

# Ecological Assessment Report

**Mafube Local Municipality Landfill Site**

**Expansion, Frankfort, Free State**

**Province**

**November 2018**

**Compiled for:**



**Compiled by:**

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## Executive Summary

The project applicant, Mafube Local Municipality proposes to expand their existing landfill site for disposal of domestic and general waste from the town of Frankfort which forms part of the Fezile Dabi District Municipality, Free State Province. This expansion is required in order to meet the ever-growing demand for waste disposal in the region. The assessment area is approximately 14.4 ha in size. Two other potential site alternatives have been provided (Alternatives 2 & 3) on which only an overview desktop study was conducted.

NSVT Consultants was appointed by the applicant as the independent Environmental Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) process.

Due to the nature of the potential impacts of the proposed development on the local ecology, an Ecological study is required. This is required in order to determine the potential presence of ecologically significant species, habitats or wetland areas within the proposed project footprint which may be affected by the proposed development. Proposed mitigation and management measures in accordance with the NEMA (Act 107 of 1998) mitigation hierarchy must also be recommended in order to attempt to reduce/alleviate the identified potential impacts.

EcoFocus Consulting was therefore subsequently appointed by the EAP as the independent ecological specialist to conduct the required Ecological study for the proposed project. This report constitutes the Ecological Assessment. A site visit/assessment for the proposed development footprint area was conducted on 14 November 2018. This date forms part of the growing season and most plant species present could therefore be successfully identified.

## Methodology

The proposed assessment area was assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present. Species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969). Georeferenced photographs were taken of ecologically sensitive areas as well as the relevant nationally or provincially protected species if encountered in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

Potential impacts of the proposed project on the surrounding natural environment were identified, evaluated and rated. The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the proposed project area were also assessed and rated.

### **Study Area**

The assessment area consists of a single footprint area of approximately 14.4 ha in size. The area is situated on the Remaining Extent of the Farm Dorp Frankfort no 74 (SG 21 Digit Code: F0140000000007400000). The assessment area is situated directly adjacent south of the town of Frankfort which forms part of the Mafube Local Municipality. This in turn, forms part of the Fezile Dabi District Municipality, Free State Province. Access to the assessment area is obtained via JJ Hadebe Street and a subsequent dirt road from the west.

Alternative 2 is approximately 10.5 ha in size and is situated directly adjacent north-west of the assessment area. Alternative 3 is approximately 14.5 ha in size and is located approximately 1.5 km north-east of the town of Frankfort.

According to SANBI (2006- ), the entire assessment area as well as Alternative 2 and the majority of Alternative 3 fall within the Frankfort Highveld Grassland vegetation type (Gm 6) which is characterised by slightly undulating and undulating terrain dominated by grassland. The vegetation type is classified as vulnerable due to extensive cultivation activities and flooded dams in the larger region (SANBI, 2006- ). Only the northern portion of Alternative 3 falls within the Northern Free State Shrubland vegetation type (Gm 7) which is classified as least threatened (SANBI, 2006- ).

The entire assessment area and Alternative 2 is categorised as an Ecological Support Area two (ESA 2) while Alternative 3 is categorised as an ESA 1 in accordance with the Free State Provincial Spatial Biodiversity Plan 2017, which sets out biodiversity priority areas in the province. ESA's are areas that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a Critical Biodiversity Area (CBA) or protected area or that play an important role in delivering ecosystem services (Collins, 2017).

## Results and Conclusion

The proposed landfill site expansion will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

The Frankfort Highveld Grassland vegetation type (Gm 6) associated with the assessment area, is classified as vulnerable due to extensive cultivation activities and flooded dams in the larger region (SANBI, 2006- ). The assessment area is however in a moderate to highly degraded state and scored a low PES value. The significant degradation has mainly been caused by anthropogenic activities associated with the existing landfill site as well as overgrazing by livestock from the local community and frequent burning. Numerous footpaths also traverse the entire area. The area is therefore not reminiscent of the natural climactic state of the relevant vegetation type.

With the exception of the two provincially protected species *Boophone disticha* & *Helichrysum nudifolium*, no Red Data Listed-, nationally protected- or any other species of conservational significance were found to be present within the assessment area. Due to the presence of the existing landfill site, the area is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. No important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes. The assessment area and surrounding landscape also does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website ([www.birdlife.org.za/conservation/important\\_bird\\_areas/iba-map](http://www.birdlife.org.za/conservation/important_bird_areas/iba-map)).

All surface water runoff on the expansion area flows towards a single accumulation point on the western boundary of the area. From there it crosses JJ Hadebe Street and feeds into an ephemeral water drainage line which eventually discharges into the Wilge River located approximately 270 m south-west of the assessment area. The expansion area therefore forms part of the upper commencement of a small localised surface water catchment and drainage area. Due to a large portion of the expansion area along the access road being highly degraded and polluted by unmanaged and illegal dumping of domestic and general waste, it is expected that a significant amount of this illegally dumped domestic and general waste will eventually find its way into the Wilge River during the rainy season. Active intervention should therefore be implemented as soon as practicably possible in order to prevent this from happening. Therefore, although the entire assessment area is categorised as an Ecological Support Area two (ESA 2), the proposed expansion

area constitutes a moderate to highly degraded grassland landscape and subsequently scored a moderate EIS value. The proposed expansion area is not viewed as being of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type and surface water catchment and drainage area.

It is the opinion of the specialist that the proposed development poses two potentially significant ecological impacts namely contamination of the surface water catchment and drainage area towards the Wilge River as well as contamination of ground water. These potential impacts can however be suitably reduced and mitigated to within acceptable residual levels. The project should therefore be considered by the competent authority for environmental authorisation and approval. It is recommended that the assessment area be applied for, for development purposes. Alternatives 2 and 3 are therefore not recommended for development.

The proposed development may however only continue if all recommended mitigations measures as per this ecological report are adequately implemented and managed for both the construction and operational phases of the proposed project. All necessary authorisations and permits must also be obtained prior to any commencement.

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## Abbreviations

CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
MAP	Mean Annual Precipitation
NCPSBP	Northern Cape Provincial Spatial Biodiversity Plan 2016
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMA	National Environmental Management Act (Act 107 of 1998)
NFA	National Forests Act (Act 84 of 1998)
NWA	National Water Act (Act 36 of 1998)
ONA	Other Natural Area'
PES	Present Ecological State
WULA	Water Use License Application

## Declaration of Independence

I, Adriaan Johannes Hendrikus Lamprecht, ID 870727 5043 083, declare that I:

- am the Director and Ecological Specialist of EcoFocus Consulting (Pty) Ltd
- act as an independent specialist consultant in the field of botany and ecology
- am assigned as the Ecological Specialist consultant by the EAP, NSVT Consultants, for the proposed project
- do not have or will not have any financial interest in the undertaking of the proposed project activity other than remuneration for work as stipulated in the Purchase Order terms of reference
- confirm that remuneration for my services relating to the proposed project is not linked to approval or rejection of the project by the competent authority
- have no interest in secondary or subsequent developments as a result of the authorisation of the proposed project
- have no and will not engage in any conflicting interests in the undertaking of the activity
- undertake to disclose to the applicant and the competent authority any information that has or may have the potential to influence the decision of the competent authority
- will provide the applicant and competent authority with access to all relevant project information in my possession whether favourable or not

**AJH Lamprecht**



**Signature**

## 1. Introduction

The project applicant, Mafube Local Municipality proposes to expand their existing landfill site for disposal of domestic and general waste from the town of Frankfort which forms part of the Fezile Dabi District Municipality, Free State Province. This expansion is required in order to meet the ever-growing demand for waste disposal in the region. The assessment area is approximately 14.4 ha in size. Two other potential site alternatives have been provided (Alternatives 2 & 3) on which only an overview desktop study was conducted.

NSVT Consultants was appointed by the applicant as the independent Environmental Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) process.

Due to the nature of the potential impacts of the proposed development on the local ecology, an Ecological study is required. This is required in order to determine the potential presence of ecologically significant species, habitats or wetland areas within the proposed project footprint which may be affected by the proposed development. Proposed mitigation and management measures in accordance with the NEMA (Act 107 of 1998) mitigation hierarchy must also be recommended in order to attempt to reduce/alleviate the identified potential impacts.

EcoFocus Consulting was therefore subsequently appointed by the EAP as the independent ecological specialist to conduct the required Ecological study for the proposed project. This report constitutes the Ecological Assessment.

Preliminary preparations conducted prior to the ecological walkthrough/site assessment where as follows:

- Georeferenced spatial information was obtained of the proposed project area in order to determine the direct impact footprint area.
- A desktop study was conducted of the information available on the relevant vegetation types and national/provincial conservation significance status associated with the proposed footprint area.

## **2. Date and Season of Ecological Site Assessment**

A site visit/assessment for the proposed development footprint area was conducted on 14 November 2018. This date forms part of the growing season and most plant species present could therefore be successfully identified.

### 3. Assessment Rational

South Africa is a country rich in natural resources and splendour and is rated as having some of the highest biodiversity in the world. Other than the pure aesthetic value which our biodiversity and natural resources provides, it also plays a significant positive role in our national economy. While continuous economic development and progress is a key national focus area, which forms a cornerstone in the socio-economic improvement of society and the livelihoods of communities and individuals, the preservation and management of the integrity and sustainability of our natural resources is also essential in achieving this objective.

Socio-economic development and progress can therefore not be completely inhibited for the sake of ensuring environmental conservation, therefore solutions and compromises rather need to be explored in order to achieve the need for socio-economic development without unreasonably jeopardising the needs of environmental conservation. A sustainable and responsible balance needs to be maintained in order to accommodate the requirements of both.

Adequate, sustainable and responsible utilisation and management of our natural resources is crucial. Finding the required balance between socio-economic development and environmental conservation, should therefore always be a priority focus point during any proposed development process.

Various environmental legislation in South Africa makes provision for the protection of our natural resources and the functionality of ecological systems in order to ensure sustainability. Such acts include the National Environmental Management: Biodiversity Act (Act 10 of 2004), National Forests Act (Act 84 of 1998), Conservation of Agricultural Resources Act (Act 43 of 1983), National Water Act (Act 36 of 1998) and framework legislation such as the National Environmental Management Act (Act 10 of 2004).

An Ecological Impact Assessment of the proposed project area was therefore conducted in order to determine and quantify the impacts of the development on the natural environment in the area.

## 4. Objectives of the Assessment

Ecological and habitat survey:

- Identify and list significant faunal and floral species encountered on the proposed project area and list any protected and/or Red Data Listed species.
- Determine and discuss the present condition and extent of degradation and/or transformation of the vegetation on the proposed project area.
- Determine and discuss the ecological sensitivity and significance of the proposed project area.
- Identify and delineate all watercourses/wetland areas potentially present on the proposed project area.
- Identify, evaluate and rate the potential impacts of the proposed project on the natural environment.
- Provide recommendations on mitigation and management measures in order to attempt to reduce/alleviate these identified potential impacts.
- Provide recommendations on the suitability of the potential development area.
- A digital report (this document) as well as the digital KML files of any identified sensitive areas will be provided to the applicant.

