parvus* |
| Paradise-flycatcher, African | *Terpsiphone viridis* |
| Paradise-whydah, Long-tailed | *Vidua paradisaea* |
| Parakeet, Rose-ringed | *Psittacula krameri* |
| Parrot, Meyer's | *Poicephalus meyeri* |
| Peacock, Common | *Pavo cristatus* |
| Penduline-tit, Cape | *Anthoscopus minutus* |
| Penduline-tit, Grey | *Anthoscopus caroli* |
| Petronia, Yellow-throated | *Petronia superciliaris* |
| Pigeon, Speckled | *Columba guinea* |
| Pipit, African | *Anthus cinnamomeus* |
| Pipit, Buffy | *Anthus vaalensis* |

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|---|---|
| Pipit, Long-billed | *Anthus similis* |
| Pipit, Plain-backed | *Anthus leucophrys* |
| Pipit, Striped | *Anthus lineiventris* |
| Plover, Kittlitz's | *Charadrius pecuarius* |
| Plover, Three-banded | *Charadrius tricollaris* |
| Pochard, Southern | *Netta erythrophthalma* |
| Prinia, Black-chested | *Prinia flavicans* |
| Prinia, Tawny-flanked | *Prinia subflava* |
| Puffback, Black-backed | *Dryoscopus cubla* |
| Pygmy-Kingfisher, African | *Ispidina picta* |
| Pytilia, Green-winged | *Pytilia melba* |
| Quail, Common | *Coturnix* |
| Quail, Harlequin | *Coturnix delegorguei* |
| Quailfinch, African | *Ortygospiza atricollis* |
| Quelea, Red-billed | *Quelea* |

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|---|---|
| Reed-warbler, African | *Acrocephalus baeticatus* |
| Reed-warbler, Great | *Acrocephalus arundinaceus* |
| Robin-chat, Cape | *Cossypha caffra* |
| Robin-chat, White-throated | *Cossypha humeralis* |
| Rock-thrush, Cape | *Monticola rupestris* |
| Roller, European | *Coracias garrulus* |
| Roller, Lilac-breasted | *Coracias caudatus* |
| Roller, Purple | *Coracias naevius* |
| Ruff, Ruff | *Philomachus pugnax* |
| Rush-warbler, Little | *Bradypterus baboecala* |
| Sandgrouse, Double-banded | *Pterocles bicinctus* |
| Sandpiper, Common | *Actitis hypoleucos* |
| Sandpiper, Curlew | *Calidris ferruginea* |
| Sandpiper, Marsh | *Tringa stagnatilis* |
| Sandpiper, Wood | *Tringa glareola* |

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|---|---|
| Scimitarbill, Common | *Rhinopomastus cyanomelas* |
| Scops-owl, African | *Otus senegalensis* |
| Scrub-robin, Kalahari | *Cercotrichas paena* |
| Scrub-robin, White-browed | *Cercotrichas leucophrys* |
| Secretarybird, Secretarybird | *Sagittarius serpentarius* |
| Seedeater, Streaky-headed | *Crithagra gularis* |
| Shelduck, South African | *Tadorna cana* |
| Shikra, Shikra | *Accipiter badius* |
| Shoveler, Cape | *Anas smithii* |
| Shrike, Crimson-breasted | *Laniarius atrococcineus* |
| Shrike, Lesser Grey | *Lanius minor* |
| Shrike, Magpie | *Corvinella melanoleuca* |
| Shrike, Red-backed | *Lanius collurio* |
| Snake-eagle, Black-chested | *Circaetus pectoralis* |
| Snipe, African | *Gallinago nigripennis* |

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|---|---|
| Sparrow, Cape | *Passer melanurus* |
| Sparrow, Great | *Passer motitensis* |
| Sparrow, House | *Passer domesticus* |
| Sparrow, Northern Grey-headed | *Passer griseus* |
| Sparrow, Southern Grey-headed | *Passer diffusus* |
| Sparrow-weaver, White-browed | *Plocepasser mahali* |
| Sparrowhawk, Black | *Accipiter melanoleucus* |
| Sparrowhawk, Little | *Accipiter minullus* |
| Sparrowhawk, Ovambo | *Accipiter ovampensis* |
| Sparrowlark, Chestnut-backed | *Eremopterix leucotis* |
| Sparrowlark, Grey-backed | *Eremopterix verticalis* |
| Spoonbill, African | *Platalea alba* |
| Spurfowl, Natal | *Pternistis natalensis* |
| Spurfowl, Swainson's | *Pternistis swainsonii* |
| Starling, Cape Glossy | *Lamprotornis nitens* |

