

Bateleur Environmental Services



Ecological Report

Proposed Upgrade of Existing Municipal Sewerage Treatment Plant, Roerfontein 161 - LT, Senwamokgope, Limpopo Province.

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May 2010



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1. Assignment

Mr. J. Moller and F. Viljoen of Bateleur Environmental Services (BES) were appointed by Polygon Environmental Planners (PEP) for specialist input in the form of an Ecological Assessment.

This ecological report will form part of an Environmental Impact Assessment (EIA) process being conducted by PEP for the proposed upgrading of the existing Senwamokgope sewerage treatment plant on part of the farm Roerfontein 161 – LT, Senwamokgope, Limpopo Province. The property is approximately 1 ha in extent.

BES has no vested interest in the proposed development.

2. Background

The following services were to be rendered by BES:

- a) Literature study.
- b) Terrain and soil survey.
- c) Fauna and flora assessment.
- d) Protected species assessment.
- e) Ecological sensitivity and ecological health survey.
- f) Identification of potential impacts on the applicable environment.
- g) Measures for the mitigation of impacts on the applicable environment.

3. Environmental Management per Definition

Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option while promoting sustainability.

4. Introduction

THE ENVIRONMENT

Section 24 of the Constitution of RSA enshrines the right to – the Environment

Everyone has the right —

1. to an environment that is not harmful to their health or well-being; and
2. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that —
 - a) prevent pollution and ecological degradation;
 - b) promote conservation; and
 - c) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
3. Sustainable development requires the consideration of all relevant factors including the following:
 - a) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimized and remedied;
 - b) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimized and remedied;
 - c) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimized and remedied;
 - d) that waste is avoided, or where it cannot be altogether avoided, minimized and reused or recycled where possible and otherwise disposed of in a responsible manner;
 - e) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
 - f) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardized;
 - g) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
 - h) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimized and remedied.

5. Study Area

Location

The site is found within the Senwamokgope area on a portion of the farm Roerfontein161 - LT, which is situated on the eastern side of the R 81 when traveling from Lemondokop to Senwamokgope. The property can be accessed by turning into the Sekgosese Secondary Science and Technology School on right and following a two-track to the Sewerage Plant. The GPS coordinates for the site entrance is at S 23°24'16.2" and E 30°10'08.9" respectively with an altitude of approximately 600m – 650m above sea level.

Figure 1



Senwamokgape Sewerage Treatment Plant



The site as seen from the entrance.

6. Description of ecology

SVI 8 TZANEEN SOUR BUSHVELD

Distribution:

Limpopo Province: A band extending along the foot-slopes and hills of the north-eastern escarpment, from the Soutpansberg Mountains in the north via Tzaneen and narrowing to the Abel Erasmus Pass area in the south. Altitude 600-1000 m and higher in places.

Vegetation & Landscape Features:

Deciduous, tall open bushveld (parkland) with a well developed, tall grass layer, occurring on the low to high mountains with undulating plains mainly at the base of, and on the lower to middle slopes of the north-eastern escarpment.

Lithology, Geology & Soil:

The potassium-poor gneisses of the Goudplaats gneiss (Swazian Erathem) and an Archaean granite dyke underlie most of this area. Shales and quartzite of the Wolkberg Group are present, but not common. Soils are Mispah, Glenrosa or Hutton forms, shallow to deep, sandy or gravelly and well drained. Land types Fa, Ab, Ae and La.

Erosion and the erosion potential of the area varies from site to site depending on factors such as slope, rainfall, habitat disturbance, land-use etc.

Climate:

Summer rainfall with dry winters. M.A.P. from about 550 mm on the foot slopes of the escarpment in the east to about 1000 mm, where it borders grassland at higher altitudes. Mean monthly maximum and minimum temperatures for Tzaneen 36.4°C and 3.9°C for January and June, respectively. Corresponding values for Levubu-Agr 36.4°C and 5.7°C for October and July, respectively.

Important Taxonomy

Tall Trees:

Pterocarpus angolensis, *Sclerocarya birrea* subsp. *Caffra*.

Small Trees:

Acacia polyacantha, *Albizia versicolor*, *Ficus sansibarica*, *Parinari curatellifolia*, *Piliostigma thonningii*, *Pterocarpus rotundifolius*, *Trichillia emetica*, *Acacia davyi*, *Acacia sieberiana* var. *woodii*, *Antidesma venosum*, *Catha edulis*, *Faurea richetiana*, *Faurea saligna*, *Ficus burkei*, *Ficus petersii*, *Heteropyxis natalensis*, *Peltrophorum africanum*, *Terminalia sericea*, *Vernonia colorata*.

Tall Shrubs:

Olea europaea subsp. *africana*, *Pseudarthria hookeri* var. *hookeri*, *Rhus pentheri*, *Triumfetta pilosa* var. *tomentosa*.

Low Shrubs:

Agathisanthemum bojeri, *Barleria elegans*, *Dicliptera clinopodia*, *Flemingia grahamiana*, *Indigofera filipes*, *Polygala producta*.

Woody Climbers:

Bauhinia galpinii, *Pterolobium stellatum*.

Graminoids:

Cybopogon caesius, *Cybopogon nardus*, *Hyparrhenia cymbaria*, *Hyparrhenia poecilotracha*, *Hyperthelia dissolute*, *Alloteropsis semialata* subsp. *semialata*, *Andropogon schirensis*, *Bothriocloa bladhii*, *Monocymbium ceresiiforme*, *Paspalum scrobiculatum*, *Schizachyrium sanguineum*, *Themeda triandra*.

Herbs:

Waltheria indica.

Conservation Status:

Endangered. Targeted conservation percentage 19%. Only a little over 1% statutorily conserved, almost all in the Lekgalameetse Nature Reserve, and about 2% conserved in private Nature Reserves such as the Selati Game Reserve and the Wolkberg (Serala) Wilderness Area. About 41% transformed mainly because of cultivation (29%) and plantations (9%). The higher-lying parts of this unit have been heavily afforested with tree plantations while the lower-lying areas are under agricultural and horticultural crops. (Please see appendix)

Scattered alien plants include *Solanum mauritianum*, *Melea azedarach* and *Caesalpinia decapetala*. The subtropical climate is conducive to the spread of *Cromolaena odorata*, *Lantana camara* and *Psidium guajava*.

Remarks:

This unit has several subtropical elements such as *Acacia polyacantha* and *Trichillia emetica*. It is very similar to SVI 9 Legogote Sour Bushveld, but the latter has a cooler climate and different floristic elements. At places on the footslopes, this vegetation becomes very dense and is transitional to forest in kloofs on the eastern slopes of the Drakensberg. *Acacia ataxacantha* and *Trema orientalis* are prominent pioneer species here. This unit is also rich in fig species.

7. Method

General.

Relevant books, maps and species lists had to be obtained or compiled for the specific environment. After careful planning a practical survey was conducted. Data was collected and incorporated with the literature study in order to create a holistic picture of the specific environment. From thereon specific impacts could be identified and mitigating strategies set in place in order to reach an ecological conclusion on the proposed development.

GPS points, points of interest and Photo points.

With the initial assessment GPS points were taken at main points of interest such as the entrance, typical vegetation units, tracks, borders of the property and soil survey sites. Photos were taken to form visual evidence for later referral.

Transects; Trees, Grasses and Forbs.

Set transects were walked in order to identify grass, tree and forb species respectively. Species were recorded and data analysed afterwards. Alien invasive species were also identified.

Fauna.

A search for tracks and signs of fauna was conducted. The tracks and signs that were found supported relevant literature. A real-time assessment was made for mammal, amphibian, arachnid, insect, bird and reptile species.

Soil samples.

A soil auger was used to drill into the soil up to the depth of roughly 0.5 to 1.2 meters. The samples were laid out in order, analysis was made and soil type recorded. Certain aspects such as where to drill in order to attain a representative sample, soil erodability and clay percentage were taken into account.

Desktop survey

A desktop survey was conducted on the specific area. Information regarding Protected Species, geology and soils, climate, vegetation, fauna and flora were obtained using relevant literature as referred to in the reference section.

8. Results

Soil survey

Soils that were analysed were found to be that of Glenrosa and Witbank soil forms. Soil samples were taken to be representative of the whole site. The soils correspond well with the vegetation unit that was found, soils are further discussed in the mitigation and appendix sections of this report.

Vegetation Survey

Literature survey

This part of the survey is thoroughly covered in the introduction of this document. The results that were found in the site surveys are on par with that which were found in the literature survey. Relevant tree, forb and grass lists including alien invasive plants are discussed below and included in the appendix section of this document.

Site survey

Only one plant community was identified on site. Because of the small size of the site, the perimeter was also surveyed in order to attain a more realistic picture of the natural background of this area. The plant community was divided into five vegetation units and classed according to the sensitivity of each.

Prominent grass species for the site included:

Urochloa mosambicensis, *Digitaria eriantha*, *Heteropogon contortus*, *Melinis repens*, *Panicum maximum*, *Cynodon dactylon*, *Aristida canescens* and *Eragrostis rigidior*

Prominent tree species for the site included:

Dichrostachys cinerea, *Peltophorum africanum*, *Sclerocarya birrea*, *Ziziphus mucronata*, *Combretum apiculatum*, *Euclea divinorum*, *Diospyros mespiliformes*, *Acacia nigrescens*, *Terminalia sericea* and *Philenoptera violacea*.

Prominent forbs / flowering plants for the site included:

Waltheria indica, *Bidens pilosa*, *Oxalis obliquifolia*, *Vernonia galpinii*, *Asparagus africanus* and *Indigofera confusa*

Assessment of the current condition of vegetation on site

The current vegetation on sites ranges from degraded to natural.

Vegetation Map

Vegetation unit 1

Diospyros mespiliforme, Philenoptera violacea, Natural undisturbed veld.

Vegetation unit 2

Artificial wetland- overflow dams

Vegetation unit 3

Grass covered areas in between dams.

Vegetation unit 4

Water body-raw sewerage mixed with water.

Vegetation unit 5

Riparian vegetation.

Fauna Survey

Literature survey

The literature survey was found to be on par with the site survey in terms of species, tracks and signs that were found. Species lists were drawn up for mammals, birds, snakes, other reptiles and amphibians.

Site survey and evaluation of habitat and potential presence of fauna

By studying the habitat of the site, one could with fair accuracy determine the species which would occur on site. Because of the degraded ecosystem, biodiversity was found to be relatively low and as such very few species would actually occur on site.

9. Protected species

Protected Species Lists Senwamokgope

Plants

Protected tree species published in the National Forest Act 84 that were found on the site were:

- Apple leaf (Philenoptera violacea) and
- Marula (Sclerocarya birrea).

These species are not to be removed without relevant permits.

Amphibians

No red data frog species occur in the particular area.

Mammals

Table 1: List of mammals.

Scientific Name	Common Name	Conservation Status	Probability of occurrence
<i>Manis temmincki</i>	Pangolin	Vulnerable	Low
<i>Crocuta crocuta</i>	Spotted Hyaena	Protected	Low
<i>Parahyaena brunnea</i>	Brown Hyaena	Protected	Low
<i>Mellivora capensis</i>	Honey Badger	Protected	Low

Reptiles

Table 2: List of reptiles.

Scientific Name	Common Name	Conservation Status	Probability of occurrence
<i>Python natalensis</i>	African Rock Python	Protected	Low

Birds

Table 3: List of birds.

Scientific Name	Common Name	Conservation Status	Probability of occurrence
<i>Ephippiorhynchus senegalensis</i>	Saddle-billed Stork	Endangered	Low
<i>Necrosyrtes monachus</i>	Hooded Vulture	Endangered	Low
<i>Gyps coprotheres</i>	Cape Griffon Vulture	Endangered	Low
<i>Gyps africanus</i>	White-backed Vulture	Endangered	Low
<i>Torgos tracheliotus</i>	Lappet-faced Vulture	Endangered	Low
<i>Aquila rapax</i>	Tawny Eagle	Vulnerable	Low
<i>Terathopius ecaudatus</i>	Bateleur	Vulnerable	Low
<i>Polemaetus bellicosus</i>	Martial Eagle	Vulnerable	Low
<i>Trigonoceps occipitalis</i>	White-headed Vulture	Vulnerable	Low
<i>Tyto capensis</i>	Grass Owl	Vulnerable	Low

Total species

Table 4: List of Critically Endangered, Endangered, Vulnerable and Protected Species that could occur on site.

Type	Number
Frogs	0
Plants	2
Snakes and other reptiles	1
Birds	10
Mammals	4
Total Number	17 Species

10. Ecological Sensitivity Map

Table 5:

Sensitivity Categories	Description and Recommendation
High	Pristine areas, Ecologically very sensitive, High Biodiversity. Applied Conservation, No development.
Medium – High	Areas with special status such as heritage sites, wetlands and conservancies / tourism orientated or areas with medium - high biodiversity / fragile ecosystems. Very considerate development and environmentally friendly structures, very low impact.
Medium	Areas with natural vegetation and considerable biodiversity. Selective and Considerate development only. Low impact.
Medium – Low	Areas with neglected to degraded natural vegetation, usually in or close to urban areas. Cultivated areas. Considerate development.
Low	Ecologically degraded areas, Low Biodiversity, Little value to Conservation, usually cut off from other ecological resources. Development to be considered.

Ecological sensitivity map

Figure 2



↔ = 0.1 km

N↑

The collective ecological sensitivity for the site was rated as **Medium - Low**.