## 5. Methodology

- The proposed assessment area was assessed on foot and visual observations/identifications were made of habitat conditions, ecologically sensitive areas and relevant species present.
- Species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 and the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969).
- Georeferenced photographs were taken of ecologically sensitive areas as well as the relevant nationally or provincially protected species if encountered in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The **Present Ecological State (PES)** of the proposed project area was assessed and rated as per the table below.

- The Present Ecological State (PES) refers to the current state or condition of an area in terms of all its characteristics and reflects the change to the area from its reference condition. The value gives an indication of the alterations that have occurred in the ecosystem.

**Table 1: Criteria for PES calculations**

<b>Ecological Category</b>	<b>Score</b>	<b>Description</b>
<b>A</b>	> 90-100%	<b>Unmodified</b> , natural and pristine.
<b>B</b>	> 80-90%	<b>Largely natural</b> . A small change in natural habitats and biota may have taken place but the ecosystem functionality has remained essentially unchanged.
<b>C</b>	> 60-80%	<b>Moderately modified</b> . Moderate loss and transformation of natural habitat and biota have occurred, but the basic ecosystem functionality has still remained predominantly unchanged.
<b>D</b>	> 40-60%	<b>Largely modified</b> . A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred.
<b>E</b>	> 20-40%	<b>Seriously modified</b> . The loss of natural habitat, biota and basic ecosystem functionality is extensive.
<b>F</b>	0-20%	<b>Critically/Extremely modified</b> . Transformation has reached a critical level and the ecosystem has been modified completely with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is irreversible.

The **Ecological Importance and Sensitivity (EIS)** of the proposed project area was assessed and rated as per the table below.

- The Ecological Importance and Sensitivity (EIS) of an area is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales, and both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.



**Table 2: Criteria for EIS calculations**

EIS Categories	Score	Description
<b>Low/Marginal</b>	<b>D</b>	Not ecologically important and/or sensitive on any scale. Biodiversity is ubiquitous and not unique or sensitive to habitat modifications.
<b>Moderate</b>	<b>C</b>	Ecologically important and sensitive on local or possibly provincial scale. Biodiversity is still relatively ubiquitous and not usually sensitive to habitat modifications.
<b>High</b>	<b>B</b>	Ecologically important and sensitive on provincial or possibly national scale. Biodiversity is relatively unique and may be sensitive to habitat modifications.
<b>Very High</b>	<b>A</b>	Ecologically important and sensitive on national and possibly international scale. Biodiversity is very unique and sensitive to habitat modifications.

Potential impacts of the proposed project on the surrounding natural environment were identified, evaluated and rated as per the methodology described below. The tables below indicate and explain the methodology and criteria used for the evaluation of the Environmental Risk Ratings as well as the calculation of the final Environmental Significance Ratings of the identified potential ecological impacts. Each potential environmental impact is scored for each of the Evaluation Components as per the table below.

**Table 3: Scale utilised for the evaluation of the Environmental Risk Ratings**

Evaluation Component	Rating Scale and Description/Criteria
<b>Magnitude of Negative or Positive Impact</b>	<p><b>10 - Very high:</b> Bio-physical features and/or ecological functionality/processes may be severely impacted upon.</p> <p><b>8 - High:</b> Bio-physical features and/or ecological functionality/processes may be significantly impacted upon.</p> <p><b>6 - Medium:</b> Bio-physical features and/or ecological functionality/processes may be moderately impacted upon.</p> <p><b>4 - Low:</b> Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p><b>2 - Very Low:</b> Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p><b>0 - Zero:</b> Bio-physical features and/or ecological functionality/processes will not be impacted upon.</p>
<b>Duration of Negative or Positive Impact</b>	<p><b>5 – Permanent:</b> Impact will continue on a permanent basis.</p> <p><b>4 - Long term:</b> Impact should cease a period (&gt; 40 years) after the operational phase/project life of the activity.</p> <p><b>3 - Medium term:</b> Impact may occur for the period of the operational phase/project life of the activity.</p> <p><b>2 - Short term:</b> Impact may only occur during the construction phase of the activity after which it will cease.</p> <p><b>1 - Immediate:</b> Impact may only occur as a once off during the construction phase of the activity.</p>

<b>Extent of Positive or Negative Impact</b>	<p><b>5 - International:</b> Impact will extend beyond National boundaries.</p> <p><b>4 - National:</b> Impact will extend beyond Provincial boundaries but remain within National boundaries.</p> <p><b>3 - Regional:</b> Impact will extend beyond 5 km of the development footprint but remain within Provincial boundaries.</p> <p><b>2 - Local:</b> Impact will not extend beyond 5 km of the development footprint.</p> <p><b>1 - Site-specific:</b> Impact will only occur on or within 200 m of the development footprint.</p> <p><b>0 – No impact.</b></p>
<b>Irreplaceability of Natural Resources being impacted upon</b>	<p><b>5 – Definite</b> loss of irreplaceable natural resources.</p> <p><b>4 – High</b> potential for loss of irreplaceable natural resources.</p> <p><b>3 – Moderate</b> potential for loss of irreplaceable natural resources.</p> <p><b>2 – Low</b> potential for loss of irreplaceable natural resources.</p> <p><b>1 – Very low</b> potential for loss of irreplaceable natural resources.</p> <p><b>0 – No impact.</b></p>
<b>Reversibility of Impact</b>	<p><b>5 – Impact cannot</b> be reversed.</p> <p><b>4 – Low</b> potential that impact may be reversed.</p> <p><b>3 – Moderate</b> potential that impact may be reversed.</p> <p><b>2 – High</b> potential that impact may be reversed.</p> <p><b>1 – Impact will be</b> reversible.</p> <p><b>0 – No impact.</b></p>
<b>Probability of Impact Occurrence</b>	<p><b>5 - Definite:</b> Probability of impact occurring is &gt; 95 %.</p> <p><b>4 - High:</b> Probability of impact occurring is &gt; 75 %.</p> <p><b>3 - Medium:</b> Probability of impact occurring is between 25 % - 75 %.</p> <p><b>2 - Low:</b> Probability of impact occurring is between 5 % - 25 %.</p> <p><b>1 - Improbable:</b> Probability of impact occurring is &lt; 5 %.</p>
<b>Cumulative Impact</b>	<p><b>High:</b> Numerous similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p><b>Medium:</b> Few similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p><b>Low:</b> Virtually no similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts. The development is anticipated to be an isolated occurrence and should therefore have a negligible cumulative impact.</p> <p><b>None:</b> No cumulative impact.</p>

Once the Environmental Risk Ratings have been evaluated for each potential ecological impact, the Significance Score of each potential ecological impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum Significance Score value is 150.

The Significance Score is then used to rate the Environmental Significance of each potential ecological impact as per Table 4 below. The Environmental Significance rating process is completed for all identified potential ecological impacts both before and after implementation of the recommended mitigation measures.

**Table 4: Scale used for the evaluation of the Environmental Significance Ratings**

Environmental Significance Score	Environmental Significance Rating	Description/Criteria
125 – 150	Very high	An impact of very high significance after mitigation will mean that the development may not take place. The impact cannot be suitably reduced and mitigated to within acceptable levels.
100 – 124	High	An impact of high significance after mitigation should influence a decision about whether or not to proceed with the development. Additional, impact-specific mitigation measures must be implemented if the continuation of the development is to be considered.
75 – 99	Medium-high	Additional, impact-specific mitigation measures must be implemented for an impact of medium-high significance if the continuation of the development is to be considered.
50 – 74	Medium	An impact of medium significance after mitigation must be adequately managed in accordance with the mitigation measures provided by the specialist.
< 50	Low	If any mitigation measures are provided by the specialist for an impact of low significance after mitigation, the impact must be adequately managed in accordance with these measures.
+	Positive impact	A positive impact is likely to result in a beneficial consequence/effect and should therefore be viewed as a motivation for the development to proceed.

Wetlands/watercourses were identified and delineated on the proposed project area as per the methodology described below:

For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 36 of 1998) as: “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

In 2005 DWAF published a wetland delineation procedure in a guideline document titled “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas”. Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments.

The wetland delineation procedure identifies the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas. This constitutes the part of the wetland that might remain flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.

The guidelines also state that the locating of the outer edge of the temporary zone must make use of four specific indicators namely:

- terrain unit indicator,
- soil form indicator,
- soil wetness indicator and
- vegetation indicator.

In addition, the wetland/watercourse and a protective buffer zone beginning from the outer edge of the wetland temporary zone, was designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland. An adequate protective buffer zone, beginning from the outer edge of the wetland temporary zone, was implemented and designated as sensitive within which no development must be allowed to occur.

## 6. Study Area

The assessment area consists of a single footprint area of approximately 14.4 ha in size. The area is situated on the Remaining Extent of the Farm Dorp Frankfort no 74 (SG 21 Digit Code: F0140000000007400000). The assessment area is situated directly adjacent south of the town of Frankfort which forms part of the Mafube Local Municipality. This in turn, forms part of the Fezile Dabi District Municipality, Free State Province. Access to the assessment area is obtained via JJ Hadebe Street and a subsequent dirt road from the west.

Alternative 2 is approximately 10.5 ha in size and is situated directly adjacent north-west of the assessment area. Alternative 3 is approximately 14.5 ha in size and is located approximately 1.5 km north-east of the town of Frankfort.

See locality map below.



