

# **NEMA Section 24G Ecological Assessment Report**

**Vergenoeg Residential Development,  
Wesselsbron, Free State Province**

**June 2019**

**Compiled for:**



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## Table of Content

1.	Introduction.....	1
2.	Date and Season of Ecological Site Assessment.....	2
3.	Assessment Rational .....	3
4.	Objectives of the Assessment .....	4
5.	Methodology .....	5
6.	Study Area .....	11
6.1.	Climate.....	13
6.2.	Geology and Soils .....	13
6.3.	Vegetation and Conservation Status .....	13
7.	Assumptions, Uncertainties and Gaps in Knowledge .....	17
8.	Results and Discussion .....	19
8.1.	Current Existing Vegetation and Site Condition.....	20
8.2.	Water Pans .....	22
8.3.	Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS).....	26
8.4.	Species List for the Assessment Area .....	30
8.5.	Ecological Site Sensitivity Map .....	31
9.	Ecological Impact Assessment .....	33
9.1.	Ecological Impacts Caused by the Project .....	34
9.2.	Cumulative Impacts.....	40
9.3.	Risk Ratings of Potential Impacts .....	41
10.	Summary and Conclusion.....	60
11.	References .....	63
12.	Details of the Specialist.....	64

## Executive Summary

The project applicant, Nala Local Municipality historically cleared an approximate 19.9 ha portion of natural vegetation for the development of low cost housing in the informal residential settlement of Monyakeng situated directly adjacent north of the town of Wesselsbron, Free State Province. The necessary underground services such as water reticulation, sewage and electrical infrastructure was also installed at the time but no formal aboveground housing infrastructure development took place.

No Environmental Authorisation or Water Use License was however initially obtained for the development from the relevant competent authorities, as is legally required. The applicant has subsequently become aware of this legal transgression and has opted to follow a Section 24G rectification process in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA) in order to rectify the situation.

NSVT Consultants was appointed by the applicant as the independent Environmental Practitioner (EAP) to conduct the NEMA Section 24G rectification process.

Due to the nature of the impacts of the project on the local vegetation, an Ecological Assessment is required. This is required in order to determine the potential historic presence of ecologically significant species, habitats or wetland areas within the project footprint. Proposed mitigation and management measures must also be recommended in order to attempt to reduce/alleviate the identified impacts.

EcoFocus Consulting was therefore subsequently appointed by the EAP as the independent ecological specialist to conduct the required Ecological study for the project. This report constitutes the NEMA Section 24G Ecological Assessment. A site visit/assessment for the development footprint area was conducted on 11 June 2019. This date forms part of the winter season. It must therefore be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals.

## Methodology

The development area and surrounding areas were 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.

Ecological 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 development area were also assessed and rated.

### **Study Area**

The assessment area consists of a single footprint area of approximately 19.9 ha in size. The assessment area falls within three properties namely the Remaining Extent and Portion 2 of the Farm Herman no 236 (SG 21 Digit Code: F0410000000023600000 & F0410000000023600002) as well as the Remaining Extent of the Farm Monyakeng no 380 (SG 21 Digit Code: F0410000000038000000). The area is located in the informal residential settlement of Monyakeng situated directly adjacent north of the town of Wesselsbron. The town forms part of the Nala Local Municipality which in turn, forms part of the Lejweleputswa District Municipality, Free State Province. Access to the assessment area is obtained via the R 505 provincial road and subsequent dirt roads inside the informal residential settlement from the west.

According to SANBI (2006- ), the entire assessment area falls within the Western Free State Clay Grassland vegetation type (Gh 9) which is characterised by flat bottomlands supporting dry species-poor grassland. A high number of salt pans are embedded within these areas and the grasslands are often substituted by dwarf karroid shrublands in disturbed areas surrounding such pans. This vegetation type is classified as least threatened (SANBI, 2006- ).