Number	Vegetation unit	Classification
1	<i>Diospyros mespiliforme</i> , <i>Philenoptera violacea</i> , Natural undisturbed veld.	Medium - Low
2	Artificial wetland- overflow dams	Low
3	Grass covered areas in between dams.	Low
4	Water body-raw sewerage mixed with water.	Low
5	Riparian vegetation.	Medium

11. Identification of potential impacts

Aspects

The following aspects could have an impact on the applicable environment:

- *Construction work*
- *Day to day operation of the proposed development*

Impacts

Construction phase

- Soil erosion
- Soil pollution
- Water pollution
- Decrease in biodiversity
- Increase in alien plants
- Minimal air pollution

Day to day operation of the proposed development

- Hazardous waste accumulation in the form of screen material
- Potential spills of raw sewerage into the nearby river system
- Soil pollution from sewerage seepage
- Surface and groundwater pollution from sewerage spills and seepage

Extent of Impacts

The impact of the establishment will have a localised impact, limited to the immediate surrounding environment of the proposed development.

Duration of Impacts

The duration of the impact will be long-term, 25 years plus.

Severity of Impacts

The severity of the impact can be rated as low.

Probability of Impacts

The probability of the impact can be reduced from a medium probability to a low probability should mitigation strategies be adhered to for the proposed establishment.

Significance of impacts

The significance of the impact on the environment is rated as medium – low, as the environment is already in a semi-degraded state.

12. Recommendations, mitigation strategies, descriptions of feasible alternatives and practical solutions for the best practicable environmental option.

The establishment

The following mitigation strategies should be adhered to during and after construction

- All alien invasive species should be eradicated on site.
- No indigenous species may be hunted or harvested without relevant permits.
- No poisons may be used without the permission of an ecologist.
- Runoff water should be managed due to the erosion potential of the site and possible pollution.
- Re-establish indigenous vegetation as soon as possible after construction.
- Appropriate signs should be put up in order to stop littering and illegal dumping.
- Construction of the establishment should take place in a considerate manner as to minimize the impact on the environment.
- An artificial wetland could be added in order to enhance the bio-remediation and the filtering processes of the final effluent. This wetland could also be combined with a stormwater attenuation pond to act as a barrier for any accidental sewerage spillages which might arise on site during heavy rains or electricity cut-offs. Please see a possible design in the appendix section of this document.
- Topsoil should be removed and stored for later use in rehabilitation of the establishment.

- Soil on steep slopes should be secured in order to actively prevent potential erosion.
- Owl boxes could be put up in order to compensate for the loss of nesting area and to better control nearby rodent populations.
- Screen material produced by the site should be treated as hazardous waste and removed or treated in a responsible manner.
- A hydrological engineer should determine the 1:50 year flood line of the river.
- All new dams should be lined with a non-permeable liner as to prevent any soil and groundwater pollution by raw sewerage.
- A borehole should be sunk in-between the river and the proposed development in order to effectively monitor for any groundwater pollution which may occur.
- Effluent water is to be tested regularly for faecal *coli*-forms, especially *E. coli*.
- Electric conductivity, total dissolved solids, pH, Nitrates, Cl and Ammonia should also be tested for. Results should comply with relevant governmental standards.

The environmental impact of sanitation

Sanitation systems should protect the environment and not harm it. Water is a scarce resource in South Africa, and it should be protected and used carefully. There are many threats of pollution where there are no sanitation systems or where they do not work properly. The worst risks are to water supplies in rivers, dams and underground sources. This in turn could cause serious health problems.

The proper operation of sanitation systems is essential to protect the environment, and must be paid for. A complicated, expensive system which is poorly maintained can be just as harmful to the environment as having no system at all.

Alien invasive species control

All alien invasive species should be cleared and follow up eradication should be done.

Category 1 species are prohibited on any land or water surface in South Africa and must be eradicated.

- *Pisidia guajava*, *Lantana camara*, *Opuntia stricta*, *Ageratum houstonianum*

Category 2 species must be eradicated outside controlled demarcated areas and are prohibited within 30m of the 1:50 year flood-line

- *Carica papaya*, *Litchi chinensis*

Category 3: Ornamental plants that may no longer be planted; existing plants may remain, as long as reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

- *Melia azedarach*

Methods of control

- (1) Where category 1, 2 or 3 plants occur contrary to the provisions of these regulations (CONSERVATION OF AGRICULTURAL RESOURCES ACT 43/1983), a land user shall control such plants by means of one or more of the following methods of control as is appropriate for the species concerned and the ecosystem in which it occurs:
 - (a) Uprooting, felling, cutting or burning;
 - (b) Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer;
 - (c) Biological control carried out in accordance with the stipulations of the Agricultural Pests Act, 1983 (Act No. 36 of 1983), the Environment Conservation Act, 1989 (Act No. 73 of 1989) and any other applicable legislation;
 - (d) Any other method of treatment recognised by the executive officer that has as its object the control of the plants concerned, subject to the provisions of sub-regulation (4);
 - (e) A combination of one or more of the methods prescribed in paragraphs (a), (b), (c), and (d), save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
- (2) The methods contemplated in sub-regulation (1) shall also be applied with regard to the propagating material and the re-growth of category 1, 2 and 3 plants in order to prevent such plants from forming seed or re-establishing in any manner.
- (3) The performance of an act of control is not in itself proof that the objects of the control methods have been achieved and follow-up operations are mandatory to achieve the appropriate level of combating.
- (4) Where uncertainty exists about the presence or efficacy of any biological control agent, a biological control expert shall be consulted.
- (5) Any action taken to control category 1, 2 and 3 plants shall be executed with caution and in a manner that will cause the least possible damage to the environment.

13. Conclusion

This specific site is already disturbed by means of previous construction activities and the presence of a sewerage treatment plant, therefore biodiversity within the site is relatively low. The upgrade can be promoted as it will responsibly deal with additional sewerage effluent from the area.

An ecological frame of mind should be kept during the upgrade. Potential impacts of the daily operation of the plant should also be considered. Water and conservation should enjoy priority. The development should be done in the most environmentally friendly manner, benefitting people and the environment.

Ecologically, there is no reason for the establishment not to continue as long as recommendations are taken into account and mitigation strategies adhered to and sustained.

14. Document limitations

This document has been prepared for the particular purpose as described in the assignment section. No responsibility will be accepted by BES for any use outside of context. BES did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in this document. Conditions may exist which were undetectable given the limited nature of the enquiry with respect to the site. In addition it is recognised that the passage of time affects the information and assessment provided in this document. BES opinions are based upon information that existed at the time of production of this document. Where data supplied by the client or any other external sources have been used, it has been assumed that the information is correct unless otherwise stated. Any assessments made in this document are based on the conditions indicated from published sources and the investigation described. Although BES has gone through reasonable lengths to ensure the accuracy, integrity and reliability of information in this document, no warranty is included, either expressed or implied, that the actual conditions will conform exactly to the assessments contained in this document.

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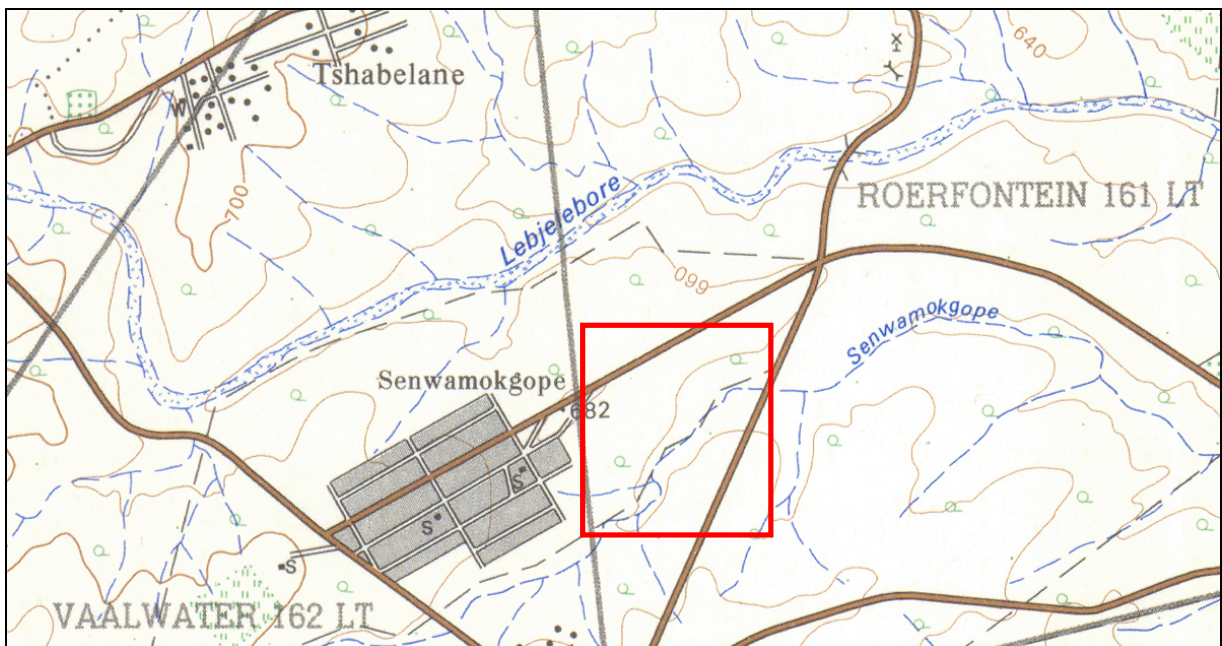
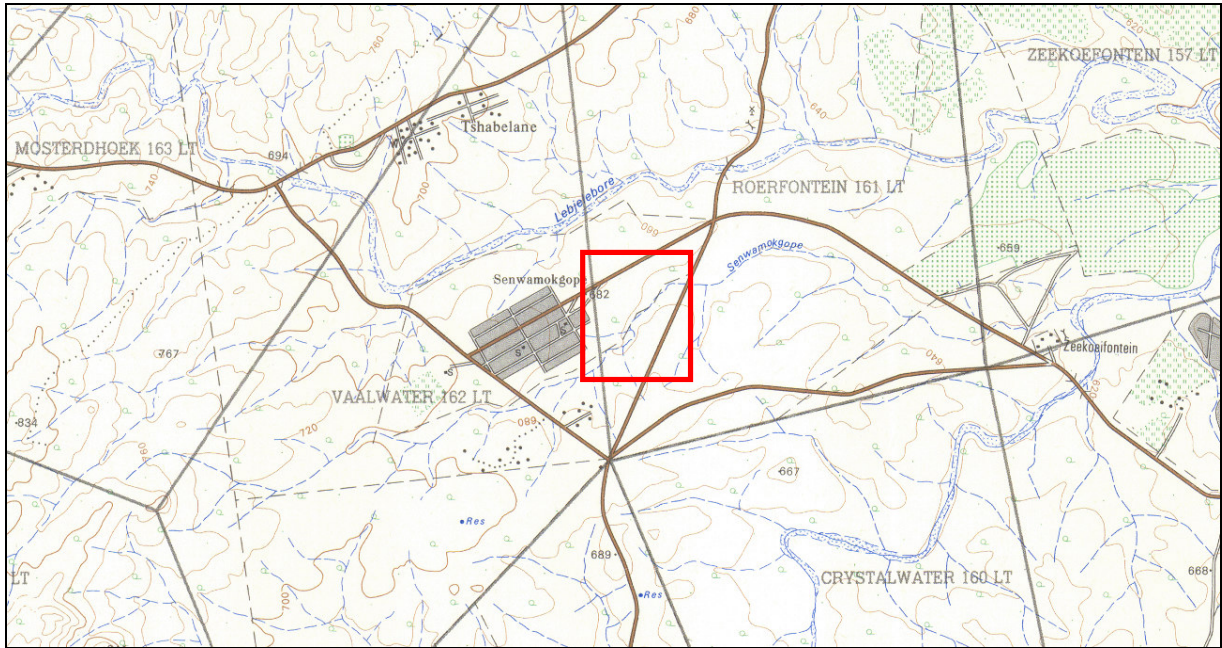
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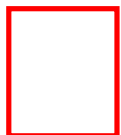
Appendix 1