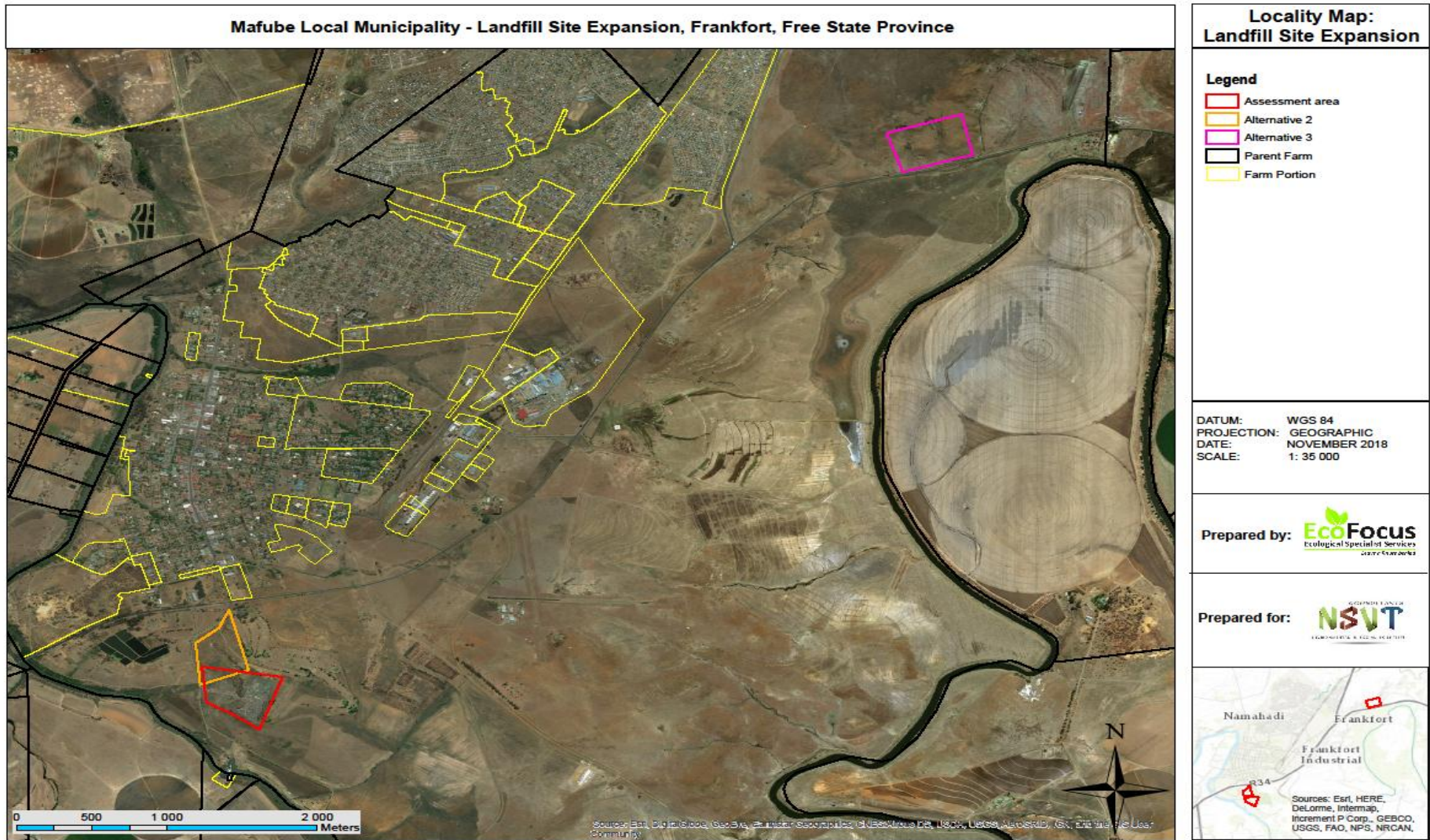


Figure 1: Two locality maps illustrating the assessment area and alternatives (see A3 sized map in the Appendices)

### 6.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 700 mm (www.climate-data.org). The maximum average monthly temperature is approximately 20.8°C in the summer months while the minimum average monthly temperature is approximately 8.2°C during the winter. Maximum daily temperatures can reach up to 27.5°C in the summer months and dip to as low as -1.5°C during the winter.

### 6.2. Geology and Soils

According to Mucina & Rutherford (2006) the geology of the landscape and associated vegetation type can be described as the following:

Mudstone or shale with sandstone of the Adelaide subgroup with Jurassic Karoo dolerite intrusions. Soils are Glenrosa, Bonheim and Avalon, with Mayo forms dominating the outcrops and slightly elevated areas. Sepane, Arcadia and Rensburg forms dominate the moist bottomlands. Most of the area is classified as Ea landtype while the rest is Ca.

### 6.3. Vegetation and Conservation Status

According to SANBI (2006- ), the entire assessment area as well as Alternative 2 and the majority of Alternative 3 fall within the Frankfort Highveld Grassland vegetation type (Gm 6) which is characterised by slightly undulating and undulating terrain dominated by grassland. The vegetation type is classified as vulnerable due to extensive cultivation activities and flooded dams in the larger region (SANBI, 2006- ). Only the northern portion of Alternative 3 falls within the Northern Free State Shrubland vegetation type (Gm 7) which is classified as least threatened (SANBI, 2006- ).

The entire assessment area and Alternative 2 is categorised as an Ecological Support Area two (ESA 2) while Alternative 3 is categorised as an ESA 1 in accordance with the Free State Provincial Spatial Biodiversity Plan 2017, which sets out biodiversity priority areas in the province. ESA's are areas that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a Critical Biodiversity Area (CBA) or protected area or that play an important role in delivering ecosystem services (Collins, 2017).

The proposed landfill site expansion will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

See vegetation and sensitivity maps below.



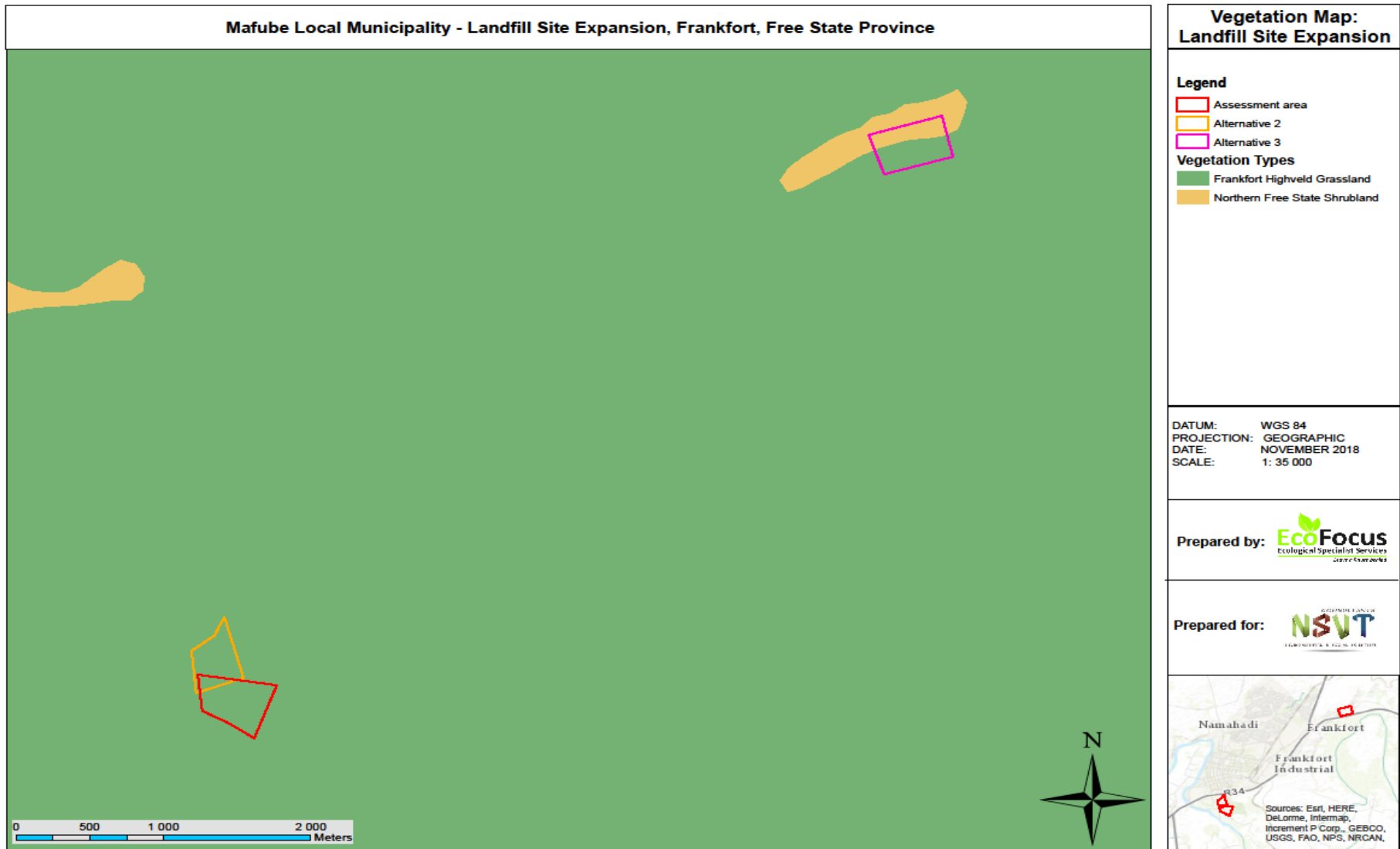


Figure 2: Vegetation map illustrating the vegetation types associated with the assessment area and alternatives (see A3 sized map in the Appendices)

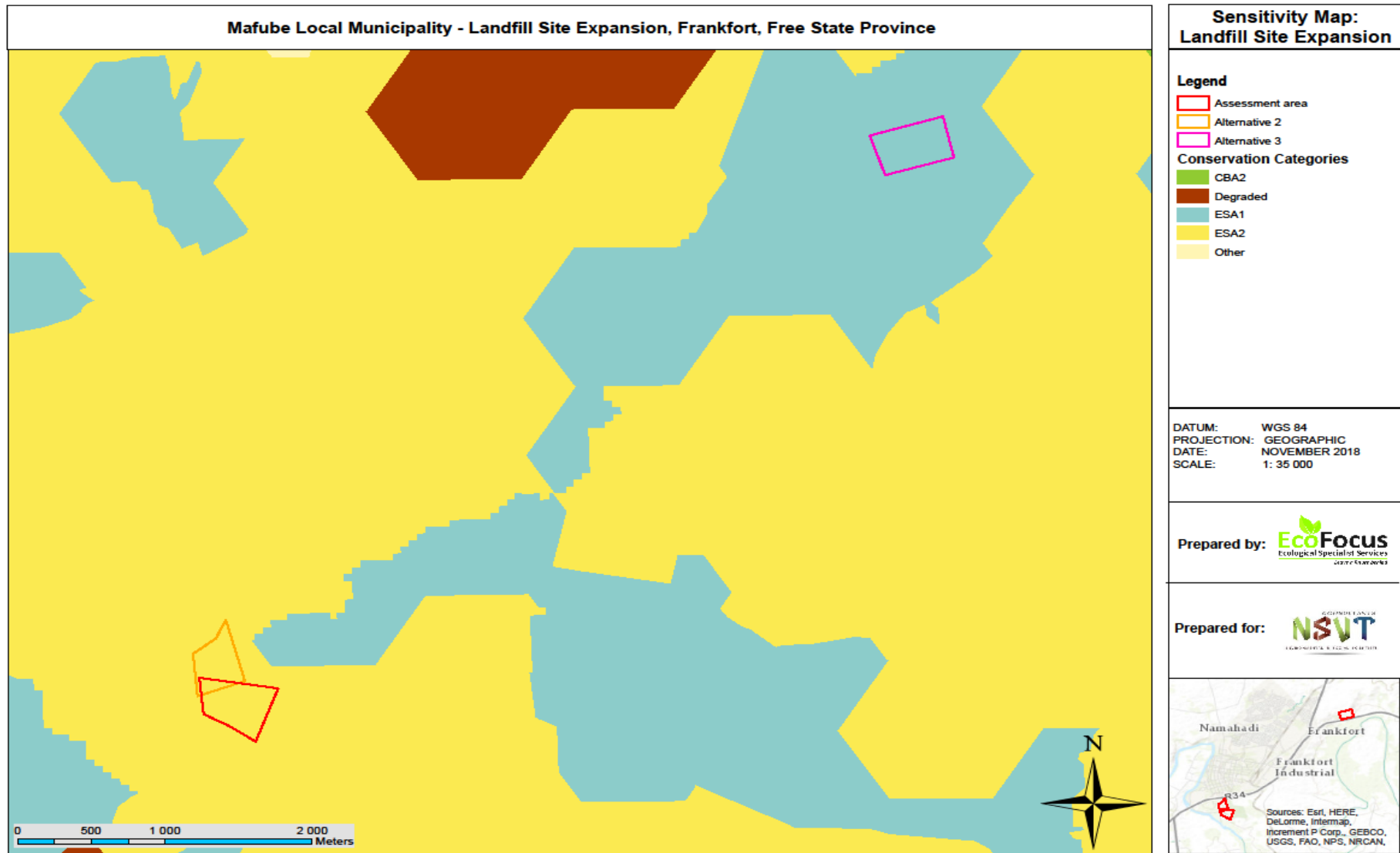


Figure 3: Sensitivity map illustrating the conservation status associated with the assessment area and alternatives (see A3 sized map in the Appendices)