The pans present in the areas surrounding the assessment area, form part of the Highveld Salt Pans vegetation type (AZi 10). This vegetation type constitutes depressions in the plateau landscape containing temporary and, less frequently also permanent water bodies. Central portions of such pans are often seasonally inundated and sometimes with floating macrophyte vegetation. Vegetation cover also often develops on drained bottoms of such pans and form typical concentric zonation patterns. Open to sparse grassy dwarf shrubland may develop around the edges of such

pans especially when subjected to high grazing pressures. Threats on such pans are ever increasing in the form of agriculture, road building, mining and urbanisation (SANBI, 2006- ).

The entire assessment area is categorised as an Ecological Support Area two (ESA 2) 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 entire assessment area is approximately 19.9 ha in size and is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation. It is also completely isolated to the south by the existing Monyakeng settlement.

The localised surrounding areas to the west, north and east of the assessment area are undeveloped but in a moderately disturbed and degraded state presumably mainly caused by significant continued long term overgrazing by livestock from the local community over time. These surrounding undeveloped areas constitute a low growing grass 'carpet' with a distinct lack of well represented grass tufting but a well-represented dwarf karroid shrub layer. These areas are therefore not necessarily viewed as being reminiscent of the natural climactic state of the relevant Western Free State Clay Grassland vegetation type (Gh 9). It is recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.

It is reasonably assumed that the historic ecology of the assessment area prior to the informal residential transformation, would have been comparable to that of these surrounding undeveloped areas as they are situated directly adjacent to the assessment area. No significant change in soil structure or landscape topography or features is evident between the assessment area and these surrounding undeveloped areas which further supports this assumption.

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

undeveloped areas. It is therefore also not anticipated that the assessment area would necessarily have housed large numbers of any species of conservational significance. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species, if deemed necessary by the competent authority. This will ensure that no provincially protected or significant species have potentially been omitted.

Due to the presence of the existing informal residential settlement along with the significant continued long term overgrazing by livestock from the local community, the surrounding undeveloped areas are subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the surrounding undeveloped areas for breeding and/or persistence purposes or for that matter, would necessarily have historically utilised the assessment area.

Two significantly sized water pans are present approximately 140 m north-east and 760 m north-west of the assessment area respectively. A broad surface water drainage area which feeds into the first pan to the north-east, is also situated directly adjacent east of the assessment area. It flows from the south in a northerly direction past the assessment area towards the pan. The flow regime of the drainage area has seemingly however not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan.

The assessment area is not located close to the defined surface water drainage area towards the second pan to the north-west and therefore does not necessarily impact as directly on the second pan as opposed to the first pan discussed earlier. Although this is the case, the assessment area still forms part of the broader surface water catchment and drainage towards this second pan.

The two pans are in a relatively healthy and stable ecological condition and support important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes. They therefore scored relatively high PES and EIS values and are viewed as being of relatively high conservational significance for habitat preservation and ecological functionality persistence in support of the

surrounding ecosystem, broader vegetation type, ESA 2 as well as ecological services and – functionality.

The assessment area and localised surrounding undeveloped areas would probably have scored a moderate historic EIS value as these areas could have been viewed as being ecologically important and sensitive on local scale mainly due to the close proximity to the first pan and its associated surface water drainage area as well as the area forming part of the broader surface water catchment and drainage towards the second pan. The assessment area would therefore have been viewed as being of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as water catchment and drainage areas towards the two pans.

It is the opinion of the specialist that the virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the assessment area is deemed irreversible. Sufficient ecological restoration of the relevant vegetation type and its functionality within the assessment area, will therefore not be feasible and will not necessarily improve the current ecological integrity or -functionality of the water drainage area or pans.

It is further the opinion of the specialist that the potentially significant long term ecological impact associated with the impeding and contamination of the water drainage area's flow regime and subsequent decrease in ecological integrity and -functionality of the two pans, can be suitably reduced and mitigated to within acceptable residual levels. In order to preserve the remaining integrity and functionality of the first pan, it is recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan. It is also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans.