Location



Topographical Map: 2330 BC

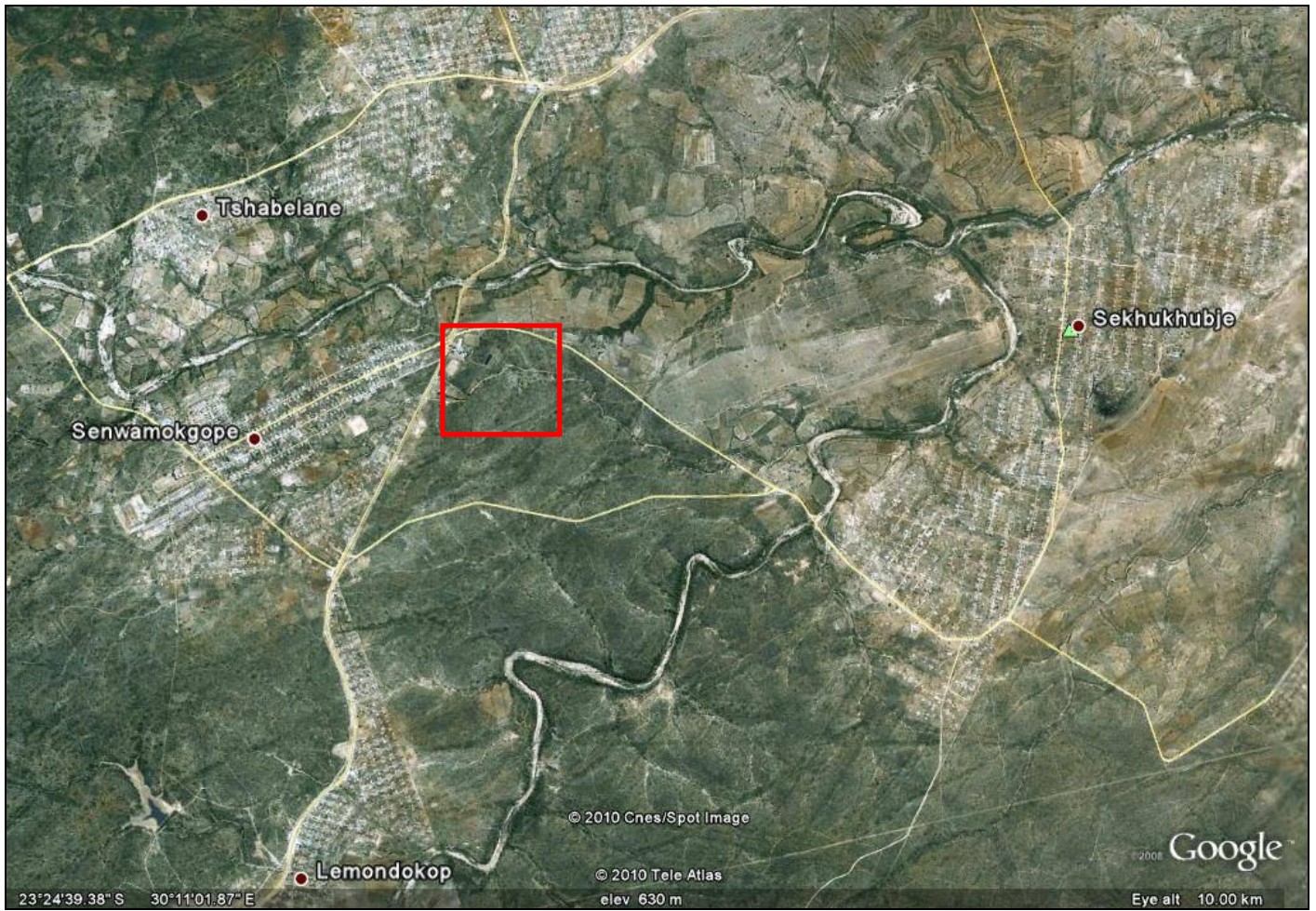
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Area of Proposed Development