## 7. Assumptions, Uncertainties and Gaps in Knowledge

Various assumptions need to be made during the assessment process at the hand of the relevant specialist. It is therefore assumed that:

- all relevant project information provided by the applicant and engineering design team to the ecological specialist was correct and valid at the time that it was provided.
- the proposed development area as provided by the engineering design team is correct and will not be significantly deviated from as this was the only area assessed.
- strategic level investigations undertaken by the applicant prior to the commencement of the Basic Assessment process, determined that the proposed development footprint represents a potentially suitable and technically acceptable location.
- the public, local communities, relevant organs of state and landowners will receive a sufficient reoccurring opportunity to participate and comment on the proposed project during the Basic Assessment process, through the provision of adequately facilitated public participation interventions and timeframes as stipulated in the NEMA: EIA Regulations, 2014.
- the need and desirability of the proposed project is based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints.
- the BA process is a project-level framework and the specialists are limited to assessing the anticipated environmental impacts associated with the construction and operational phases of the proposed project.
- it is assumed that strategic level decision making by the relevant authorities will be conducted through cooperative governance principles, with the consideration of environmentally sustainable and responsible development principles underpinning all decision making.

Given that a BA involves prediction, the uncertainty factor forms part of the assessment process. Two types of uncertainty are associated with the BA process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as observations and conclusions are made, only based on professional specialist opinion. Final certainty will only be obtained upon actual implementation of the proposed development. Adequate research, specialist experience and expertise should however minimise this uncertainty.
- Uncertainty of relevant decision making relates to the interpretation of provided information by relevant authorities during the BA process. Continual two way communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive

consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.

- The principle of human nature provides for uncertainties and unpredictability with regards to the socio-economic impacts of the proposed development and the subsequent public reaction/opinion which will be received during the Public Participation Process (PPP).

Gaps in knowledge can be attributed to:

- The ecological study process was undertaken prior to the availing of certain information which would only be derived from the final project design and layout. The design layout had not been finalised yet at the time of the ecological study.
- The potential of future similar developments in the same geographical area, which could lead to cumulative impacts cannot be meaningfully anticipated. It is however assumed that this development should adequately accommodate expected growing future needs for an extended period of time.

EcoFocus Consulting is an independent ecological specialist company. All information and recommendations as per this report are therefore provided in a fair and unbiased/objective manner based on professional specialist opinion.

## 8. Results and Discussion

### 8.1. Current Existing Vegetation and Site Condition

The assessment area is approximately 14.4 ha in size of which the eastern half constitutes the existing landfill site which is in a completely transformed and highly degraded condition. The area is actively used for dumping of domestic and general waste and is virtually completely devoid of any natural vegetation and ecological functionality.



**Figure 4: Image illustrating the completely transformed and highly degraded condition of the existing landfill site**

The historic excavation of the existing landfill site has created steep sideslopes around the outer perimeters of the site. The sideslopes which face outwards towards the surrounding landscape are moderately to highly degraded by anthropogenic activities associated with the existing landfill site. They merely pose a sparse grass layer and low growing, relatively dense woody component mainly dominated by shrubs of the species *Searsia pyroides*, *Leucosidea sericea* & *Asparagus laricinus*. This low growing woody component houses some common bird species and nests such as the Cape Sparrow (*Passer melanurus*), Southern Masked Weaver (*Ploceus velatus*) & Cape Turtle Doves (*Streptopelia capicola*) but no important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes. The assessment area and surrounding landscape also does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website ([www.birdlife.org.za/conservation/important-bird-areas/iba-map](http://www.birdlife.org.za/conservation/important-bird-areas/iba-map)).



**Figure 5: Image illustrating the low growing, relatively dense woody component of the outer sideslopes of the existing landfill site**

The western half of the assessment area is where the expansion of the existing landfill site is proposed to take place. This area constitutes a moderate to relatively steeply sloping landscape towards the west. All surface water runoff on the expansion area flows towards a single accumulation point on the western boundary of the area. From there it crosses JJ Hadebe Street and feeds into an ephemeral water drainage line which eventually discharges into the Wilge River located approximately 270 m south-west of the assessment area. The expansion area therefore forms part of the upper commencement of a small localised surface water catchment and drainage area.

The expansion area constitutes a moderate to highly degraded grassland landscape with sparse, low growing woody individuals. The significant degradation has mainly been caused by anthropogenic activities associated with the existing landfill site as well as overgrazing by livestock from the local community and frequent burning. Numerous footpaths also traverse the entire area. The area is therefore not reminiscent of the natural climactic state of the relevant Frankfort Highveld Grassland vegetation type (Gm 6).

A large portion of the expansion area along the access road, which leads into the existing landfill site, has also been highly degraded and polluted by unmanaged and illegal dumping of domestic and general waste as well as mechanical overturning of soils. This area is mainly dominated by legally declared invasive species such as *Datura stramonium*, *Argemone mexicana* & *Solanum*

*elaegnifolium* (all Category 1b). Due to the flow of surface water from the expansion area towards the west and accumulation into the ephemeral water drainage line, it is expected that a significant amount of this illegally dumped domestic and general waste will eventually find its way into the Wilge River during the rainy season. Active intervention should therefore be implemented as soon as practicably possible in order to prevent this from happening.



**Figure 6: Two images illustrating the degraded landscape of the proposed expansion area as well as the unmanaged and illegal dumping of domestic and general waste and mechanical overturning of soils along the access road. The woody component of the outer sideslopes is also evident in the background of the first image**

The grassland of the expansion area is mainly dominated by a low growing grass 'carpet' due to continuous overgrazing and frequent burning activities. The lack of grass tufts and seed development rendered the successful identification of grass species individuals very difficult which also reiterates the severity level of the disturbance of the grassland. Grass species which seem to be the most represented include *Eragrostis curvula*, *Cynodon dactylon*, *Cymbopogon pospischilii* & *Hyparrhenia hirta*.

Although the area is moderate to highly degraded, there is still a sparse but relatively well represented forbs layer present. Forbs species found to be present include *Gnidia caffra*, *Ledebouria marginata*, *Lessertia frutescens*, *Arctotis arctotoides*, *Senecio othonniflorus*, *Vernonia oligocephala*, *Salvia verbenaca*, *Ajuga ophrydis*, *Ipomoea bathycolpos*, *Senecio venosus*, *Melolobium canescens*, *Verbena aristigera*, *Helichrysum nudifolium* (provincially protected) & *Hermannia depressa*. Seventeen (17) individuals of the provincially protected species *Boophone disticha* were also found to be present within the expansion area. It is recommended that all of these individuals be removed prior to the commencement of the construction phase and adequately relocated to a suitable, similar open area.

No Red Data Listed-, nationally protected- or any other species of conservational significance were found to be present within the assessment area. Due to the presence of the existing landfill site, the area is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes.







Figure 7: Two images illustrating examples of the provincially protected species *Boophone disticha*

## 8.2. Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

The Present Ecological State (PES) of the proposed expansion area is classified as Class D as it is largely modified. A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred due to anthropogenic activities associated with the existing landfill site as well as overgrazing by livestock from the local community and frequent burning. Numerous footpaths also traverse the entire area. The area is therefore not reminiscent of the natural climactic state of the relevant Frankfort Highveld Grassland vegetation type (Gm 6).

The proposed expansion area forms part of the upper commencement of a small localised surface water catchment and drainage area which eventually discharges into the Wilge River located approximately 270 m south-west of the assessment area. Due to the large portion of the expansion area along the access road being highly degraded and polluted by unmanaged and illegal dumping of domestic and general waste, it is expected that a significant amount of this illegally dumped domestic and general waste will eventually find its way into the Wilge River during the rainy season. Active intervention should therefore be implemented as soon as practicably possible in order to prevent this from happening.

Although the entire assessment area is categorised as an Ecological Support Area two (ESA 2), the proposed expansion area constitutes a moderate to highly degraded grassland landscape. With the exception of two provincially protected species, no Red Data Listed-, nationally protected- or any other species of conservational significance were found to be present within the assessment area. Due to the presence of the existing landfill site, the area is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. No important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes. The assessment area and surrounding landscape also does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website ([www.birdlife.org.za/conservation/important-bird-areas/iba-map](http://www.birdlife.org.za/conservation/important-bird-areas/iba-map)).

The Ecological Importance and Sensitivity (EIS) of the proposed expansion area is classified as Class C (low) as it can be viewed as being ecologically important and sensitive on local scale mainly due to it forming part of the small localised water catchment and drainage area as well as the presence of the two provincially protected species. Biodiversity is however still relatively ubiquitous and not sensitive to further habitat modifications due to its existing degraded state. The proposed expansion

area is therefore not viewed as being of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type and surface water catchment and drainage area.

### 8.3. Species List for the Assessment Area

**Table 5: Species list for the assessment area (Provincially protected species highlighted in yellow; Legally declared invasive species highlighted in pink)**

Graminoids	Forbs	Shrubs & trees
<i>Cymbopogon pospischilii</i>	<i>Ajuga ophrydis</i>	<i>Asparagus larycinus</i>
<i>Cynodon dactylon</i>	<i>Arctotis arctotoides</i>	<i>Leucosidea sericea</i>
<i>Eragrostis curvula</i>	<i>Argemone mexicana</i>	<i>Searsia pyroides</i>
<i>Hyparrhenia hirta</i>	<i>Boophone disticha</i>	-
-	<i>Datura stramonium</i>	-
-	<i>Gnidia caffra</i>	-
-	<i>Helichrysum nudifolium</i>	-
-	<i>Hermannia depressa</i>	-
-	<i>Ipomoea bathycolpos</i>	-
-	<i>Ledebouria marginata</i>	-
-	<i>Lessertia frutescens</i>	-
-	<i>Melolobium canescens</i>	-
-	<i>Salvia verbenaca</i>	-
-	<i>Senecia othonniflorus</i>	-
-	<i>Senecio venosus</i>	-
-	<i>Solanum elaeagnifolium</i>	-
-	<i>Verbena aristigera</i>	-
-	<i>Vernonia oligocephala</i>	-

#### 8.4. Ecological Sensitivity Map

The sensitivity map below illustrates the locations of the seventeen (17) individuals of the provincially protected species *Boophone disticha*; the highly degraded and polluted area and the ephemeral water drainage line which continues from the single accumulation point towards the Wilge River.