The project should therefore be considered by the competent authority for Environmental Authorisation and approval. The 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, licenses and permits must also be obtained prior to any commencement.

## List of Figures

Figure 1: Locality map illustrating the assessment area (see A3 sized map in the Appendices).....	12
Figure 2: Vegetation map illustrating the vegetation type associated with the assessment area (see A3 sized map in the Appendices).....	15
Figure 3: Conservation status map illustrating the conservation status associated with the assessment area (see A3 sized map in the Appendices).....	16
Figure 4: Image illustrating the completely transformed landscape of the assessment area.....	19
Figure 5: Two images illustrating the moderately disturbed and degraded state of the localised surrounding undeveloped areas to the west, north and east of the assessment area.....	21
Figure 6: Image illustrating the presence of the significantly sized water pan to the north-east of the assessment area as well as the significantly disturbed and degraded area surrounding the pan's edge .....	22
Figure 7: Image illustrating the broad surface water drainage area which is situated directly adjacent east of the assessment area and feeds into the pan .....	23
Figure 8: Image illustrating the presence of the second significantly sized water pan to the north-west of the assessment area .....	24
Figure 9: Image illustrating the presence of the long term sewage water leak in the north-western portion of the assessment area which has resulted in the confined area surrounding the leak, possessing certain wetland features due to these anthropogenic causes .....	25
Figure 10: Site sensitivity map illustrating the delineation of the first water pan situated north-east of the assessment area as well as its associated surface water drainage area which flows from the south in a northerly direction past the assessment area, towards the pan (see A3 sized map in the Appendices) .....	32



## List of Tables

Table 1: Criteria for PES calculations .....	6
Table 2: Criteria for EIS calculations .....	7
Table 3: Scale utilised for the evaluation of the Environmental Risk Ratings.....	7
Table 4: Scale used for the evaluation of the Environmental Significance Ratings.....	9
Table 5: PES table for the water pans surrounding the assessment area (0-5 indicates decrease in significance) .....	26
Table 6: EIS table for the water pans surrounding the assessment area (0-5 indicates increase in significance) .....	29
Table 7: Species list for the assessment area (Legally declared invasive species highlighted in pink).	30
Table 8: Environmental Risk and Significance Ratings.....	42

## Abbreviations

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
DAFF	Department of Agriculture Forestry and Fisheries
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
MAP	Mean Annual Precipitation
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 Environmental Assessment Practitioner (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, Nala Local Municipality historically cleared an approximate 19.9 ha portion of natural vegetation for the development of low cost housing in the informal residential settlement of Monyakeng situated directly adjacent north of the town of Wesselsbron, Free State Province. The necessary underground services such as water reticulation, sewage and electrical infrastructure was also installed at the time but no formal aboveground housing infrastructure development took place.

No Environmental Authorisation or Water Use License was however initially obtained for the development from the relevant competent authorities, as is legally required. The applicant has subsequently become aware of this legal transgression and has opted to follow a Section 24G rectification process in accordance with the National Environmental Management Act (Act 107 of 1998) (NEMA) in order to rectify the situation.

NSVT Consultants was appointed by the applicant as the independent Environmental Practitioner (EAP) to conduct the NEMA Section 24G rectification process.

Due to the nature of the impacts of the project on the local vegetation, an Ecological Assessment is required. This is required in order to determine the potential historic presence of ecologically significant species, habitats or wetland areas within the project footprint. Proposed mitigation and management measures must also be recommended in order to attempt to reduce/alleviate the identified impacts.

EcoFocus Consulting was therefore subsequently appointed by the EAP as the independent ecological specialist to conduct the required Ecological study for the project. This report constitutes the NEMA Section 24G Ecological Assessment.

Preliminary preparations conducted prior to the ecological 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 assessment area.

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

A site visit/assessment for the development footprint area was conducted on 11 June 2019. This date forms part of the winter season. It must therefore be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals.