Appendix 2

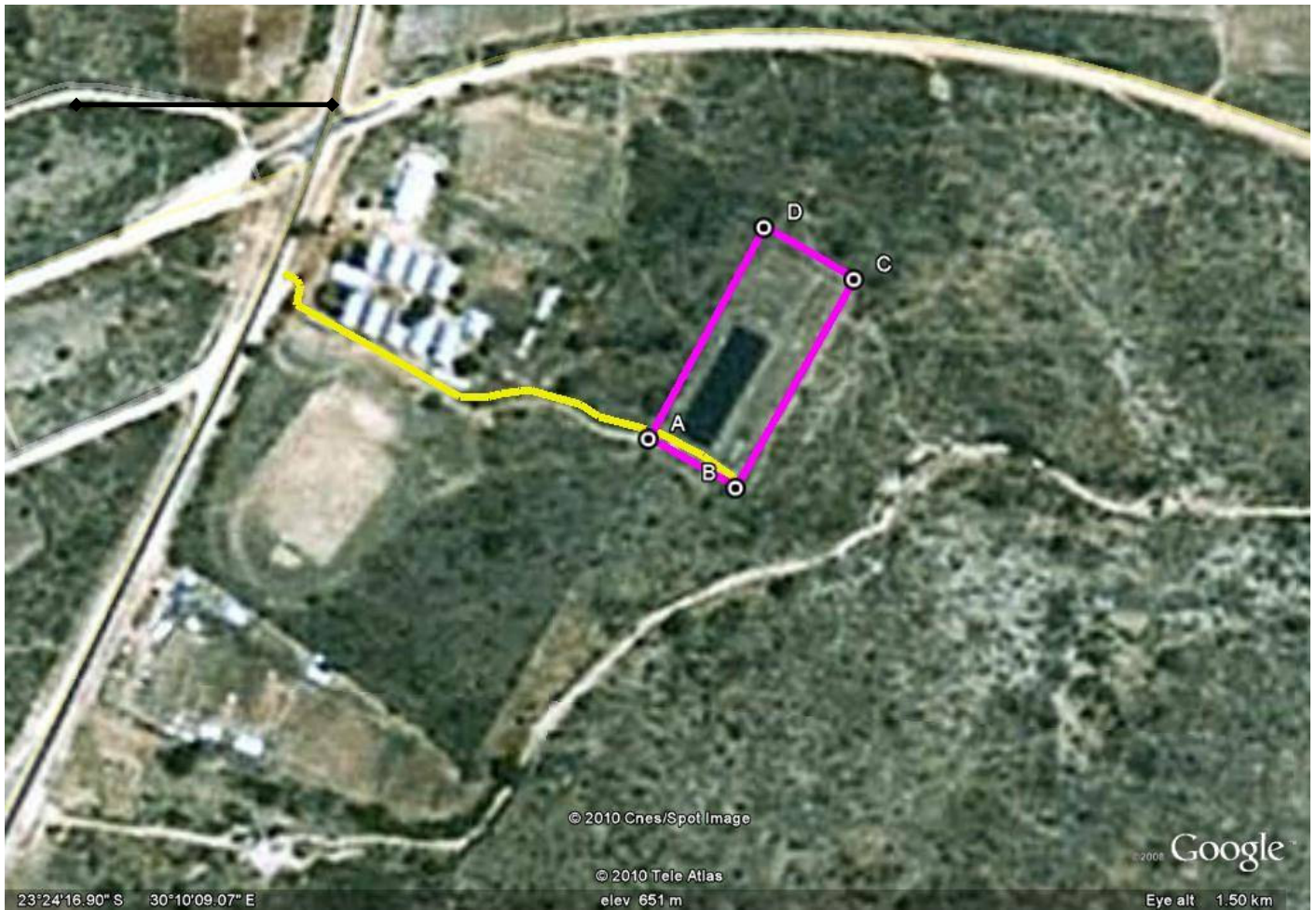
GPS Map



Development overlay



Area of Proposed Development



◄ ————— ► = 0.1 km

Google / GPS Map

N ↑

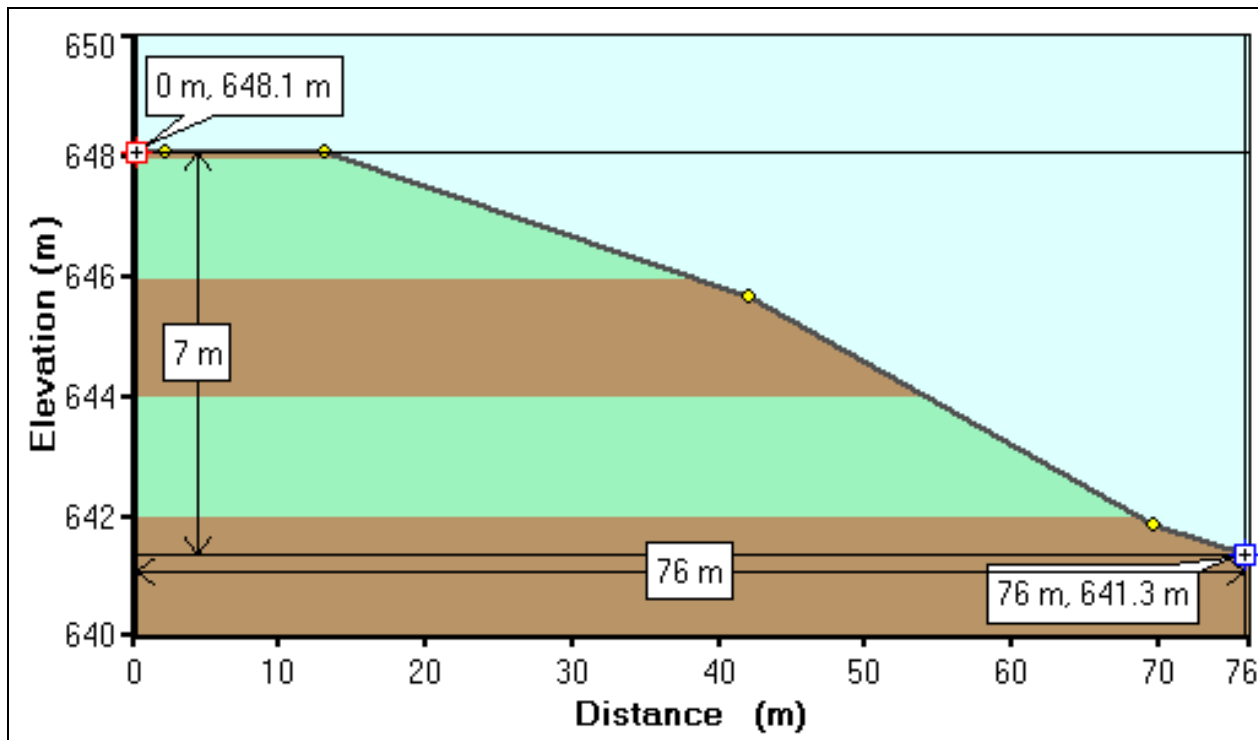
~~~~~ = Two-track

| <i>Marker Number</i> | <i>Coordinates</i>      |
|----------------------|-------------------------|
| A                    | S23 17 35.6 E30 41 11.9 |
| B                    | S23 17 2.43 E30 41 13.4 |
| C                    | S23 16 58.6 E30 41 54.9 |
| D                    | S23 16 49.3 E30 41 14.4 |

# **Appendix 3**

## **Terrain Map**

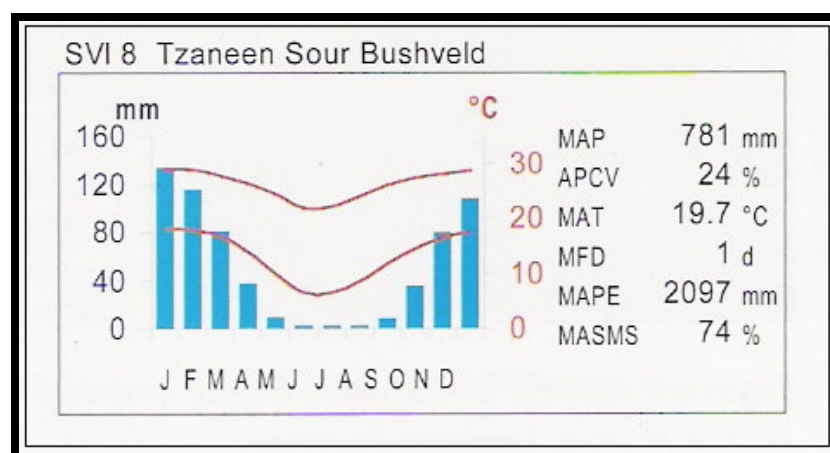
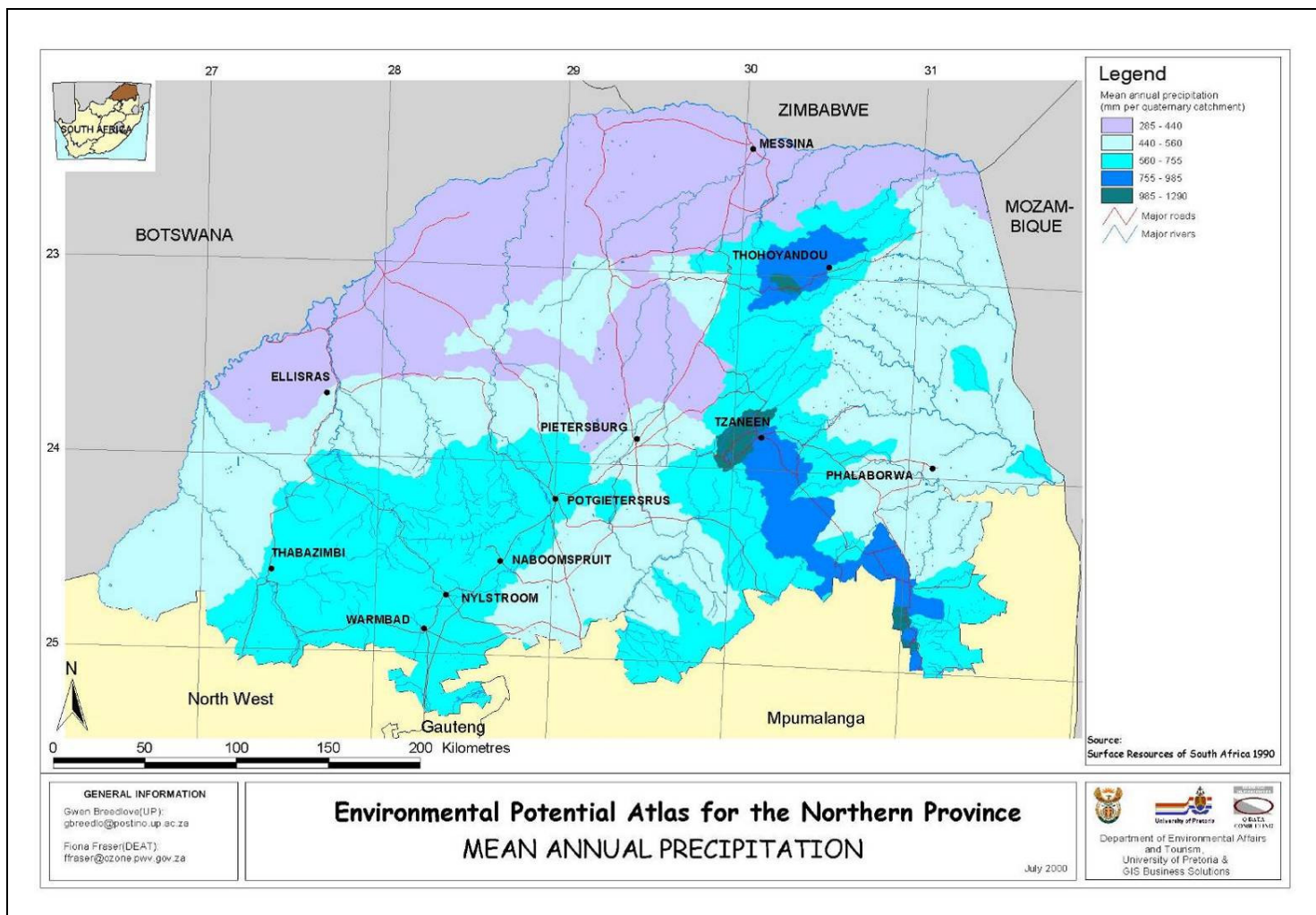




Slope Waypoint A to B

## **Appendix 4**

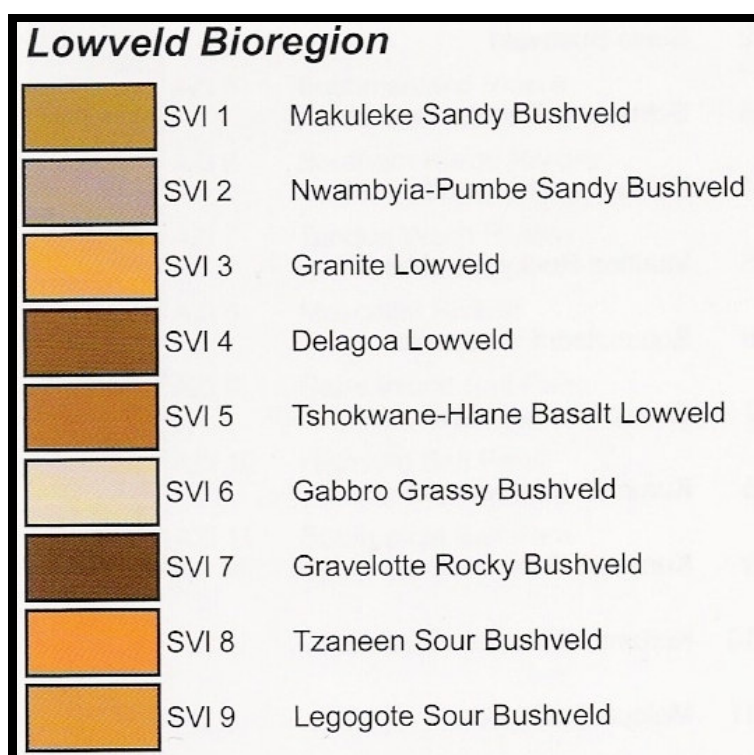
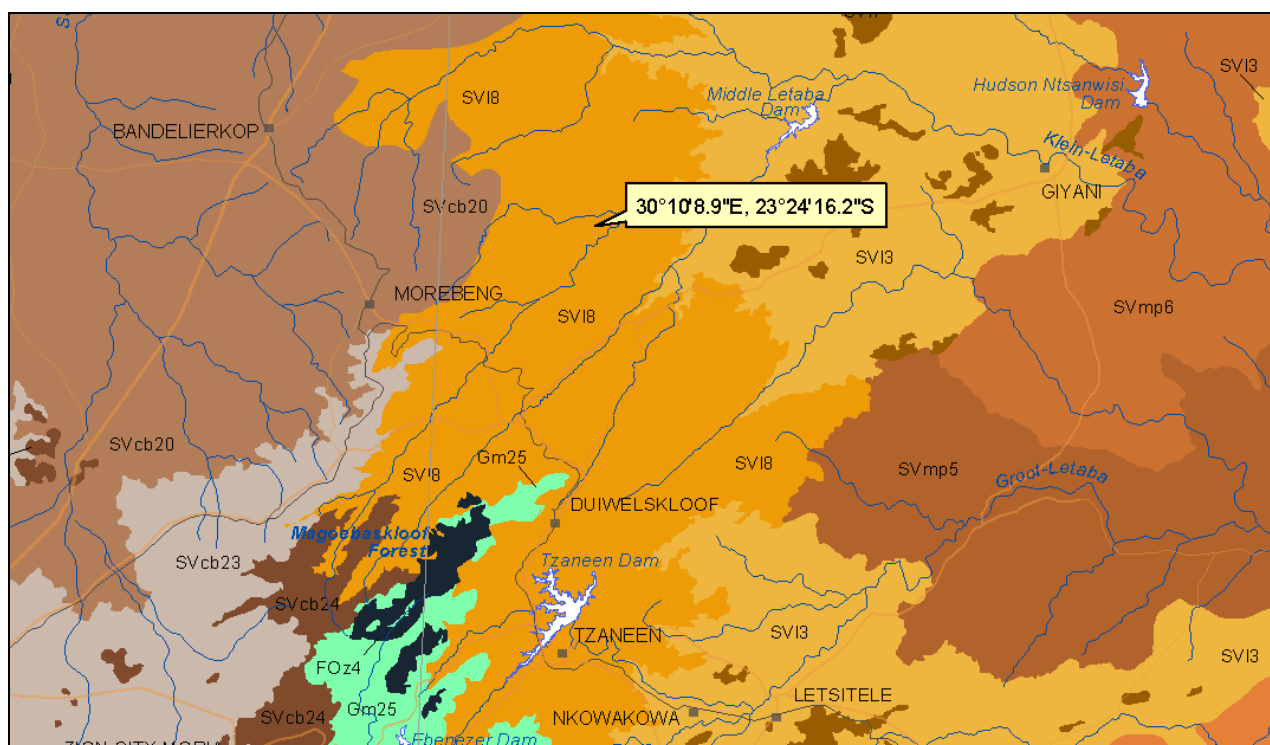
# **Climatic Information**



# **Appendix 5**

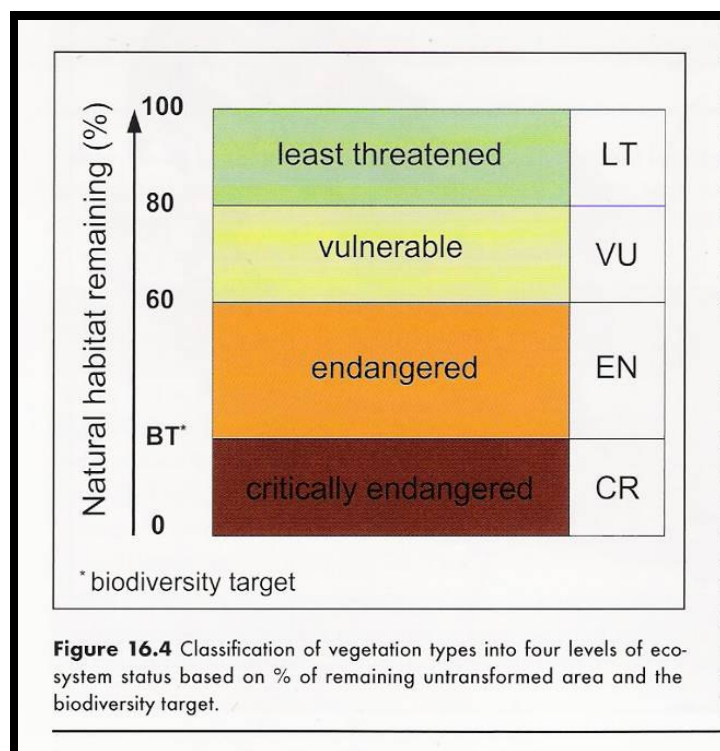
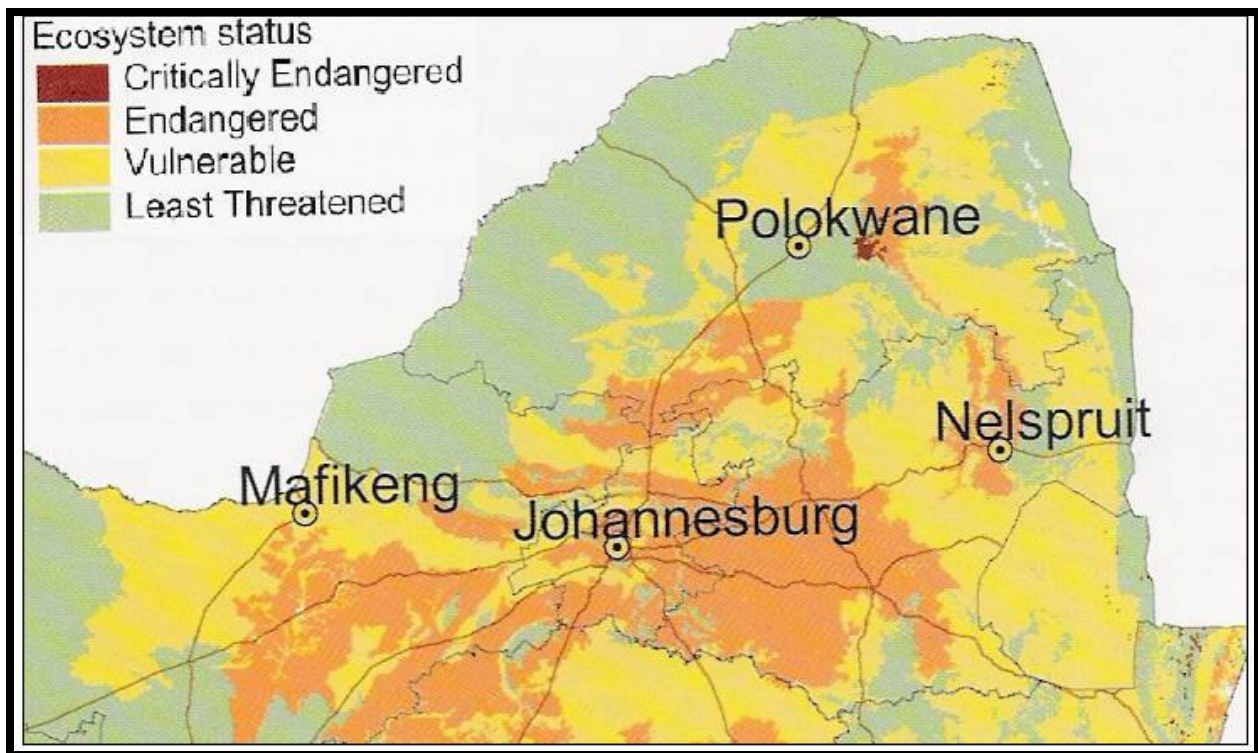
## **Vegetation Map**





# **Appendix 6**

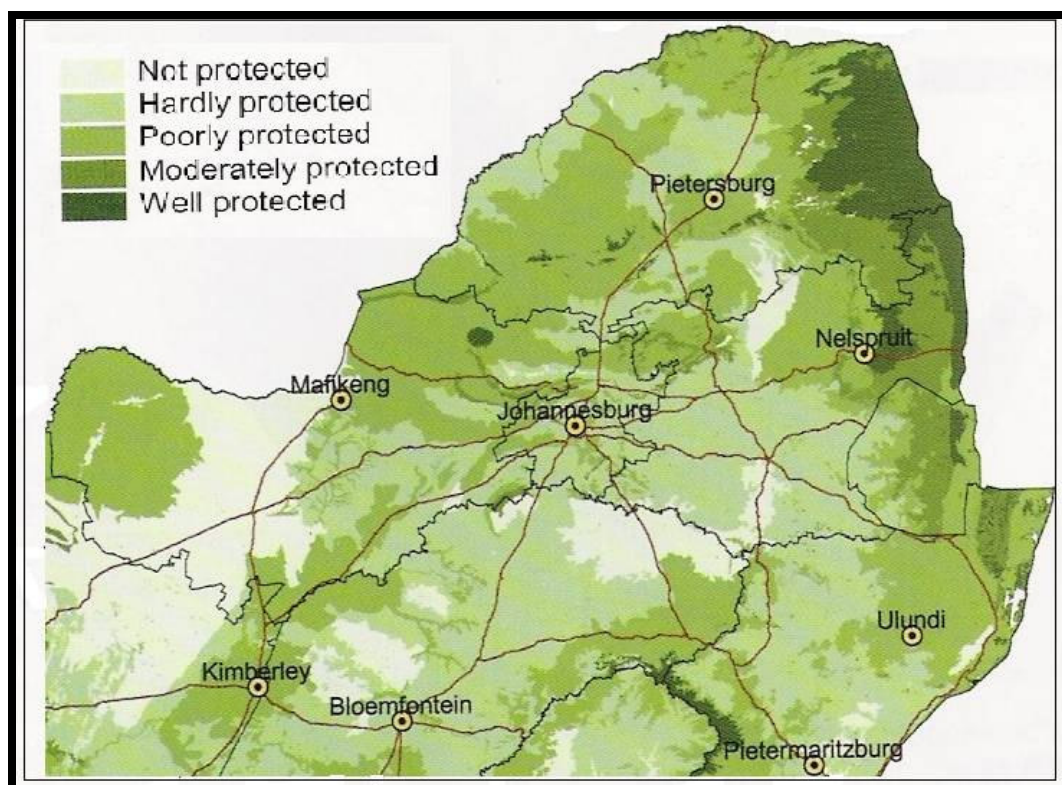
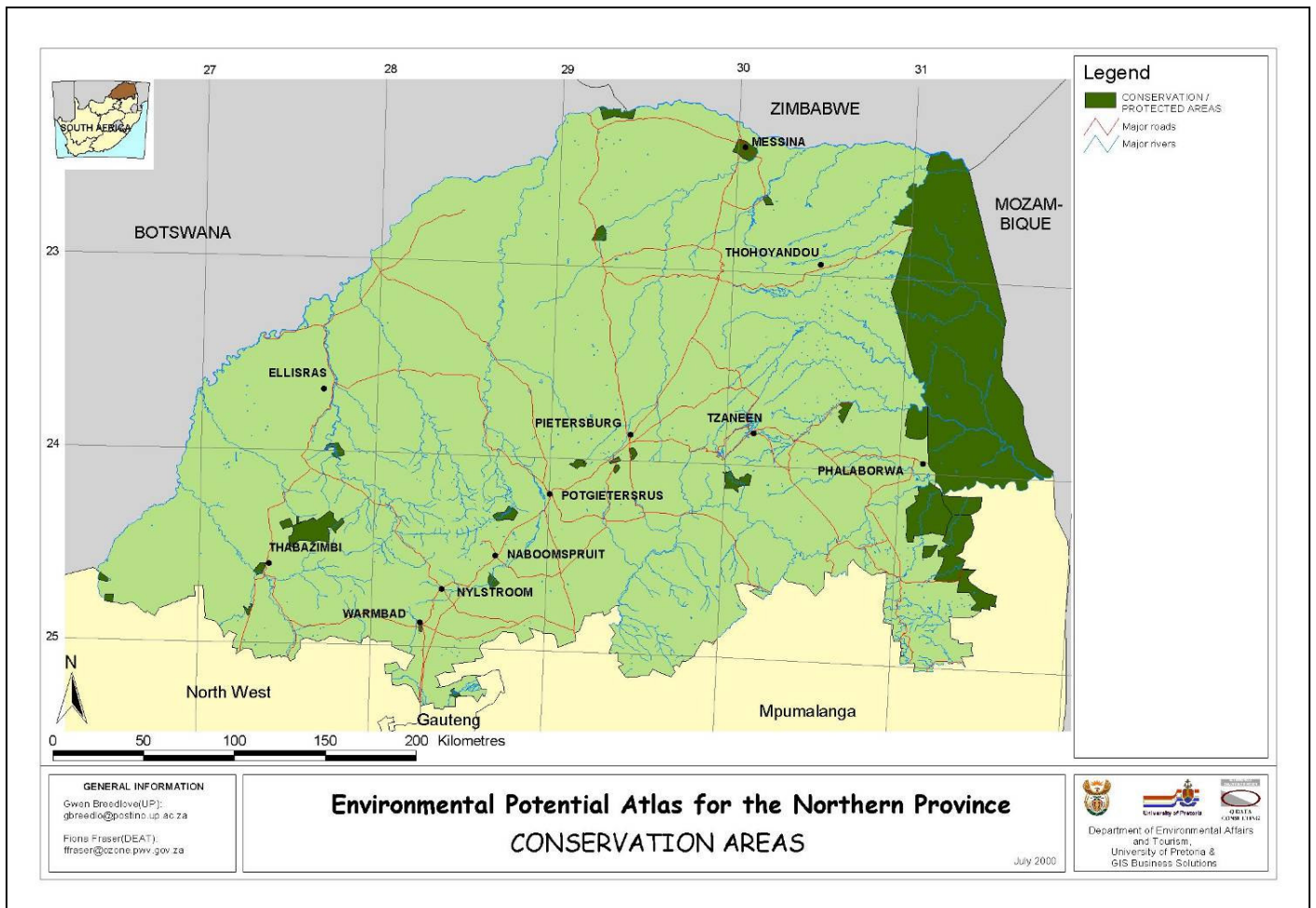
## **Ecosystem Status**



## **Appendix 7**

### **Conservation Status and Vulnerability**





# **Appendix 8**

## **Vegetation Units**



| Number | Vegetation unit                                                                          |
|--------|------------------------------------------------------------------------------------------|
| 1      | <i>Diospyros mespiliforme</i> , <i>Philenoptera violacea</i> , Natural undisturbed veld. |
| 2      | Artificial wetland- overflow dams                                                        |
| 3      | Grass covered areas in between dams.                                                     |
| 4      | Water body-raw sewerage mixed with water.                                                |
| 5      | Riparian vegetation.                                                                     |

# **Appendix 9**

## **Photographs**





Bullrushes aiding in bio-remediation.



A pump station at the last catchment dam.



A view of the natural vegetation outside the plant.



*Lantana camara*, an alien invasive species found on site.





Screen material is collected and burned.



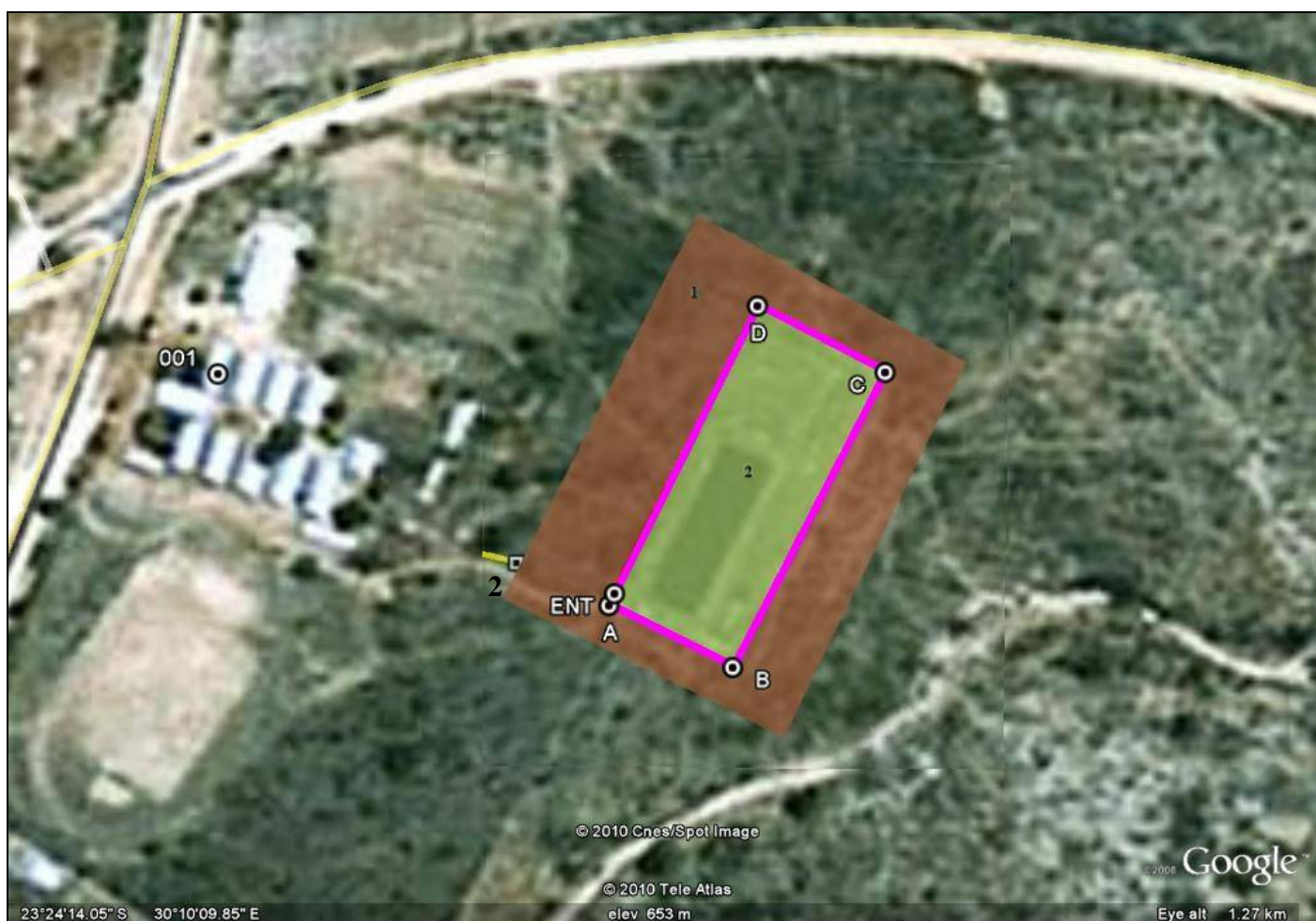
Entrance of raw sewerage into the first dam.



The two sewerage plant operators.

# **Appendix 10**

## **Soil Map**



: Boundary of current system.

**N** ↑

| Area number | Soil Type |
|-------------|-----------|
| 1           | Glenrosa  |
| 2           | Witbank   |



**Soil Data:**

|                            |                                                              |
|----------------------------|--------------------------------------------------------------|
| Site Number                | 1                                                            |
| GPS Point                  | S 23 24 16.0 E 30 10 07.4                                    |
| Soil Type                  | Glenrosa                                                     |
| Clay %                     | 25%                                                          |
| Drainage potential         | Medium-High                                                  |
| Underlying Mother Material | Grey Biotite Gneiss and Migmatite with Anatectic Mobilisates |

Photo:



|                            |                                                              |
|----------------------------|--------------------------------------------------------------|
| Site Number                | 2                                                            |
| GPS Point                  | S 23 24 17.3 E 30 10 11.0                                    |
| Soil Type                  | Witbank                                                      |
| Clay %                     | N/A                                                          |
| Drainage potential         | N/A                                                          |
| Underlying Mother Material | Grey Biotite Gneiss and Migmatite with Anatectic Mobilisates |

Photo



# **Appendix 11**

## **Floral Species Lists**

**Grass species:**

| <b>Nr.</b> | <b>Grass species</b>                            | <b>Common Name</b>      |
|------------|-------------------------------------------------|-------------------------|
| 1          | <i>Cynodon dactylon</i>                         | Couch Grass             |
| 2          | <i>Aristida congesta</i> var <i>barbicollis</i> | Spreading Tree-awn      |
| 3          | <i>Aristida canescens</i>                       | Pale Tree-awn           |
| 4          | <i>Bothriochloa insculpta</i>                   | Pinhole Grass           |
| 5          | <i>Chloris pycnothrix</i>                       | Spiderweb Grass         |
| 6          | <i>Digitaria eriantha</i>                       | Common Finger Grass     |
| 7          | <i>Eragrostis aspera</i>                        | Rough Love Grass        |
| 8          | <i>Eragrostis gummiiflua</i>                    | Gum Grass               |
| 9          | <i>Eragrostis racemosa</i>                      | Narrow Heart Love Grass |
| 10         | <i>Eragrostis rigidior</i>                      | Broad-curly Leaf        |
| 11         | <i>Eragrostis superba</i>                       | Saw-tooth Love Grass    |
| 12         | <i>Heteropogon contortus</i>                    | Spear Grass             |
| 13         | <i>Hyparrhenia cymbaria</i>                     | Boat Thatching Grass    |
| 14         | <i>Hyperthelia dissolute</i>                    | Yellow Thatching Grass  |
| 15         | <i>Melinis repens</i>                           | Natal Red Top           |
| 16         | <i>Panicum maximum</i>                          | Guinea Grass            |
| 17         | <i>Perotis patens</i>                           | Cat's Tail              |
| 18         | <i>Pogonarthria squarrosa</i>                   | Herringbone Grass       |
| 19         | <i>Tragus berteronianus</i>                     | Carrot Seed Grass       |
| 20         | <i>Urochloa mosambicensis</i>                   | Bushveld Signal Grass   |
| 21         | <i>Urochloa oligotricha</i>                     | Perennial Signal Grass  |



**Tree species list:**

| Nr. | Tree species                     | Common Name                |
|-----|----------------------------------|----------------------------|
| 1   | <i>Dichrostachys cinerea</i>     | Sickle bush                |
| 2   | <i>Terminalia sericea</i>        | Silver-cluster leaf        |
| 3   | <i>Peltophorum africanum</i>     | Weeping-wattle             |
| 4   | <i>Sclerocarya birrea</i>        | Marula                     |
| 5   | <i>Burkea Africana</i>           | Wild seringa               |
| 6   | <i>Philenoptera violacea</i>     | Forrest apple-leaf         |
| 7   | <i>Combretum molle</i>           | Velvet bushwillow          |
| 8   | <i>Rhus leptodictya</i>          | Mountain karree            |
| 9   | <i>Dombeya rotundifolia</i>      | Common wild pear           |
| 10  | <i>Ehretia rigida</i>            | Puzzle bush                |
| 11  | <i>Carissa bispinosa</i>         | Forrest num-num            |
| 12  | <i>Strychnos pungens</i>         | Spine-leaved monkey orange |
| 13  | <i>Combretum zeyheri</i>         | Large-fruited bushwillow   |
| 14  | <i>Combretum apiculatum</i>      | Red bushwillow             |
| 15  | <i>Combretum erythrophyllum</i>  | River bushwillow           |
| 16  | <i>Euclea divinorum</i>          | Magic guarri               |
| 17  | <i>Bauhinia galpinii</i>         | Pride-of-De-Kaap           |
| 18  | <i>Pterocarpus rotundifolius</i> | Round-leaved teak          |
| 19  | <i>Diospyros mespiliformes</i>   | Jackal-berry               |
| 20  | <i>Acacia nigrescens</i>         | Knob Thorn                 |
| 21  | <i>Acacia karoo</i>              | Sweet Thorn                |
| 22  | <i>Acacia nilotica</i>           | Scented Thorn              |
| 23  | <i>Melia azedarach</i>           | Syringa                    |
| 24  | <i>Combretum hereroense</i>      | Russet bushwillow          |
| 25  | <i>Ziziphus mucronata</i>        | Buffalo thorn              |
| 26  | <i>Lichi chinensis</i>           | Litchi                     |
| 27  | <i>Pisidium guajava</i>          | Guava                      |
| 28  | <i>Carica papaya</i>             | Papaya                     |

- Exotic species
- Indigenous species

**Forb List:**

| Nr. | Scientific Name                | Common Name      |
|-----|--------------------------------|------------------|
| 1   | <i>Ageratum houstonianum</i>   | Blue weed        |
| 2   | <i>Asparagus africanus</i>     | Bush asparagus   |
| 3   | <i>Berkeya zeyheri</i>         | No Common Name   |
| 4   | <i>Bidens pilosa</i>           | Blackjack        |
| 5   | <i>Ceratotheca triloba</i>     | Wild foxglove    |
| 6   | <i>Comphrena celosiodes</i>    | No Common Name   |
| 7   | <i>Lantana camara</i>          | Lantana          |
| 8   | <i>Indigofera confusa</i>      | No Common Name   |
| 9   | <i>Leucas lavandulifolia</i>   | Tumble weed      |
| 10  | <i>Leucas sexdentata</i>       | No English name  |