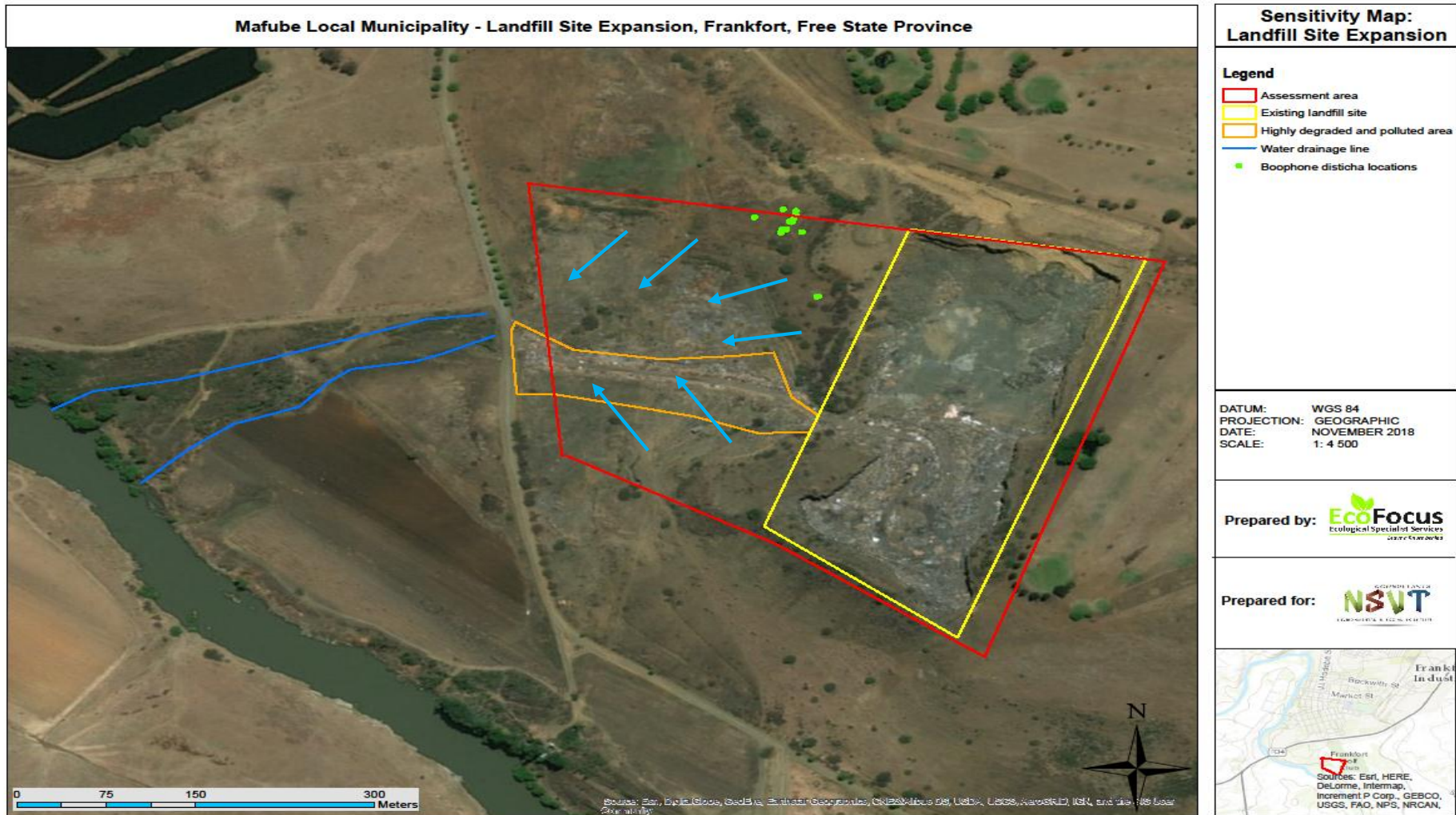


Figure 8: Sensitivity map illustrating the locations of the provincially protected species *Boophone disticha* individuals; the highly degraded and polluted area and the ephemeral water drainage line which continues from the single accumulation point towards the Wilge River (see A3 sized map in the Appendices)

### 8.5. Alternative 2

Alternative 2 is approximately 10.5 ha in size and is situated directly adjacent north-west of the assessment area. Alternative 2 constitutes a slightly less degraded grassland landscape relative to the assessment area, but is still in a moderately disturbed and degraded state also mainly caused by anthropogenic activities associated with the existing landfill site as well as overgrazing by livestock from the local community and frequent burning. Numerous footpaths also traverse the entire area. The area is therefore also not reminiscent of the natural climactic state of the relevant Frankfort Highveld Grassland vegetation type (Gm 6).

Alternative 2 however houses in excess of fifty (50) individuals of the provincially protected species *Boophone disticha* which is significantly more compared to the assessment area. Alternative 2 also forms part of the upper commencement of the same small localised surface water catchment and drainage area as the assessment area.

Due to the slightly less degraded state of Alternative 2 relative to the assessment area as well as the significant presence of provincially protected species individuals, it is not recommended that Alternative 2 be considered for development instead of the assessment area.

### 8.6. Alternative 3

Alternative 3 is approximately 14.5 ha in size and is located approximately 1.5 km north-east of the town of Frankfort. Alternative 3 constitutes a relatively natural landscape associated with an Ecological Support Area one (ESA 1) and the vulnerable Frankfort Highveld Grassland vegetation type (Gm 6).

A number of ephemeral watercourses also traverse Alternative 3 which subsequently feed into the Wilge River located approximately 370 m south-east of Alternative 3. Alternative 3 also forms part of the upper commencement of a quaternary surface water catchment and drainage area.

Due to the relatively natural landscape of Alternative 3 and the surrounding areas as well as the presence of a number of ephemeral watercourses, it is not recommended that Alternative 3 be considered for development instead of the assessment area.



## 9. Ecological Impact Assessment

The following section identifies the potential ecological impacts (both positive and negative) which the proposed project will have on the surrounding environment.

Once the potential ecological impacts are identified, they are assessed by rating their Environmental Risk after which the final Environmental Significance is calculated and rated for each identified ecological impact.

The same Environmental Risk rating process is then followed for each ecological impact to determine the Environmental Significance if the recommended mitigation measures were to be implemented.

The objective of this section is therefore firstly to identify all the potential ecological impacts of the proposed project and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The potential ecological impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implement of effective management strategies for them.

### 9.1. Construction Phase

#### **Transformation of terrestrial vegetation on the assessment area associated with the Frankfort Highveld Grassland vegetation type (Gm 6)**

The proposed landfill site expansion will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

The Frankfort Highveld Grassland vegetation type (Gm 6) associated with the assessment area, is classified as vulnerable due to extensive cultivation activities and flooded dams in the larger region (SANBI, 2006- ). The assessment area is however in a moderate to highly degraded state and scored a low PES value. The significant degradation has mainly been caused by anthropogenic activities associated with the existing landfill site as well as overgrazing by livestock from the local community and frequent burning. Numerous footpaths also traverse the entire area. The area is therefore not reminiscent of the natural climactic state of the relevant vegetation type. The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### **Transformation of an Ecological Support Area two (ESA 2) associated with the assessment area**

The proposed landfill site expansion will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

Although the entire assessment area is categorised as an Ecological Support Area two (ESA 2), the proposed expansion area constitutes a moderate to highly degraded grassland landscape.

The proposed expansion area forms part of the upper commencement of a small localised surface water catchment and drainage area which eventually discharges into the Wilge River located approximately 270 m south-west of the assessment area. Due to the large portion of the expansion area along the access road being highly degraded and polluted by unmanaged and illegal dumping of domestic and general waste, it is expected that a significant amount of this illegally dumped domestic and general waste will eventually find its way into the Wilge River during the rainy season. Active intervention should therefore be implemented as soon as practicably possible in order to prevent this from happening.

The assessment area scored a moderate EIS value and the proposed expansion area is therefore not viewed as being of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type and surface water catchment and drainage area. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### **Destruction of-/damage to Red Data Listed, nationally or provincially protected species individuals/habitats associated with the assessment area**

The proposed landfill site expansion will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

Seventeen (17) individuals of the provincially protected species *Boophone disticha* as well as a number of *Helichrysum nudifolium* (provincially protected) individuals were found to be present within the expansion area.

No Red Data Listed-, nationally protected- or any other species of conservational significance were found to be present within the assessment area.

Due to the presence of the existing landfill site, the area is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. No important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes. The assessment area and surrounding landscape also does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website ([www.birdlife.org.za/conservation/important\\_bird\\_areas/iba-map](http://www.birdlife.org.za/conservation/important_bird_areas/iba-map)). The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

#### **Terrestrial invasive species establishment**

A large portion of the expansion area along the access road, which leads into the existing landfill site, is mainly dominated by legally declared invasive species such as *Datura stramonium*, *Argemone mexicana* & *Solanum elaeagnifolium* (all Category 1b). These individuals will in fact be removed during the construction phase which will prove to be beneficial to the environment. No other significant alien invasive species establishments were found to be present within the rest of the assessment area.

The assessment area and surrounding areas could potentially be prone to significant alien invasive species establishment due to surface disturbances and vegetation clearance caused by construction activities. The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

#### **Surface material erosion**

The proposed expansion area constitutes a moderate to relatively steeply sloping landscape towards the west. All surface water runoff on the expansion area flows towards a single accumulation point on the western boundary of the area. The assessment area could therefore potentially be prone to significant surface soil erosion due to the loosening of materials and clearance of vegetation caused by construction activities which usually binds surface material. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### **Dust generation and emissions**

The activities associated with the proposed project construction phase could potentially result in significant fugitive dust emissions due to vegetation removal. This could spread into the surrounding natural areas and Wilge River. The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### **Impeding of the water catchment and drainage area**

The proposed expansion area forms part of the upper commencement of a small localised surface water catchment and drainage area which eventually discharges into the Wilge River located approximately 270 m south-west of the assessment area.

The proposed development could cause impediment of the catchment area due to artificial obstruction of natural surface water flow during rainfall events. The proposed footprint is small relative to the broader catchment and drainage area of the Wilge River and the transformation of the proposed development footprint area should therefore not make a significant difference in surface water drainage towards the Wilge River. The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### **Contamination of the Wilge River and subsequent reduction of surface water quality**

Due to the large portion of the expansion area along the access road being highly degraded and polluted by unmanaged and illegal dumping of domestic and general waste, it is expected that a significant amount of this illegally dumped domestic and general waste will eventually find its way into the Wilge River during the rainy season. Active intervention should therefore be implemented as soon as practicably possible in order to prevent this from happening.