### 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 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:

- Describe the assumed historic vegetation on the assessment area and identify and list conservationally significant faunal and floral species which could likely have been encountered on the project area.
  - List any nationally and/or provincially protected and/or Red Data Listed species.
- Determine and discuss the Present Ecological State (PES) and extent of degradation and/or transformation of the vegetation on the assessment area and surrounding areas. Also indicate the assumed historic Ecological Importance and Sensitivity (EIS) of the assessment area in order to provide an indication of the assumed historic conservational significance of the assessment area.
- Identify and delineate all watercourses/wetland areas potentially present on and in close proximity to the assessment area.
- Identify, evaluate and rate the ecological impacts of the development on the natural environment.
- Provide recommendations on mitigation and management measures in order to attempt to reduce/alleviate these identified ecological impacts.
- Provide recommendations on the suitability of the proposed development area.
- A digital report (this document) as well as the digital KML files of any identified ecologically sensitive/conservationally significant areas will be provided to the applicant.

## 5. Methodology

- The development area and surrounding areas were 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 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 project area and surrounding undeveloped areas 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.

Ecological impacts of the 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 ecological impacts. Each ecological 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 ecological impact, the Significance Score of each 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 ecological impact as per Table 4 below. The Environmental Significance rating process is completed for all identified 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 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 19.9 ha in size. The assessment area falls within three properties namely the Remaining Extent and Portion 2 of the Farm Herman no 236 (SG 21 Digit Code: F0410000000023600000 & F0410000000023600002) as well as the Remaining Extent of the Farm Monyakeng no 380 (SG 21 Digit Code: F0410000000038000000). The area is located in the informal residential settlement of Monyakeng situated directly adjacent north of the town of Wesselsbron. The town forms part of the Nala Local Municipality which in turn, forms part of the Lejweleputswa District Municipality, Free State Province. Access to the assessment area is obtained via the R 505 provincial road and subsequent dirt roads inside the informal residential settlement from the west.

See locality map below.





Figure 1: Locality map illustrating the assessment area (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 452 mm ([www.climate-data.org](http://www.climate-data.org)). The highest average monthly temperature is approximately 22.7°C in the summer months while the lowest average monthly temperature is approximately 8.9°C during the winter. Maximum monthly temperatures can reach up to 29.8°C in the summer months and dip to as low as 0°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:

Deposits of sandstone, mudstone and shale (Volksrust formation, Ecca Group) underlie extensive areas of flat to undulating plains interrupted by dolerite sills in some places. Few if any rivers or streams drain away from these plains and virtually all water drains into pans scattered throughout the area. The area mainly constitutes dry, clayey duplex soils typical of land types Da, Db and Dc.

### 6.3. Vegetation and Conservation Status

According to SANBI (2006- ), the entire assessment area falls within the Western Free State Clay Grassland vegetation type (Gh 9) which is characterised by flat bottomlands supporting dry species-poor grassland. A high number of salt pans are embedded within these areas and the grasslands are often substituted by dwarf karroid shrublands in disturbed areas surrounding such pans. This vegetation type is classified as least threatened (SANBI, 2006- ).

The pans present in the areas surrounding the assessment area, form part of the Highveld Salt Pans vegetation type (AZi 10). This vegetation type constitutes depressions in the plateau landscape containing temporary and, less frequently also permanent water bodies. Central portions of such pans are often seasonally inundated and sometimes with floating macrophyte vegetation. Vegetation cover also often develops on drained bottoms of such pans and form typical concentric zonation patterns. Open to sparse grassy dwarf shrubland may develop around the edges of such pans especially when subjected to high grazing pressures. Threats on such pans are ever increasing in the form of agriculture, road building, mining and urbanisation (SANBI, 2006- ).

The entire assessment area is categorised as an Ecological Support Area two (ESA 2) 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).

'Ground truthing' has however indicated that the entire assessment area is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation.

See vegetation and conservation status maps below.