| 11  | <i>Nymphaea nouchali</i>       | Blue waterlily   |
| 12  | <i>Oxalis corniculata</i>      | Creeping sorrel  |
| 13  | <i>Oxalis obliquifolia</i>     | Sorrel           |
| 14  | <i>Persicaria lapathifolia</i> | Spotted Knotweed |
| 15  | <i>Tagetes minuta</i>          | Khaki weed       |
| 16  | <i>Vernonia galpinii</i>       | No Common Name   |
| 17  | <i>Wahlenbergia krebsii</i>    | No Common Name   |
| 18  | <i>Waltheria indica</i>        | No Common Name   |

- Exotic species
- Indigenous species

**Sedge List:**

| Nr. | Scientific Name               | Common Name    |
|-----|-------------------------------|----------------|
| 1   | <i>Pycnus polystachyos</i>    | No Common Name |
| 2   | <i>Kyllinga alba</i>          | No Common Name |
| 3   | <i>Typha capensis</i>         | Bullrush       |
| 4   | <i>Mauruscus sumatriensis</i> | No Common Name |

**Succulents:**

| Nr. | Scientific Name            | Common Name          |
|-----|----------------------------|----------------------|
| 1   | <i>Aloe transvaalensis</i> | No Common Name       |
| 2   | <i>Opuntia stricta</i>     | Australian pest pear |

- Exotic species
- Indigenous species

# **Appendix 12**

## **Faunal Species Lists**

**Mammal List:**

| <b>SCIENTIFIC NAME</b>            | <b>ENGLISH NAME</b>            | <b>PROBABILITY OF OCCURRENCE</b> |
|-----------------------------------|--------------------------------|----------------------------------|
| <i>Amblysomus hottentotus</i>     | Hottentot Golden Mole          | Medium                           |
| <i>Elephantulus myomurus</i>      | Rock Elephant Shrew            | Low                              |
| <i>Myosorex narius</i>            | Forest Elephant Shrew          | Medium                           |
| <i>Myosorex tenuis</i>            | Zuurbron Forest Shrew          | Medium                           |
| <i>Crocidura mariquensis</i>      | Maquaassie Mush Shrew          | Low                              |
| <i>Crocidura luna</i>             | Grey-Brown musk Shrew          | Medium                           |
| <i>Crocidura fuscomurina</i>      | Tiny Musk Shrew                | Low                              |
| <i>Crocidura cyanea</i>           | Reddish Grey Musk Shrew        | Low                              |
| <i>Crocidura silacea</i>          | Lesser grey-brown Musk Shrew   | Medium                           |
| <i>Crocidura hirta</i>            | Lesser Red Musk Shrew          | Low                              |
| <i>Suncus lixus</i>               | Greater Dwarf Shrew            | Low                              |
| <i>Epomophorus walbergi</i>       | Walberg's Epauletted Fruit Bat | Medium                           |
| <i>Epomophorus crypturus</i>      | Peters's Epauletted Fruit Bat  | Medium                           |
| <i>Taphozous mauritanus</i>       | Mauritian Tomb Bat             | Low                              |
| <i>Hipposideros caffer</i>        | Sundevail's Leaf-nose Bat      | Medium                           |
| <i>Nycteris thebaica</i>          | Egyptian Slit-faced Bat        | Medium                           |
| <i>Rhinolophus clivosus</i>       | Geoffrey's Horseshoe Bat       | Medium                           |
| <i>Rhinolophus darling</i>        | Darling's Horseshoe Bat.       | Medium                           |
| <i>Rhinolophus simulator</i>      | Bushveld Horseshoe Bat         | Medium                           |
| <i>Miniopterus schreibersii</i>   | Schreibers's Long Fingered Bat | Medium                           |
| <i>Eptesicus capensis</i>         | Cape Serottline Bat            | Low                              |
| <i>Myotis tricolor</i>            | Temminch's hairy Bat           | Medium                           |
| <i>Pipistrellus kuhlii</i>        | Kuhl's Pipstrelle              | Low                              |
| <i>Pipistrellus rustica</i>       | Rusty Bat                      | Medium                           |
| <i>Pipistrellus nanus</i>         | Banana Bat                     | Medium                           |
| <i>Nycticeius schlieffenii</i>    | Schlieffens Bat                | Low                              |
| <i>Scotophilus dinganii</i>       | Yellow House Bat               | Medium                           |
| <i>Scotophilus viridis</i>        | Lesser Yellow House Bat        | Medium                           |
| <i>Tadarida aegyptiaca</i>        | Egyptian Free-tailed Bat       | Medium                           |
| <i>Papio cynocephalus ursinus</i> | Savanna Baboon                 | Medium                           |
| <i>Chlorocebus aethiops</i>       | Vervet Monkey                  | Medium                           |
| <i>Cercopithecus mitis</i>        | Samango Monkey                 | Low                              |
| <i>Galago crassicaudatus</i>      | Thick-tailed Bushbaby          | Low                              |
| <i>Galago Moholi</i>              | Southern Lesser Bushbaby       | Low                              |
| <i>Lepus saxatilis</i>            | Scrub Hare                     | Medium                           |
| <i>Paraxerus cepapi</i>           | Tree Squirrel                  | Medium                           |
| <i>Graphiurus platyops</i>        | Rock Dormouse                  | Low                              |
| <i>Graphiurus marinus</i>         | Woodland Dormouse              | Medium                           |
| <i>Graphiurus parvus</i>          | Lesser Savanna Dormouse        | Low                              |
| <i>Cryptomys hottentotus</i>      | Common Molerat                 | Medium                           |
| <i>Cryptomys damarensis</i>       | Dammara Molerat                | Medium                           |
| <i>Hystrix africae australis</i>  | Porcupine                      | Medium                           |
| <i>Thryonomys swinderianus</i>    | Greater Cane Rat               | Medium                           |
| <i>Steatomys pratensis</i>        | Fat Mouse                      | Medium                           |
| <i>Dendromus melanotis</i>        | Grey Climbing Mouse            | Low                              |

|                                |                          |        |
|--------------------------------|--------------------------|--------|
| <i>Dendromus mesomelas</i>     | Brant's Climbing Mouse   | Low    |
| <i>Dendromus mystacalis</i>    | Chestnut Climbing Mouse  | Low    |
| <i>Tatera leucogaster</i>      | Bushveld Gerbil          | Low    |
| <i>Tetera brantsii</i>         | Highveld Gerbil          | Low    |
| <i>Acomys spinosissimus</i>    | Spiny Mouse              | Medium |
| <i>Aethomys namaquensis</i>    | Namaqua Rock Mouse       | Low    |
| <i>Aethomys chrysophilus</i>   | Red Veld Rat             | Medium |
| <i>Dasymys incomtus</i>        | Water Rat                | Medium |
| <i>Rhabdomys pumilio</i>       | Striped Mouse            | Medium |
| <i>Lemniscomys rosalia</i>     | Single striped mouse     | Medium |
| <i>Mus sorella</i>             | Thomas's Pygmy Mouse     | Medium |
| <i>Mus minutoides</i>          | Pygmy Mouse              | Medium |
| <i>Mus musculus</i>            | House Mouse              | Medium |
| <i>Thallomys paedulus</i>      | Tree Mouse               | Low    |
| <i>Thallomys nigricaudatus</i> | Black Tailed Tree Mouse  | Low    |
| <i>Grammomys dolichurus</i>    | Woodland Mouse           | Medium |
| <i>Mastomys Natalensis</i>     | Natal Multimammate Mouse | Medium |
| <i>Mastomys coucha</i>         | Multimammate Mouse       | Medium |
| <i>Rattus rattus</i>           | House Rat                | High   |
| <i>Otomys angoniensis</i>      | Angoni Vlei Rat          | Medium |
| <i>Otomys irroratus</i>        | Vlei rat                 | Low    |
| <i>Mungos mungo</i>            | Banded Mongoose          | Medium |
| <i>Galerella sanguinea</i>     | Slender Mongoose         | Medium |
| <i>Atilax paludinosus</i>      | Water Mongoose           | Medium |
| <i>Helogale parvula</i>        | Dwarf Mongoose           | Medium |
| <i>Cynictis penicillata</i>    | Yellow mongoose          | Low    |
| <i>Potamochoerus larvatus</i>  | Bushpig                  | Medium |
| <i>Tragelaphus scriptus</i>    | Bushbuck                 | Low    |
| <i>Raphicerus campestris</i>   | Steenbok                 | Low    |
| <i>Raphicerus sharpei</i>      | Sharp's Grysbok          | Low    |
| <i>Sylvicarpa grimmia</i>      | Common Duiker            | Medium |

### **Bird List**

\* Endemic or near endemic

|                                  |
|----------------------------------|
| <i>Whitebreasted Cormorant</i>   |
| <i>Reed Cormorant</i>            |
| <i>Darter</i>                    |
| <i>Grey Heron</i>                |
| <i>Blackheaded Heron</i>         |
| <i>Goliath Heron</i>             |
| <i>Purple Heron</i>              |
| <i>Great White Heron</i>         |
| <i>Yellow Billed Egret</i>       |
| <i>Little Egret</i>              |
| <i>Cattle Egret</i>              |
| <i>Squacco Heron</i>             |