Dirty water runoff from the assessment area during the construction phase caused by hydrocarbon or other chemical spills by machinery and equipment, could also potentially move into the Wilge River which could contaminate and negatively impact on the water quality and subsequent ecological functionality of the area. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

## 9.2. Operational Phase

Once the construction phase has been completed, there should be no significant additional or new ecological impacts associated with the operational phase over and above the already discussed significant long term impacts of the operational phase. The destruction of-/damage to Red Data Listed, nationally or provincially protected species individuals/habitats was discussed under the construction phase impact section as a long term impact which will continue throughout the entire lifespan and operational phase of the proposed project.

A number of identified potential ecological impacts could however change in nature and increase in significance from the construction phase into the operational phase and will continue throughout while a few additional potential ecological impact could additionally take place during the operational phase.

### **Ecological degradation and alien invasive species establishment due to the ecological 'edge effect' caused by the development**

The natural areas surrounding the proposed development footprint could potentially be prone to continued significant ecological degradation and alien invasive species establishment due to the ecological 'edge effect' caused by continuous disturbances from operational activities. Waste facilities tend to decrease the ecological integrity of the immediately surrounding landscape due to inadequate containment of light weighted plastics and other waste products which undesirably get dispersed into the surrounding environment and subsequently impact on the ecology. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### **Death of wild animals due to ingestion of light weighted plastics and other waste products**

Wild animals could inadvertently ingest light weighted plastics and other waste products which have been undesirably dispersed into the surrounding natural area. Such ingestion could cause serious physiological harm or even death. The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

**Continued impeding of the water catchment and drainage area**

Once the construction of the development has been completed, the proposed development could potentially result in continued impediment of the water catchment and drainage area due to artificial obstruction of natural surface water flow during rainfall events. The proposed footprint is small relative to the broader catchment and drainage area of the Wilge River and the transformation of the proposed development footprint area should therefore not make a significant difference in surface water drainage towards the Wilge River. The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

**Continued contamination of the Wilge River and subsequent reduction of surface water quality**

Dirty water runoff from the assessment area during the operational phase could potentially continue to move into the Wilge River which could continuously contaminate and negatively impact on the water quality and subsequent ecological functionality of the area. The significance of this potential impact will be medium-high.

Mitigation measures to reduce impacts are recommended under heading 9.4.

**Contamination of groundwater and subsequent reduction of groundwater quality towards the Wilge River**

Leakages or seepages of contaminated liquid waste materials disposed of at the site during the operational phase could potentially infiltrate into the groundwater system and result in significant continued chemical and biological contamination and reduction in groundwater quality. This could have a significant negative impact on the water quality of the Wilge River. The significance of potential contamination of groundwater will be medium-high.

Mitigation measures to reduce impacts are recommended under heading 9.4.

### 9.3. Cumulative Impacts

The majority of the potential cumulative impacts associated with the proposed development along with the existing landfill site should not be significantly high. The expansion of the existing landfill site and subsequent increase in general and domestic waste volumes being disposed of, could however potentially add significant cumulative impacts on groundwater contamination and quality as well as on contamination of local surface water catchment and drainage if not adequately managed. Adequate implementation and management of the recommended mitigation measures should however be able to reduce anticipated residual cumulative impacts.

It is therefore not anticipated that the proposed development would pose any significant potential residual cumulative ecological impacts within the broader region.

The management and future decommissioning of the landfill site should also be adequately managed and completed in order to prevent any significant impacts from continuing over time.

#### **9.4. Risk Ratings of Potential Impacts**

The following section provides the Environmental Risk as well as the Environmental Significance Ratings for the potential ecological impacts for the proposed project both before and after implementation of the recommended mitigation measures.



## 9.4.1. Construction Phase

Table 6: Environmental Risk and Significance Ratings

	Assessment Area	No go alternative
<b>Identified Environmental Impact</b>	<b>Transformation of terrestrial vegetation on the assessment area associated with the Frankfort Highveld Grassland vegetation type (Gm 6)</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-
<b>Duration of Negative or Positive Impact</b>	Long term (4)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Low (2)	-
<b>Reversibility of Impact</b>	Low (4)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (48)	-

<p style="text-align: center;"><b>Mitigation Measures to be implemented</b></p>	<p>It is recommended that the assessment area be applied for, for development purposes. Alternatives 2 and 3 are therefore not recommended for development.</p> <p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>No site construction camp to be established in any natural surrounding areas outside the proposed development area. Site camps only to be established within the proposed development footprint.</p> <p>Adequately fence off the construction area and ensure that no construction activities, machines or equipment operate or impact outside the fenced off area.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas.</p> <p>Areas surrounding construction footprints must be adequately rehabilitated as soon as practically possible after construction.</p>	
<p style="text-align: center;"><b>Cumulative Impact Rating after mitigation implementation</b></p>	<p>Low</p>	<p>-</p>

<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (39)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Transformation of an Ecological Support Area two (ESA 2) associated with the assessment area</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-
<b>Duration of Negative or Positive Impact</b>	Long term (4)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	Low (4)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-

<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium (51)	-
<b>Mitigation Measures to be implemented</b>	<p>It is recommended that the assessment area be applied for, for development purposes. Alternatives 2 and 3 are therefore not recommended for development.</p> <p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>No site construction camp to be established in any natural surrounding areas outside the proposed development area. Site camps only to be established within the proposed development footprint.</p> <p>Adequately fence off the construction area and ensure that no construction activities, machines or equipment operate or impact outside the fenced off area.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas.</p> <p>Areas surrounding construction footprints must be adequately rehabilitated as soon as practically possible after construction.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-

<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (42)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Destruction of-/damage to Red Data Listed, nationally or provincially protected species individuals/habitats</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-
<b>Duration of Negative or Positive Impact</b>	Long term (4)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	Low (4)	-
<b>Probability of Impact Occurrence</b>	High (4)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Medium	-

<b>Environmental Significance Score and Rating prior to mitigation</b>	<b>Medium (68)</b>	-
<b>Mitigation Measures to be implemented</b>	<p>It is recommended that the assessment area be applied for, for development purposes. Alternatives 2 and 3 are therefore not recommended for development.</p> <p>A Provincial Flora Permit has to be obtained for all provincially protected species found to be present within the assessment area prior to the commencement of any construction activities.</p> <p>It is recommended that the seventeen (17) individuals of the provincially protected species <i>Boophone disticha</i> be removed prior to the commencement of the construction phase and adequately relocated to a suitable, similar open area.</p> <p>A Plant Relocation Management Plan must be compiled by a suitably qualified and experienced ecologist for the removal process.</p> <p>The project construction footprint must be kept as small as practicably possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.</p> <p>No site construction camp to be established in any natural surrounding areas outside the proposed development area. Site camps only to be established within the proposed development footprint.</p>	

	<p>Adequately fence off the construction area and ensure that no construction activities, machines or equipment operate or impact outside the fenced off area.</p> <p>Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas.</p> <p>Areas surrounding construction footprints must be adequately rehabilitated as soon as practically possible after construction.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (28)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Terrestrial invasive species establishment</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-
<b>Duration of Negative or Positive Impact</b>	Short term (2)	-

<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Low (2)	-
<b>Reversibility of Impact</b>	High (2)	-
<b>Probability of Impact Occurrence</b>	High (4)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (48)	-
<b>Mitigation Measures to be implemented</b>	<p>Alien invasive species individuals currently on site must be actively eradicated from the assessment area and adequately disposed of in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014.</p> <p>Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the construction phase. Such a management plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated to prevent significant alien invasive species establishment.</p>	



<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (18)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	Surface material erosion	
<b>Magnitude of Negative or Positive Impact</b>	Medium (6)	-
<b>Duration of Negative or Positive Impact</b>	Short term (2)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Low (2)	-
<b>Reversibility of Impact</b>	High (2)	-
<b>Probability of Impact Occurrence</b>	High (4)	-

<b>Cumulative Impact Rating prior to mitigation</b>	Medium	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium (56)	-
<b>Mitigation Measures to be implemented</b>	<p>An adequate Storm water and Erosion Management Plan must be implemented for the entire assessment area during the construction phase. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation in order to prevent any significant erosion from occurring.</p> <p>Areas within and immediately surrounding the assessment area must be adequately rehabilitated to prevent significant erosion.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (18)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Dust generation and emissions</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-

<b>Duration of Negative or Positive Impact</b>	Short term (2)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Low (2)	-
<b>Reversibility of Impact</b>	High (2)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (36)	-
<b>Mitigation Measures to be implemented</b>	<p>Implement suitable dust management and prevention measures during the construction phase.</p> <p>Areas within and immediately surrounding the proposed project footprints must be adequately rehabilitated to prevent significant dust emissions.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-

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<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (9)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Impeding of the water catchment and drainage area</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-
<b>Duration of Negative or Positive Impact</b>	Short term (2)	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	High (2)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-

<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (42)	-
<b>Mitigation Measures to be implemented</b>	<p>An adequate Storm water Management Plan must be implemented within the assessment area during the construction phase. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation during the construction phase. This must be done to ensure continued ecological functionality of the local catchment.</p> <p>Storm water collected from the footprint surface area must be managed and channelled through an integrated storm water system.</p> <p>Adequate management of storm water runoff quality, quantities and flow speed from the proposed development area during the construction phase will play an integral role in the preservation of the catchment area's integrity.</p> <p>Surface water runoff approaching the proposed project footprint area from topographically higher areas must be diverted around the footprint.</p> <p>A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation if required in accordance with the National Water Act (Act 36 of 1998).</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (22)	-

	Assessment Area	No go alternative
<b>Identified Environmental Impact</b>	<b>Contamination of the Wilge River and subsequent reduction of surface water quality</b>	
<b>Magnitude of Negative or Positive Impact</b>	Medium (6)	-
<b>Duration of Negative or Positive Impact</b>	Short term (2)	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	Moderate (3)	-
<b>Probability of Impact Occurrence</b>	High (4)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Medium	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium (68)	
<b>Mitigation Measures to be implemented</b>	An adequate Storm water Management Plan must be implemented within the assessment area during the construction phase. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation during the construction phase. This must be done to ensure continued ecological functionality of the	

local catchment.

Storm water collected from the footprint surface area must be managed and channelled through an integrated storm water system.

Adequate management of storm water runoff quality, quantities and flow speed from the proposed development area during the construction phase will play an integral role in the preservation of the catchment area's integrity.

Surface water runoff approaching the proposed project footprint area from topographically higher areas must be diverted around the footprint.

A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation if required in accordance with the National Water Act (Act 36 of 1998).

A comprehensive South African Scoring System 5 (SASS 5) aquatic bio-monitoring assessment must be conducted of the Wilge River directly downstream of the proposed project area prior to commencement of the construction phase. This information will serve as baseline watercourse health data to be used for subsequent monitoring assessments to be conducted. Such an assessment must be conducted by a suitably qualified and experienced ecologist.

Water samples of the Wilge River must be collected directly downstream of the proposed project area prior to commencement of the construction phase. The quality of these samples must be chemically and biologically analysed by an accredited laboratory in order to serve as baseline water quality data to be used for subsequent monitoring assessments to be conducted.