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|---|---|
| Starling, Pied | *Spreo bicolor* |
| Starling, Red-winged | *Onychognathus morio* |
| Starling, Violet-backed | *Cinnyricinclus leucogaster* |
| Starling, Wattled | *Creatophora cinerea* |
| Stilt, Black-winged | *Himantopus* |
| Stint, Little | *Calidris minuta* |
| Stonechat, African | *Saxicola torquatus* |
| Stork, Abdim's | *Ciconia abdimii* |
| Stork, Black | *Ciconia nigra* |
| Stork, Marabou | *Leptoptilos crumeniferus* |
| Stork, White | *Ciconia* |
| Stork, Yellow-billed | *Mycteria ibis* |
| Sunbird, Amethyst | *Chalcomitra amethystina* |
| Sunbird, Greater Double-collared | *Cinnyris afer* |
| Sunbird, Malachite | *Nectarinia famosa* |

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|---|---|
| Sunbird, Marico | *Cinnyris mariquensis* |
| Sunbird, White-bellied | *Cinnyris talatala* |
| Swallow, Barn | *Hirundo rustica* |
| Swallow, Greater Striped | *Hirundo cucullata* |
| Swallow, Lesser Striped | *Hirundo abyssinica* |
| Swallow, Pearl-breasted | *Hirundo dimidiata* |
| Swallow, Red-breasted | *Hirundo semirufa* |
| Swallow, White-throated | *Hirundo albigularis* |
| Swamp-warbler, Lesser | *Acrocephalus gracilirostris* |
| Swamphen, African Purple | *Porphyrio madagascariensis* |
| Swift, African Black | *Apus barbatus* |
| Swift, Alpine | *Tachymarptis melba* |
| Swift, Common | *Apus* |
| Swift, Horus | *Apus horus* |
| Swift, Little | *Apus affinis* |

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|---|---|
| Swift, White-rumped | *Apus caffer* |
| Tchagra, Black-crowned | *Tchagra senegalus* |
| Tchagra, Brown-crowned | *Tchagra australis* |
| Teal, Cape | *Anas capensis* |
| Teal, Hottentot | *Anas hottentota* |
| Teal, Red-billed | *Anas erythrorhyncha* |
| Tern, Whiskered | *Chlidonias hybrida* |
| Tern, White-winged | *Chlidonias leucopterus* |
| Thick-knee, Spotted | *Burhinus capensis* |
| Thrush, Groundscraper | *Psophocichla litsipsirupa* |
| Thrush, Karoo | *Turdus smithi* |
| Thrush, Kurrichane | *Turdus libonyanus* |
| Thrush, Olive | *Turdus olivaceus* |
| Tinkerbird, Yellow-fronted | *Pogoniulus chrysoconus* |
| Tit, Ashy | *Parus cinerascens* |

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|---|---|
| Tit, Southern Black | *Parus niger* |
| Tit-babbler, Chestnut-vented | *Parisoma subcaeruleum* |
| Turtle-dove, Cape | *Streptopelia capicola* |
| Vulture, Cape | *Gyps coprotheres* |
| Wagtail, African Pied | *Motacilla aguimp* |
| Wagtail, Cape | *Motacilla capensis* |
| Wagtail, Yellow | *Motacilla flava* |
| Warbler, Garden | *Sylvia borin* |
| Warbler, Icterine | *Hippolais icterina* |
| Warbler, Marsh | *Acrocephalus palustris* |
| Warbler, Sedge | *Acrocephalus schoenobaenus* |
| Warbler, Willow | *Phylloscopus trochilus* |
| Waxbill, Black-faced | *Estrilda erythronotos* |
| Waxbill, Blue | *Uraeginthus angolensis* |
| Waxbill, Common | *Estrilda astrild* |

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|---|---|
| Waxbill, Orange-breasted | *Amandava subflava* |
| Waxbill, Violet-eared | *Granatina* |
| Weaver, Cape | *Ploceus capensis* |
| Weaver, Thick-billed | *Amblyospiza albifrons* |
| Weaver, Village | *Ploceus cucullatus* |
| Wheatear, Capped | *Oenanthe pileata* |
| Wheatear, Mountain | *Oenanthe monticola* |
| White-eye, Cape | *Zosterops virens* |
| White-eye, Orange River | *Zosterops pallidus* |
| Whitethroat, Common | *Sylvia communis* |
| Whydah, Pin-tailed | *Vidua macroura* |
| Whydah, Shaft-tailed | *Vidua regia* |
| Widowbird, Long-tailed | *Euplectes progne* |
| Widowbird, Red-collared | *Euplectes ardens* |
| Widowbird, White-winged | *Euplectes albonotatus* |

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|---|---|
| Wood-dove, Emerald-spotted | *Turtur chalcospilos* |
| Wood-hoopoe, Green | *Phoeniculus purpureus* |
| Woodpecker, Bearded | *Dendropicos namaquus* |
| Woodpecker, Cardinal | *Dendropicos fuscescens* |
| Woodpecker, Golden-tailed | *Campethera abingoni* |
| Wren-warbler, Barred | *Calamonastes fasciolatus* |
| Wryneck, Red-throated | *Jynx ruficollis* |

# APPENDIX C: SITE SENSITIVITY MAP