| <i>Blackcrowned Night Heron</i>  |
| <i>Little Bittern</i>            |
| <i>Hamerkop</i>                  |
| <i>White Stork</i>               |
| <i>Black Stork</i>               |
| <i>Yellowbilled Stork</i>        |
| <i>Sacred Ibis</i>               |
| <i>Hadedda Ibis</i>              |
| <i>African Spoonbill</i> *       |
| <i>Whitefaced Duck</i>           |
| <i>Whitebacked Duck</i>          |
| <i>Egyptian Goose</i>            |
| <i>Yellowbilled Duck</i>         |
| <i>African Black Duck</i>        |
| <i>Cape Teal</i>                 |
| <i>Hottentot Teal</i>            |
| <i>Redbilled Teal</i>            |
| <i>Spurwinged Goose</i>          |
| <i>Secretary Bird</i>            |
| <i>Cape Vulture</i> *            |
| <i>Yellowbilled Kite</i>         |
| <i>Blackshouldered Kite</i>      |
| <i>Cuckoo Hawk</i>               |
| <i>Booted Eagle</i>              |
| <i>Longcrested Eagle</i>         |
| <i>Martial Eagle</i>             |
| <i>Crowned Eagle</i>             |
| <i>Blackbreasted Snake Eagle</i> |
| <i>Bateleur</i>                  |
| <i>Verreux's Eagle</i>           |
| <i>African Fish Eagle</i>        |
| <i>Steppe Buzzard</i>            |

|                                  |
|----------------------------------|
| <i>Forest Buzzard *</i>          |
| <i>Jackal Buzzard *</i>          |
| <i>Redbreasted Sparrowhawk</i>   |
| <i>Little Sparrowhawk</i>        |
| <i>Black Sparrowhawk</i>         |
| <i>African Goshawk</i>           |
| <i>Gabar Goshawk</i>             |
| <i>African Marsh Harrier</i>     |
| <i>Gymnogene</i>                 |
| <i>Osprey</i>                    |
| <i>Lanner Falcon</i>             |
| <i>Peregrine Falcon</i>          |
| <i>European Hobby</i>            |
| <i>Eastern Redfooted Kestrel</i> |
| <i>Rock Kestrel</i>              |
| <i>Greater Kestrel</i>           |
| <i>Lesser Kestrel *</i>          |
| <i>Common Quail</i>              |
| <i>Helmeted Guinea Fowl</i>      |
| <i>African Rail *</i>            |
| <i>Black Crake</i>               |
| <i>Baillon's Crake</i>           |
| <i>Redchested Flufftail</i>      |
| <i>Buffspotted Flufftail</i>     |
| <i>Moorhen</i>                   |
| <i>Redknobbed Coot</i>           |
| <i>Red Crested Korhaan</i>       |
| <i>African Finfoot</i>           |
| <i>African Jacana *</i>          |
| <i>Ringed Plover *</i>           |
| <i>Threebanded Plover</i>        |
| <i>Crowned Plover</i>            |
| <i>Kittlitz's Plover</i>         |
| <i>Blacksmith Plover *</i>       |
| <i>Common Sandpiper</i>          |
| <i>Wood Sandpiper</i>            |
| <i>Marsh Sandpiper</i>           |
| <i>Greenshank</i>                |
| <i>Curlew Sandpiper</i>          |
| <i>Little Stint</i>              |
| <i>Ruff</i>                      |
| <i>Ethiopian Snipe</i>           |
| <i>Avocet</i>                    |
| <i>Blackwinged Stilt</i>         |
| <i>Spotted Dikkop</i>            |
| <i>Water Dikkop</i>              |
| <i>Greyheaded Gull</i>           |
| <i>Whiskered tern</i>            |

|                                |
|--------------------------------|
| <i>Feral Pigeon</i>            |
| <i>Rock (Spotted) Pigeon</i>   |
| <i>Rameron Pigeon</i> *        |
| <i>Redeyed Dove</i>            |
| <i>Cape Turtle Dove</i>        |
| <i>Laughing Dove</i>           |
| <i>Namaqua Dove</i>            |
| <i>Greenspotted Dove</i>       |
| <i>Tambourine Dove</i>         |
| <i>Purple Crested Lourie</i>   |
| <i>Grey Lourie</i>             |
| <i>Knysna Lourie</i> *         |
| <i>Redchedsted Cuckoo</i>      |
| <i>African Cuckoo</i>          |
| <i>Black Cuckoo</i>            |
| <i>Great Spotted Cuckoo</i>    |
| <i>Jacobin Cuckoo</i>          |
| <i>Emerald Cuckoo</i>          |
| <i>Copper Tailed Cuckoo</i>    |
| <i>Klaas's Cuckoo</i>          |
| <i>Diederik Cuckoo</i>         |
| <i>Barn Owl</i>                |
| <i>African Scops Owl</i>       |
| <i>Pearl Spotted Owl</i>       |
| <i>White Faced Owl</i>         |
| <i>Marsh Owl</i>               |
| <i>Wood Owl</i>                |
| <i>Spotted Eagle Owl</i>       |
| <i>Giant Eagle Owl</i>         |
| <i>Rufous cheeked Nightjar</i> |
| <i>European Nightjar</i>       |
| <i>Mozambique Nightjar</i>     |
| <i>Freckled Nightjar</i>       |
| <i>Fierynecked Nightjar</i>    |
| <i>Palm swift</i>              |
| <i>Black Swift</i>             |
| <i>Whiterumped Swift</i>       |
| <i>Horus Swift</i>             |
| <i>Little Swift</i>            |
| <i>Alpine Swift</i>            |
| <i>Speckled Mousebird</i>      |
| <i>Redfaced Mousebird</i>      |
| <i>Narina Trogon</i> *         |
| <i>Pied Kingfisher</i>         |
| <i>Great Kingfisher</i>        |
| <i>Halfcollared Kingfisher</i> |
| <i>Malachite Kingfisher</i>    |
| <i>Striped Kingfisher</i>      |



|                                        |
|----------------------------------------|
| <i>Brownhooded Kingfisher</i>          |
| <i>Little Bee-eater</i>                |
| <i>White Fronted Bee-eater</i>         |
| <i>Carmine Bee-eater</i>               |
| <i>European Bee-eater</i>              |
| <i>Hoopoe</i>                          |
| <i>Scimitar Wood Hoopoe</i>            |
| <i>Redbilled Wood Hoopoe</i> *         |
| <i>Southern Yellow-billed Hornbill</i> |
| <i>Red-billed Hornbill</i>             |
| <i>Crowned Hornbill</i>                |
| <i>Blackcollared Barbet</i>            |
| <i>Crested Barbet</i>                  |
| <i>Pied Barbet</i> *                   |
| <i>Yellow-fronted Tinker Barbet</i>    |
| <i>Greater Honeyguide</i> *            |
| <i>Scalythroated Honeyguide</i> *      |
| <i>Sharp Billed Honey Guide</i>        |
| <i>Lesser Honeyguide</i>               |
| <i>Ground Woodpecker</i> *             |
| <i>Bearded Woodpekker</i>              |
| <i>Bennett's Woodpekker</i>            |
| <i>Golden tailed Woodpekker</i>        |
| <i>Red Throated Wrynek</i>             |
| <i>Cardinal Woodpecker</i> *           |
| <i>Olive Woodpecker</i> *              |
| <i>Melodious Lark</i>                  |
| <i>Rufousnaped Lark</i>                |
| <i>Flappet Lark</i>                    |
| <i>Sabota Lark</i> *                   |
| <i>Longbilled Lark</i> *               |
| <i>Chestnut-Backed Finch Lark</i>      |
| <i>Redcapped Lark</i>                  |
| <i>European Swallow</i>                |
| <i>Whitethroated Swallow</i> *         |
| <i>Pearlbreasted Swallow</i>           |
| <i>Greater Striped Swallow</i>         |
| <i>Grey Rumped Swallow</i>             |
| <i>White Tailed Swallow</i>            |
| <i>Lesser Striped Swallow</i>          |
| <i>Rock Martin</i>                     |
| <i>House Martin</i>                    |
| <i>Brownthroated Martin</i>            |
| <i>Long Tailed Bush Shrike</i>         |
| <i>Red Backed Shrike</i>               |
| <i>Lesser Grey Shrike</i>              |
| <i>Southern Boubou</i>                 |
| <i>Fiscal Shrike</i>                   |

|                                     |
|-------------------------------------|
| <i>Crimson-Breasted Shrike</i>      |
| <i>Tree-streaked Tchagra</i>        |
| <i>Red-billed Helmet Shrike</i>     |
| <i>Helmet Shrike</i>                |
| <i>Olive bush Shrike</i>            |
| <i>Gorgeous Bush Shrike</i>         |
| <i>White Breasted Cuckoo Shrike</i> |
| <i>Grey Cuckoo Shrike</i>           |
| <i>Black Cuckoo Shrike</i>          |
| <i>Grey Headed Bush Shrike</i>      |
| <i>Black-crowned Tchagra</i>        |
| <i>Puff Back</i>                    |
| <i>Brubru</i>                       |
| <i>White Crowned Shrike</i>         |
| <i>Black Flycatcher</i>             |
| <i>Black Cuckooshrike</i>           |
| <i>Square Tailed Drongo</i>         |
| <i>Forktailed Drongo</i>            |
| <i>European Golden Oriole</i>       |
| <i>Blackheaded Oriole</i>           |
| <i>Black Crow</i>                   |
| <i>Pied Crow</i>                    |
| <i>Whitenecked Raven</i>            |
| <i>Southern Black Tit</i>           |
| <i>Redeyed Bulbul *</i>             |
| <i>Blackeyed Bulbul</i>             |
| <i>Yellow Belied Bulbul</i>         |
| <i>Terrestrial Bulbul</i>           |
| <i>Sombre Bulbul</i>                |
| <i>Olive Thrush</i>                 |
| <i>Groundscraper Thrush</i>         |
| <i>Kurrichane Thrush</i>            |
| <i>Olive Thrush</i>                 |
| <i>Orange Thrush</i>                |
| <i>Cape Rock Thrush *</i>           |
| <i>Arrow Marked Babbler</i>         |
| <i>Capped Wheatear</i>              |
| <i>Mountain Chat **</i>             |
| <i>Sicklewinged Chat *</i>          |
| <i>Anteating Chat *</i>             |
| <i>Stone Robin</i>                  |
| <i>Chorister Robin *</i>            |
| <i>Cape Robin *</i>                 |
| <i>White Throated Robin</i>         |
| <i>Starred Robin *</i>              |
| <i>Cape Rock Jumper *</i>           |
| <i>Chorister Robin</i>              |
| <i>Whitebrowed Scrub Robin</i>      |

|                                      |
|--------------------------------------|
| <i>Long-billed Crombec</i>           |
| <i>Layard's Titbabbler</i> *         |
| <i>African Marsh Warbler</i>         |