	<p>If hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably possible from the Wilge River.</p> <p>Hydrocarbon and other chemical storage areas must be adequately banded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.</p> <p>Adequate hydrocarbon and other chemical storage, handling and usage procedures must be developed and all relevant construction personnel must be sufficient trained on- and apply these procedures during the entire construction phase.</p> <p>The unmanaged and illegally dumped domestic waste on the large portion of the expansion area along the access road, which leads into the existing landfill site, must be cleaned up and adequately disposed of at the existing landfill site as soon as practicably possible prior to the commencement of the rainy season.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (28)	-



## 9.4.2. Operational Phase

Table 7: Environmental Risk and Significance Ratings

	Assessment Area	No go alternative
<b>Identified Environmental Impact</b>	<b>Ecological degradation and alien invasive species establishment due to the ecological 'edge effect' caused by the development</b>	
<b>Magnitude of Negative or Positive Impact</b>	Low (4)	-
<b>Duration of Negative or Positive Impact</b>	Medium term (3)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Low (2)	-
<b>Reversibility of Impact</b>	High (2)	-
<b>Probability of Impact Occurrence</b>	High (4)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Low (52)	-

<p><b>Mitigation Measures to be implemented</b></p>	<p>Ensure that sufficient waste storage and disposal measures are implemented in order to adequately manage and contain light weighted plastics and other waste products to prevent significant undesired dispersal into surrounding natural areas. This will subsequently prevent ecological degradation and alien invasive species establishment.</p> <p>Community or municipal initiatives should be implemented for the annual clean-up of natural areas surrounding the facility.</p> <p>Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the operational phase. Such a management plan must be compiled by a suitably qualified and experienced ecologist.</p>	
<p><b>Cumulative Impact Rating after mitigation implementation</b></p>	<p>Low</p>	<p>-</p>
<p><b>Environmental Significance Score and Rating after mitigation implementation</b></p>	<p>Low (20)</p>	<p>-</p>
	<p><b>Assessment Area</b></p>	<p><b>No go alternative</b></p>
<p><b>Identified Environmental Impact</b></p>	<p><b>Death of wild animals due to ingestion of light weighted plastics and other waste products</b></p>	
<p><b>Magnitude of Negative or Positive Impact</b></p>	<p>Medium (6)</p>	<p>-</p>

<b>Duration of Negative or Positive Impact</b>	Medium term (3)	-
<b>Extent of Positive or Negative Impact</b>	Local (2)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	Moderate (3)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium (51)	-
<b>Mitigation Measures to be implemented</b>	<p>Ensure that sufficient waste storage and disposal measures are implemented in order to adequately manage and contain light weighted plastics and other waste products to prevent significant undesired dispersal into surrounding natural areas.</p> <p>Community or municipal initiatives should be implemented for the annual clean-up of natural areas surrounding the facility.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-

<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (28)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Continued impeding of the water catchment and drainage area</b>	
<b>Magnitude of Negative or Positive Impact</b>	Medium (6)	-
<b>Duration of Negative or Positive Impact</b>	Medium term (3)	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	Moderate (3)	-
<b>Probability of Impact Occurrence</b>	Medium (3)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Low	-

<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium (54)	-
<b>Mitigation Measures to be implemented</b>	<p>An adequate Storm water Management Plan must be implemented within the assessment area during the operational phase. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation during the operational phase. This must be done to ensure continued ecological functionality of the local catchment.</p> <p>Storm water collected from the footprint surface area must be managed and channelled through an integrated storm water system.</p> <p>Adequate management of storm water runoff quality, quantities and flow speed from the proposed development area during the operational phase will play an integral role in the preservation of the catchment area's integrity.</p> <p>Surface water runoff approaching the proposed project footprint area from topographically higher areas must be diverted around the footprint.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (15)	-

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	Assessment Area	No go alternative
<b>Identified Environmental Impact</b>	<b>Continued contamination of the Wilge River and subsequent reduction of surface water quality</b>	
<b>Magnitude of Negative or Positive Impact</b>	High (8)	-
<b>Duration of Negative or Positive Impact</b>	Medium term (3)	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	Moderate (3)	-
<b>Reversibility of Impact</b>	Low (4)	-
<b>Probability of Impact Occurrence</b>	High (4)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Medium	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium-high (84)	-
<b>Mitigation Measures to be implemented</b>	An adequate Storm water Management Plan must be implemented within the assessment area during the operational phase. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation during the operational phase. This must be done to ensure continued ecological functionality of the	

local catchment.

Storm water collected from the footprint surface area must be managed and channelled through an integrated storm water system.

Adequate management of storm water runoff quality, quantities and flow speed from the proposed development area during the operational phase will play an integral role in the preservation of the catchment area's integrity.

Surface water runoff approaching the proposed project footprint area from topographically higher areas must be diverted around the footprint.

Dirty surface water runoff on the operational surface area must be collected and adequately treated prior to it being released into the surrounding environment.

A South African Scoring System 5 (SASS 5) aquatic bio-monitoring assessment needs to be done of the Wilge River on a six monthly basis. This data must then be compared to the initial pre-construction baseline data.

If any contamination or reduction in water quality and the SASS 5 scores is determined due to the project, the competent authority must immediately be notified and the necessary steps must be followed by the project owner to locate and remediate the source of contamination as soon as practicably possible.

Water samples of the Wilge River must be collected directly downstream of the proposed project area on a minimum six monthly basis. The quality of these samples must be chemically and biologically analysed by an accredited laboratory and be compared to the initial pre-construction baseline data.

<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (32)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Contamination of groundwater and subsequent reduction of groundwater quality towards the Wilge River</b>	
<b>Magnitude of Negative or Positive Impact</b>	High (8)	-
<b>Duration of Negative or Positive Impact</b>	Long term (4)	-
<b>Extent of Positive or Negative Impact</b>	Regional (3)	-
<b>Irreplaceability of Natural Resources being impacted upon</b>	High (4)	-
<b>Reversibility of Impact</b>	Low (4)	-
<b>Probability of Impact Occurrence</b>	High (4)	-



<b>Cumulative Impact Rating prior to mitigation</b>	Medium	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium-High (92)	-
<b>Mitigation Measures to be implemented</b>	<p>The waste facility must be sufficiently lined underground in order to prevent undesired seepages or leaks into the groundwater.</p> <p>The integrity of the lining must be maintained and re-evaluated annually in order to ensure its functionality.</p> <p>A leachate pond must be constructed in order to store and treat leachates for adequate disposal.</p> <p>Groundwater samples must be collected directly downstream of the proposed project area prior to the commencement of the operational phase and the quality must be chemically and biologically analysed by an accredited laboratory in order to serve as baseline values for the groundwater quality.</p> <p>Groundwater samples must then be collected and the quality must be chemically and biologically analysed by an accredited laboratory on a continual minimum 6 monthly basis and compared with the baseline data.</p> <p>If any contamination or reduction in groundwater quality is determined due to the project, the competent authority must immediately be notified and the necessary steps must be followed by the project owner to locate and remediate the source of contamination as soon as practicably possible.</p>	

<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (40)	-

## 10. Summary and Conclusion

The proposed landfill site expansion will in all probability completely transform the majority of the existing surface vegetation on the assessment area.

The Frankfort Highveld Grassland vegetation type (Gm 6) associated with the assessment area, is classified as vulnerable due to extensive cultivation activities and flooded dams in the larger region (SANBI, 2006- ). The assessment area is however in a moderate to highly degraded state and scored a low PES value. The significant degradation has mainly been caused by anthropogenic activities associated with the existing landfill site as well as overgrazing by livestock from the local community and frequent burning. Numerous footpaths also traverse the entire area. The area is therefore not reminiscent of the natural climactic state of the relevant vegetation type.

With the exception of the two provincially protected species *Boophone disticha* & *Helichrysum nudifolium*, no Red Data Listed-, nationally protected- or any other species of conservational significance were found to be present within the assessment area. Due to the presence of the existing landfill site, the area is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the area for breeding and persistence purposes. No important bird species, unique or specialised bird habitats were observed or are expected to utilise the area for breeding or persistence purposes. The assessment area and surrounding landscape also does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website ([www.birdlife.org.za/conservation/important-bird-areas/iba-map](http://www.birdlife.org.za/conservation/important-bird-areas/iba-map)).

All surface water runoff on the expansion area flows towards a single accumulation point on the western boundary of the area. From there it crosses JJ Hadebe Street and feeds into an ephemeral water drainage line which eventually discharges into the Wilge River located approximately 270 m south-west of the assessment area. The expansion area therefore forms part of the upper commencement of a small localised surface water catchment and drainage area. Due to a large portion of the expansion area along the access road being highly degraded and polluted by unmanaged and illegal dumping of domestic and general waste, it is expected that a significant amount of this illegally dumped domestic and general waste will eventually find its way into the Wilge River during the rainy season. Active intervention should therefore be implemented as soon as practicably possible in order to prevent this from happening. Therefore, although the entire assessment area is categorised as an Ecological Support Area two (ESA 2), the proposed expansion

area constitutes a moderate to highly degraded grassland landscape and subsequently scored a moderate EIS value. The proposed expansion area is not viewed as being of high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type and surface water catchment and drainage area.

It is the opinion of the specialist that the proposed development poses two potentially significant ecological impacts namely contamination of the surface water catchment and drainage area towards the Wilge River as well as contamination of ground water. These potential impacts can however be suitably reduced and mitigated to within acceptable residual levels. The project should therefore be considered by the competent authority for environmental authorisation and approval. It is recommended that the assessment area be applied for, for development purposes. Alternatives 2 and 3 are therefore not recommended for development.

The proposed development may however only continue if all recommended mitigations measures as per this ecological report are adequately implemented and managed for both the construction and operational phases of the proposed project. All necessary authorisations and permits must also be obtained prior to any commencement.

## 11. References

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Mucina, L. & Rutherford, M.C. (eds.) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

National Environmental Management Act (Act 107 of 1998)

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Van Oudtshoorn, F. 2004. Gids tot Grasse van SuidAfrika. 2nd Ed. Briza Publikasies.

[www.climate-data.org](http://www.climate-data.org)

## 12. Details of the Specialist

Adriaan Johannes Hendrikus Lamprecht (Pr.Sci.Nat)

M.Env.Sci. Ecological remediation and sustainable utilisation (NWU: Potchefstroom)

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## Abbreviated Curriculum Vitae

### Qualifications

- M.Env.Sci Ecological Remediation and Sustainable Utilisation/Vegetation Ecology
  - 2010 - North West University Potchefstroom
- B.Sc Botany and Zoology (Cum Laude)
  - 2008 - North West University Potchefstroom

### Accredited courses completed

- Implementing Environmental Management Systems ISO 14001
  - 2011 - North West University Potchefstroom
- Environmental Law for Environmental Managers
  - 2011 - North West University Potchefstroom
- SASS 5 Aquatic Biomonitoring Training Course
  - 2017 – GroundTruth Consulting

### Professional registrations

- South African Council for Natural Scientific Professions (**SACNASP**)
  - Professional Ecological Scientist Registration number 115601

- International Association for Impact Assessment (**IAIA**)
  - Registration number 5232
- South African Green Industries Council (**SAGIC**) Invasive Species training
  - Registration number 2405/2459

### **Employment and Experience Background**

Upon completion of his studies, Rikus started his career in 2011 as an **Environmental Professional in Training (PIT) at Anglo American Thermal Coal: Environmental Services**. He received environmental training and practical implementation experience in all environmental facets of the mining industry with the focus on: Environmental rehabilitation, land management (biodiversity and invasive species eradication), waste & water-, air quality-, game reserve-, environmental management and legislation, as well as corporate reporting. He was also appointed as the Biodiversity management custodian at Anglo American Thermal Coal collieries.

He was subsequently employed by **Fraser Alexander Tailings from October 2011 to the end of November 2015 as an Environmental Contracts Manager**, where he was responsible for the technical and operational management of all Fraser Alexander Tailings' mining environmental rehabilitation work. He was responsible for all facets of project management, as well as implementation of rehabilitation and environmental strategies, by planning activities, organising physical, financial and human resources, delegating task responsibilities, leading people, controlling risks and providing technical support.

He conducted a significant amount of quantitative and qualitative ecological vegetation monitoring during his employment period with the company. Such monitoring mainly included environmentally rehabilitated mining areas in the open-cast coal-, gold-, platinum- and chrome mining industries situated in the Free State, Gauteng, Mpumalanga, North-West and Limpopo Provinces. He was involved with analysis, processing and interpretation of environmental monitoring data and compilation of high quality technical/scientific environmental monitoring reports for clients. He was subsequently further involved with providing adequate ecological management and maintenance recommendations for rehabilitated areas. He also provided technical/scientific environmental rehabilitation support to mining clients, with regards to sufficient soil preparation and amelioration, grassing processes, as well as grass species mixtures and ratios.

He was then employed by **Enviroworks Consulting from January 2016 to the end of May 2017 as a Senior Ecological Specialist** where he was responsible for virtually all Ecological, Aquatic and Wetland specialist assessments and reporting related to Environmental Impact Assessment (EIA) and Basic Assessment (BA) projects. He also completed numerous EIA and BA projects as the main project Environmental Assessment Practitioner (EAP).

Rikus then subsequently established the company EcoFocus Consulting (Pty) Ltd, which provides high quality professional environmental and ecological specialist services and solutions to the industrial development-, construction-, mining-, agricultural and other sectors, at the end of May 2017.

He possesses significant qualifications, vast knowledge, skills and practical experience in the specialist field of ecological and environmental management. This, coupled with his disciplined, determined and goal-driven mind-set, as well as his high level of personal standards, ensure high quality, timely and outcomes based outputs and service delivery relating to any project.

### **Ecological Specialist Report Completion**

#### **2018**

- Completion of a specialist ecological assessment and report for the proposed 30 ha Portion 30 of the Farm Lilyvale no 2313 Residential development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 20 ha Luckhoff Waste Facility development project in Luckhoff, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 19 ha agricultural development project outside Griekwastad, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 135 ha agricultural development project outside Griekwastad, Northern Cape Province.
- Completion of five specialist ecological assessments and reports for the proposed Dawid Kruiper Local Municipality Residential Developments around Upington, Northern Cape Province.
- Completion of a specialist Grazing and Erosion Management Plan for the Retiefs Nek no 123, outside Bethlehem, Free State Province.
- Completion of a specialist Grazing and Erosion Management Plan for the Dekselfontein no 317, outside Bethlehem, Free State Province.



- Completion of a specialist ecological assessment and report for a proposed 12 ha agricultural development project in Petrusville, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 270 ha industrial park development project in Secunda, Mpumalanga Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 233 ha industrial park development project in Sabie, Mpumalanga Province.
- Completion of a specialist ecological assessment and report for the proposed Dawid Kruiper Local Municipality Residential Development around Upington, Northern Cape Province.
- Completion of two specialist ecological assessments and reports for two proposed 15 ha agricultural development projects outside Hopetown, Northern Cape Province.
- Completion of two Alien Invasive Species Management Plans for two proposed 15 ha agricultural development projects outside Hopetown, Northern Cape Province.
- Completion of a Protected Species Relocation Management Plan for a proposed 15 ha agricultural development project outside Hopetown, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 169 ha industrial park development project in Sabie, Mpumalanga Province.
- Completion of a specialist Grazing and Erosion Management Plan for the Farm Barnea no 231, outside Bethlehem, Free State Province.
- Compilation of a GIS locality, vegetation and sensitivity map for the proposed 7.13 ha Karoo Hoogland Local Municipality Residential Development project in Sutherland, Northern Cape Province.
- Completion of a specialist Erosion and Rehabilitation Monitoring Report for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Drafting of an official Environmental Policy for Teambo Facilitators (Pty) Ltd in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 11.6 ha COGHSTA NEMA Section 24G residential development project in Douglas, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 3.26 ha COGHSTA NEMA Section 24G residential development project in Strydenburg, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 25.6 ha COGHSTA NEMA Section 24G residential development project in Loxton, Northern Cape Province.
- Completion of a specialist biodiversity offset feasibility assessment and report for a proposed 805 ha agricultural development project outside Douglas, Northern Cape Province.

- Completion of a specialist ecological assessment and report for a proposed 2 ha Rouxville Waste Water Treatment Works expansion project in Rouxville, Free State Province.
- Completion of a specialist ecological exemption letter for the proposed Vanderkloof Tegnologie Chicken Abattoir development project in Petrusville, Northern Cape Province.
- Completion of a Protected Species Relocation Management Plan for a proposed 2 ha Rouxville Waste Water Treatment Works expansion project in Rouxville, Free State Province.
- Completion of a Rehabilitation and Alien Invasive Species Management Plan for a proposed 2 ha Rouxville Waste Water Treatment Works expansion project in Rouxville, Free State Province.
- Completion of a Stormwater and Erosion Management Plan for a proposed 2 ha Rouxville Waste Water Treatment Works expansion project in Rouxville, Free State Province.
- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed 2 ha Rouxville Waste Water Treatment Works expansion project in Rouxville, Free State Province.
- Completion of a revised specialist ecological assessment and report for the proposed 17.7 ha Luckhoff Waste Facility development project in Luckhoff, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 113.3 ha Dawn Valley Estate development project in Bloemfontein, Free State Province.
- Completion of a specialist Grazing and Invasive Species Management Plan for the Farm Klipfontein no 71, outside Lindley, Free State Province.
- Completion of a specialist Grazing and Invasive Species Management Plan for the Farm Meyerskop no 1801, outside Bethlehem, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 2.24 ha Mullerstuine Cemetery development project in Vanderbijlpark, Gauteng Province.
- Completion of a specialist Species of Special Concern & Alien Invasive Species assessment and report for all the Transnet Engineering Group 5 Free State Province Sites.
- Completion of a specialist Species of Special Concern & Alien Invasive Species assessment and report for all the Transnet Engineering Group 6 Northern Cape Province Sites.
- Completion of a specialist ecological assessment and report for a proposed 80 ha agricultural development project outside Ritchie, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for a proposed 545 ha residential development project in Leandra, Mpumalanga Province.
- Completion of a specialist ecological assessment and report for a proposed 2 ha Chimoio Game Camp Lodging development project outside Kroonstad, Free State Province.

- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed 2 ha Chimoio Game Camp Lodging development project outside Kroonstad, Free State Province.
- Completion of a Protected Species Relocation Management Plan for a proposed 80 ha agricultural development project outside Ritchie, Northern Cape Province.
- Completion of a Rehabilitation and Alien Invasive Species Management Plan for a proposed 80 ha agricultural development project outside Ritchie, Northern Cape Province.
- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed 80 ha agricultural development project outside Ritchie, Northern Cape Province.

## 2017

- Completion of a specialist ecological assessment and report for the proposed Phethogo Consulting filling station development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 132 kV CENTLEC Harvard transmission line development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed Zevenfontein filling station development project in Johannesburg, Gauteng Province.
- Completion of a specialist ecological assessment and report for the proposed Olifantsvlei Curro School development project in Johannesburg, Gauteng Province.
- Completion of a specialist ecological assessment and report for the proposed 23 ha Babereki Agricultural development project in Hartswater, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed Eikenhof Curro School development project in Johannesburg, Gauteng Province.
- Completion of a specialist ecological assessment and report for the proposed 40 ha CoGHSTA residential development project in Norvalspont, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed 9 ha CoGHSTA residential development project in Williston, Northern Cape Province.
- Completion of a specialist ecological and wetland assessment and report for the proposed 100 ha Musgrave residential and commercial development in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 15 ha BVI Engineering Waste Water Treatment Works and associated pipeline development project in Britstown, Northern Cape Province.
- Completion of a specialist ecological walkthrough assessment and report and relocation of provincially protected species *Eucomis autumnalis* individuals for the Bloemwater 33.6 km Brandkop Bypass water supply pipeline in Bloemfontein, Free State Province.

- Completion and execution of a Species Relocation and Re-establishment Plan for 13 individuals of the provincially protected species, *Eucomis autumnalis*, for the Bloemwater 33.6 km Brandkop Bypass water supply pipeline in Bloemfontein, Free State Province.
- Completion of a specialist ecological exemption letter for the proposed Siloam Crematorium development in Welkom, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 0.5 ha Vuna Afrika Agricultural feedmill pelletizing plant development project outside Wepener, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 0.4 ha Olympic Flame filling station development project in Welkom, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 3000 ha agricultural development project outside Douglas, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed 46.04 ha University, Industrial and Residential development project in Orania, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 482 ha Piet Louw NEMA Section 24G agricultural development project outside Hopetown, Northern Cape Province.
- Completion of a specialist ecological assessment for a proposed 500 ha Wolfkop Valley Estate development project outside Bloemfontein, Free State Cape Province.
- Completion of a specialist Erosion and Rehabilitation Management Plan for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 4.1 ha Plot 31 Spitskop Residential development project in Bloemfontein, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 26.8 ha Oxidation Dam development project in Orania, Northern Cape Province.

## 2016

- Completion of a specialist ecological assessment and report for the proposed 3 km Olifantshoek Bulk Water Supply and reservoir development project in Olifantshoek, Northern Cape Province.
- Completion of two specialist ecological and wetland assessments and reports for the proposed respective 16 ha and 6 ha N8 highway gravel quarries development project near Ladybrand, Free State Province.

- Completion of a specialist ecological assessment and report for the proposed 100 ha De Eelt vineyard development project near Prieska, Northern Cape Province.
- Completion of two specialist ecological and wetland assessments and reports for the Lafarge cement production facility and quarry, respectively near Lichtenburg, North-West Province.
- Completion of a specialist ecological assessment and report for the proposed 12 ha Nooitgedacht Retirement Estate development project near Nelspruit, Mpumalanga Province.
- Completion of a specialist ecological assessment and report for the proposed 42 km Ventersburg Bulk Water Supply and reservoir development project between Ventersburg and Riebeeckstad, Free State Province.