| <i>Titbabbler</i>                    |
| <i>Grey Pendule Tit</i>              |
| <i>Burnt-neck Eremomela</i>          |
| <i>Yellow Bellied Eremomela</i>      |
| <i>Green-capped Eremomela</i>        |
| <i>Green-Backed Bleating Warbler</i> |
| <i>Yellowthroated Warbler</i>        |
| <i>Barthroated Apalis</i>            |
| <i>Longbilled Crombec</i>            |
| <i>Yellowbellied Eremomela</i>       |
| <i>Karoo Eremomela</i> *             |
| <i>Bleating Warbler</i>              |
| <i>Grassbird</i> *                   |
| <i>Fantailed Cisticola</i>           |
| <i>Desert Cisticola</i>              |
| <i>Cloud Cisticola</i> *             |
| <i>Wailing Cisticola</i>             |
| <i>Lazy Cisticola</i>                |
| <i>Red Faced Cisticola</i>           |
| <i>Ratteling Cisticola</i>           |
| <i>Neddicky</i>                      |
| <i>Blackchested Prinia</i> *         |
| <i>Tawney Flanked Prinia</i>         |
| <i>Spotted Flycatcher</i>            |
| <i>Dusky Flycatcher</i>              |
| <i>Blue-grey Flycatcher</i>          |
| <i>Fan-Tailed Flycatcher</i>         |
| <i>Pallid Flycatcher</i>             |
| <i>Marico Flycatcher</i>             |
| <i>Fiscal Flycatcher</i> *           |
| <i>Cape Batis</i>                    |
| <i>Chin-spot Batis</i>               |
| <i>Fairy Flycatcher</i> *            |
| <i>Bluemantled Flycatcher</i>        |
| <i>Paradise Flycatcher</i>           |
| <i>Yellow Wagtail</i>                |
| <i>Long Tailed Wagtail</i>           |
| <i>African Pied Wagtail</i>          |
| <i>Cape Wagtail</i>                  |
| <i>Grassveld Pipit</i>               |
| <i>Longbilled Pipit</i>              |
| <i>Plainbacked Pipit</i>             |
| <i>Buffy Pipit</i>                   |
| <i>Bushveld Pipit</i>                |
| <i>Striped Pipit</i>                 |

|                                        |
|----------------------------------------|
| <i>Orange throated Longclaw *</i>      |
| <i>European Starling</i>               |
| <i>Wattled Starling</i>                |
| <i>Cape Glossy Starling</i>            |
| <i>Red Wing Starling</i>               |
| <i>Red-Billed Oxpecker</i>             |
| <i>Lesser Doublecollared Sunbird*</i>  |
| <i>Greater Doublecollared Sunbird*</i> |
| <i>White Bellied Sunbird</i>           |
| <i>Scarlet Chested Sunbird</i>         |
| <i>Black sunbird</i>                   |
| <i>Marico Sunbird</i>                  |
| <i>Cape White-eye *</i>                |
| <i>House Sparrow</i>                   |
| <i>Cape Sparrow *</i>                  |
| <i>Southern Greyheaded Sparrow</i>     |
| <i>Yellowthroated Sparrow</i>          |
| <i>Thickbilled Weaver</i>              |
| <i>Golden weaver</i>                   |
| <i>Spectacled Weaver</i>               |
| <i>Cape Weaver *</i>                   |
| <i>Spotted Backed Weaver</i>           |
| <i>Lesser Masked Weaver</i>            |
| <i>Red Headed Weaver</i>               |
| <i>Golden Bishop</i>                   |
| <i>Masked Weaver</i>                   |
| <i>Redbilled Quelea</i>                |
| <i>Red Bishop</i>                      |
| <i>Yellowrumped Widow</i>              |
| <i>Longtailed Widow</i>                |
| <i>Melba Finch</i>                     |
| <i>Jamesons Fire Finch</i>             |
| <i>Bluebilled Firefinch</i>            |
| <i>Quil Finch</i>                      |
| <i>Green Twinspot</i>                  |
| <i>Redbilled Firefinch</i>             |
| <i>Orange Breasted Waxbill</i>         |
| <i>Black Cheeked Waxbill</i>           |
| <i>Violet-Eared Waxbill</i>            |
| <i>Common Waxbill</i>                  |
| <i>Swee Waxbill *</i>                  |
| <i>Cut Throat Finch</i>                |
| <i>Redheaded Finch *</i>               |
| <i>Cuckoo Finch</i>                    |
| <i>Bronze Manikin</i>                  |
| <i>Pin-Tailed Whydah</i>               |
| <i>Paradise Whydah</i>                 |
| <i>Shaft-Tailed Whydah</i>             |

|                               |
|-------------------------------|
| <i>Black Widow Finch</i>      |
| <i>Purple Widow Finch</i>     |
| <i>Steel-Blue Widow Finch</i> |
| <i>Yelloweyed Canary</i>      |
| <i>Cape Canary</i>            |
| <i>Forest Canary *</i>        |
| <i>Bully Canary</i>           |
| <i>Black-Throated Canary</i>  |
| <i>Streakyheaded Canary</i>   |
| <i>Goldenbreasted Bunting</i> |
| <i>Cape Bunting *</i>         |
| <i>Rock Bunting</i>           |
| <i>Larklike Bunting *</i>     |

## Snakes

| ENGLISH NAME                       | SCIENTIFIC NAME                    | Probability of occurrence |
|------------------------------------|------------------------------------|---------------------------|
| PUFADDER                           | <i>BITIS ARIETANS</i>              | Medium                    |
| COMMON NIGHT ADDER                 | <i>CAUSUS RHOMBEATUS</i>           | Medium                    |
| SNOUTED NIGHT ADDER                | <i>CAUSUS DEFILIPPI</i>            | Medium                    |
| BLACK MAMBA                        | <i>DENDROASPIS POLYLEPIS</i>       | Medium                    |
| MOZAMBIQUE SPITTING COBRA          | <i>NAJA MOSSAMBICA</i>             | Medium                    |
| SHIELD NOSE SNAKE                  | <i>ASPIDELAPS SCUTATUS</i>         | Low                       |
| ZAMBEZI GARTER SNAKE               | <i>ELAPSOIDEA BOULENGERT</i>       | Low                       |
| SPOTTED HARLEQUIN SNAKE            | <i>HOMOROSELAPS LACTENS</i>        | Medium                    |
| BOOMSLANG                          | <i>DISPHOLIDUS TYPUS</i>           | Medium                    |
| BIRD SNAKE                         | <i>THELOTORNIS CAPENSIS</i>        | Medium                    |
| SOUTHERN STILETTO SNAKE            | <i>ATRACTASPIS BIBRONII</i>        | Medium                    |
| OLIVE WHIP SNAKE                   | <i>PSAMMOPITIS MOSSAMBICUS</i>     | Medium                    |
| SHORT-SNOUTED WHIP SNAKE           | <i>PSAMMOPITIS BREUIROSTIS</i>     | Low                       |
| KALAHARI SAND SNAKE                | <i>PSAMMOPITIS TRINASALIS</i>      | Low                       |
| WESTERN STRIPED BELLIED SAND SNAKE | <i>PSAMMOPITIS SUBTAENIATUS</i>    | Low                       |
| CROSS MARRED SAND SNAKE            | <i>PSAMMOPITIS CRUCIFGR</i>        | Low                       |
| DWARF WHIP SNAKE                   | <i>PSAMMOPITIS ANGOLENSIS</i>      | Low                       |
| SPOTTED SKAAPSTEKER                | <i>PSAMMOPITIS RITOMBEATUS</i>     | Low                       |
| STRIPED SKAAPSTEKER                | <i>PSAMMOPITYLAX TRITAENIATUS</i>  | Low                       |
| EASTERN BARK SNAKE                 | <i>HEMIRHAGERRHIS NOTOTAENIA</i>   | Medium                    |
| MANY SPOTTED SNAKE                 | <i>AMPLORHINUS MULTIMACULATUS</i>  | Low                       |
| COMMON TIGER SNAKE                 | <i>TELESCOPUS SEMIANNULATUS</i>    | Medium                    |
| MARBLE TREE SNAKE                  | <i>DIPSAPOBOA AULICA</i>           | Low                       |
| HERALD SNAKE                       | <i>CROTAPITOPELEIS HOTAMBOEIA</i>  | Medium                    |
| BLACK HEADED CENTIPEDE EATER       | <i>APARALLACUTUS CAPENSIS</i>      | Medium                    |
| NATAL PURPLE GLOSSED SNAKE         | <i>AMBLYODIPSAS CONCOLOR</i>       | Low                       |
| COMMON PURPLE CLOSED SNAKE         | <i>AMBLYODIPSAS POLYLEPIS</i>      | Low                       |
| SOUTHERN AFRICAN PYTHON            | <i>PYTHON NATALENSIS</i>           | Medium                    |
| BROWN HOUSE SNAKE                  | <i>LAMPROPHIS CAPENSIS</i>         | High                      |
| OLIVE HOUSE SNAKE                  | <i>LAMPROITIS INORNATUS</i>        | Low                       |
| AURORA HOUSE SNAKE                 | <i>LAMPROPHIS AURORA</i>           | Medium                    |
| SPOTTED ROCK SNAKE                 | <i>LAMPROPITIS GUTTATUS</i>        | Low                       |
| SWAZI ROCK SNAKE                   | <i>LAMPROPITIS SWAZICUS</i>        | Low                       |
| COMMON BROWN WATER SNAKE           | <i>LYCODONMORPITUS RUFULY</i>      | Medium                    |
| MOLE SNAKE                         | <i>PSEUDASPIS CANA</i>             | Medium                    |
| TWO STRIPED SHOVEL SNOUT           | <i>PROSYMNA BIVITTATA</i>          | Low                       |
| EAST AFRICAN SHOVEL SNOUT          | <i>PROSYMNA STUHLMANNII</i>        | Low                       |
| SPOTTED BUSH SNAKE                 | <i>PHILOTHAMNUS SEMIVARIEGATUS</i> | Medium                    |
| GREEN WATER SNAKE                  | <i>PHILOTHAMUS HOPLPGASTER</i>     | Medium                    |

|                                |                                  |        |
|--------------------------------|----------------------------------|--------|
| COMMON SLUG EATER              | <i>DUBERRIA LUTRIX</i>           | Medium |
| COMMON WOLF SNAKE              | <i>LYCOPHIDION CAPENSE</i>       | Medium |
| VARIEGAROD WOLF SNAKE          | <i>LYCOPITIDION VARIEGATUM</i>   | Medium |
| CAPE FILE SNAKE                | <i>MEHELYA CAPINSIS</i>          | Low    |
| BLACK FILE SNAKE               | <i>MEITEYA NYASSAE</i>           | Low    |
| COMMON EGG EATER               | <i>DASYPELTIS SCABRA</i>         | Medium |
| DELALANDE'S BEAKED BLIND SNAKE | <i>RHINOTYPHLOPS LALANDEI</i>    | Medium |
| SCITLEGEL'S BEAKED BLIND SNAKE | <i>RITINOTYPHLOPS SCHLEGELII</i> | Medium |
| BIBRON'S BLIND SNAKE           | <i>TYPHLOPS BIBRONII</i>         | Medium |
| LONG TAILED WORM SNAKE         | <i>LEPTOTYPHLOPS LONGICAUDUS</i> | Medium |
| PETER'S WORM SNAKE             | <i>LEPTOTYPITLOPS SCUTIFRONS</i> | Medium |
| INCOGNITO WORM SNAKE           | <i>LEPTOTYPHLOPS INCOGNITUS</i>  | Medium |
| DISTANT'S WORM SNAKE           | <i>LEPTOTYPHLOPS DISTANTI</i>    | Medium |

**Other Reptiles:**

| <b><u>SCIENTIFIC NAME</u></b>                | <b><u>ENGLISH NAME</u></b>      | <b><u>PROBABILITY OF OCCURRENCE</u></b> |
|----------------------------------------------|---------------------------------|-----------------------------------------|
| <i>Manopeltis infusate</i>                   | Dusky Spade-snouted Worm Lizard | Low                                     |
| <i>Acontias plumbeus</i>                     | Giant Legless Skink             | Low                                     |
| <i>Thyphlosaurus cregoi</i>                  | Cregoi's Blind Legless Skink    | Low                                     |
| <i>Scelotes mirus</i>                        | Montane Dwarf Burrowing Skink   | Medium                                  |
| <i>Lygosoma sundevallii</i>                  | Sundevall's Writhing Skink      | Low                                     |
| <i>Mabuya capensis</i>                       | Cape Skink                      | Medium                                  |
| <i>Mabuya quinquetaeniata</i>                | Five-line or Rainbow Skink      | Medium                                  |
| <i>Mabuya striata punctatissima</i>          | Striped Skink                   | Medium                                  |
| <i>Mabuya varia</i>                          | Variable Skink                  | Medium                                  |
| <i>Panaspis wahlbergii</i>                   | Walberg's Snake Eyed Skink      | Medium                                  |
| <i>Ichnotropis capensis</i>                  | Cape Rough-scaled Lizard        | Medium                                  |
| <i>Ichnotropis squamulosa</i>                | Common Rough-scale Lizard       | Medium                                  |
| <i>Nucras intertexta</i>                     | Spotted Sandveld Lizard         | Medium                                  |
| <i>Nucras lalandii</i>                       | Delalande's Sandveld Lizard     | Low                                     |
| <i>Nucras holubi</i>                         | Holub's Sandveld Lizard         | Medium                                  |
| <i>Nurcras ornata</i>                        | Ornate Sandveld Lizard          | Low                                     |
| <i>Pedioplanis lineocellata lineocellata</i> | Spotted Sand Lizard             | Medium                                  |
| <i>Gerrhosaurus flavigularis</i>             | Yellow -throated Plated Lizard  | Medium                                  |
| <i>Gerrhosaurus major</i>                    | Rough-scaled Plated Lizard      | Low                                     |
| <i>Gerrhosaurus nigrolineatus</i>            | Black-lined Plated Lizard       | Medium                                  |
| <i>Gerrhosaurus validus</i>                  | Giant Plated Lizard             | Low                                     |
| <i>Chamaesaura aenea</i>                     | Transvaal Grass Lizard          | Low                                     |
| <i>Cordylus tropidosternum jonesi</i>        | Tropical Girdled Lizard         | Low                                     |
| <i>Cordylus vittifer</i>                     | Transvaal Girdled Lizard        | Medium                                  |
| <i>Pseudocordylus transvaalensis</i>         | Northern Crag Lizard            | Low                                     |
| <i>Varanus albigularis</i>                   | Rock Monitor                    | Medium                                  |
| <i>Varanus niloticus</i>                     | Nile Monitor                    | Medium                                  |
| <i>Agama aculeate</i>                        | Ground Agama                    | Medium                                  |
| <i>Agama atra</i>                            | Southern Rock Agama             | Low                                     |
| <i>Acanthocercus atricollis</i>              | Southern Tree Agama             | Medium                                  |
| <i>Chamaeleo dilepis</i>                     | Flap-neck Chameleon             | Medium                                  |
| <i>Hemidactylus mabouia</i>                  | Moreau's Tropical House Gecko   | Medium                                  |
| <i>Homopholis wahlbergii</i>                 | Walberg's Velvet Gecko          | Medium                                  |
| <i>Lygodactylus capensis</i>                 | Cape Dwarf Gecko                | Medium                                  |
| <i>Pachydactylus turneri</i>                 | Turner's Thick-toed Gecko       | Medium                                  |
| <i>Pachydactylus vansonii</i>                | Van Son's Thick-toed Gecko      | Medium                                  |
| <i>Geochelone pardalis</i>                   | Leopard Tortoise                | Medium                                  |
| <i>Kinixys spekii</i>                        | Speke's Hinged Tortoise         | Low                                     |
| <i>Pelomedusa subrufa</i>                    | Marsh or Helmeted Terrapin      | Medium                                  |
| <i>Pelusios sinuatus</i>                     | Serrated Hinged Terrapin        | High                                    |



## Amphibians

| ENGLISH NAME            | SCIENTIFIC NAME                 | PROBABILITY OF OCCURRENCE |
|-------------------------|---------------------------------|---------------------------|
| COMMON PLATANNA         | <i>XENOPUS LAEVIS</i>           | Medium                    |
| BANDED RUBBER FROG      | <i>PHRYNOMANTIS BIFASCIATUS</i> | Medium                    |
| NATAL GHOST FROG        | <i>HELEOPHRYNE NATALENSIS</i>   | Low                       |
| BROWN BACK TREE FROG    | <i>LEPTOPELIS MOSSAMBICUS</i>   | Medium                    |
| BUBBLING KASSINA        | <i>KASSINA SENEQALENSIS</i>     | Medium                    |
| PAINTED REED FROG       | <i>HYPOROLIUS MARMORATUS</i>    | Medium                    |
| FOAM NEST FROG          | <i>BREVICEPS ADSPERSUS</i>      | Medium                    |
| AFRICAN BULL FROG       | <i>PYXICEPHALUS EDULUS</i>      | Low                       |
| TREMOLO SAND FROG       | <i>TOMOPTERNA CRYPTOTUS</i>     | Low                       |
| KNOCKING SAND FROG      | <i>TOMOPTERNA TUBERCUVOSA</i>   | Low                       |
| NATAL SAND FROG         | <i>TOMOPTERNA NATALENSIS</i>    | Medium                    |
| RAUCOUS TOAD            | <i>BUFO RANGERI</i>             | Medium                    |
| FLAT BACKED TOAD        | <i>BUFO MACULATUS</i>           | Medium                    |
| GUTTURAL TOAD           | <i>BUFO GUTTURALIS</i>          | Medium                    |
| EASTERN OLIVE TOAD      | <i>BUFO FENOULITETI</i>         | Medium                    |
| RED TOAD                | <i>SCHISMADERMA CARENS</i>      | Medium                    |
| STRIPED STREAM FROG     | <i>STRONGYLOPUS FASCIATUS</i>   | Medium                    |
| COMMON RIVER FROG       | <i>AFRANA ANGOLENSIS</i>        | Medium                    |
| STRIPED GRASS FROG      | <i>PTYCHADENA POROSISSIMA</i>   | Medium                    |
| BROAD BANDED GRASS FROG | <i>PTYCHADENA MOSSAMBICA</i>    | Medium                    |
| BRONZE CACO             | <i>CACOSTERNUM NANUM</i>        | Medium                    |
| COMMON CACO             | <i>CACOSTERNUM BOETTGERI</i>    | Medium                    |
| SNORING PUDDLE FROG     | <i>PHRYNOBATRACHUS NAKEWSIS</i> | Medium                    |

### **Fish Species**

| <b>ENGLISH NAME</b>      | <b>SCIENTIFIC NAME</b>    | <b>PROBABILITY OF OCCURRENCE</b> |
|--------------------------|---------------------------|----------------------------------|
| Sharptooth Catfish       | <i>Clarias gariepinus</i> | High                             |
| Tilapia / Bream / Kurper | <i>Tilapia spp.</i>       | Medium                           |
| Freshwater Bass          | <i>Micropterus spp.</i>   | Low                              |
| Common Carp              | <i>Cyprinus carpio</i>    | Low                              |
| Mudfish                  | <i>Labeo spp.</i>         | Medium                           |
| Yellowfish               | <i>Labeobarbus spp.</i>   | Low                              |

# **Appendix 13**

## **Design**