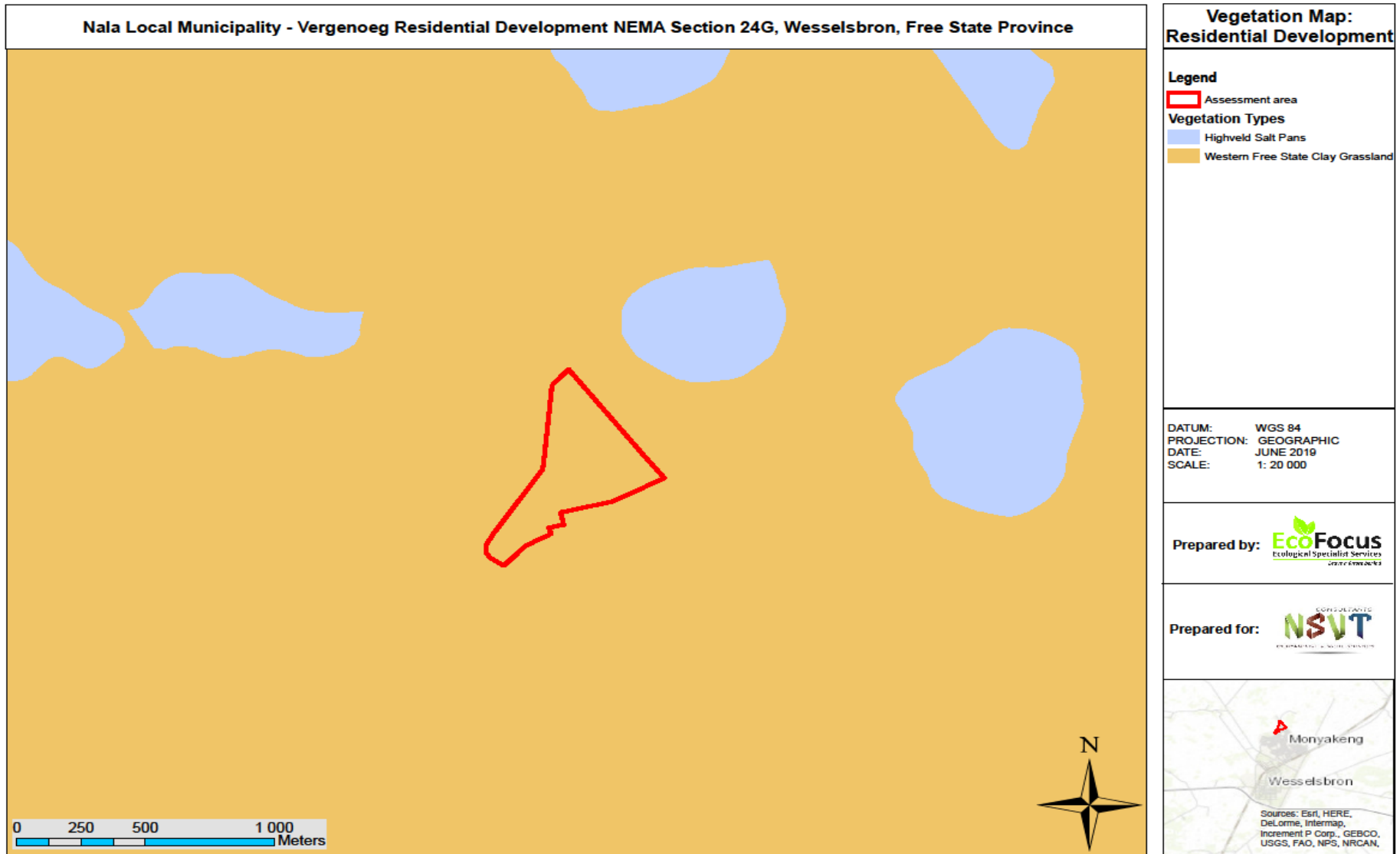


Figure 2: Vegetation map illustrating the vegetation type associated with the assessment area (see A3 sized map in the Appendices)

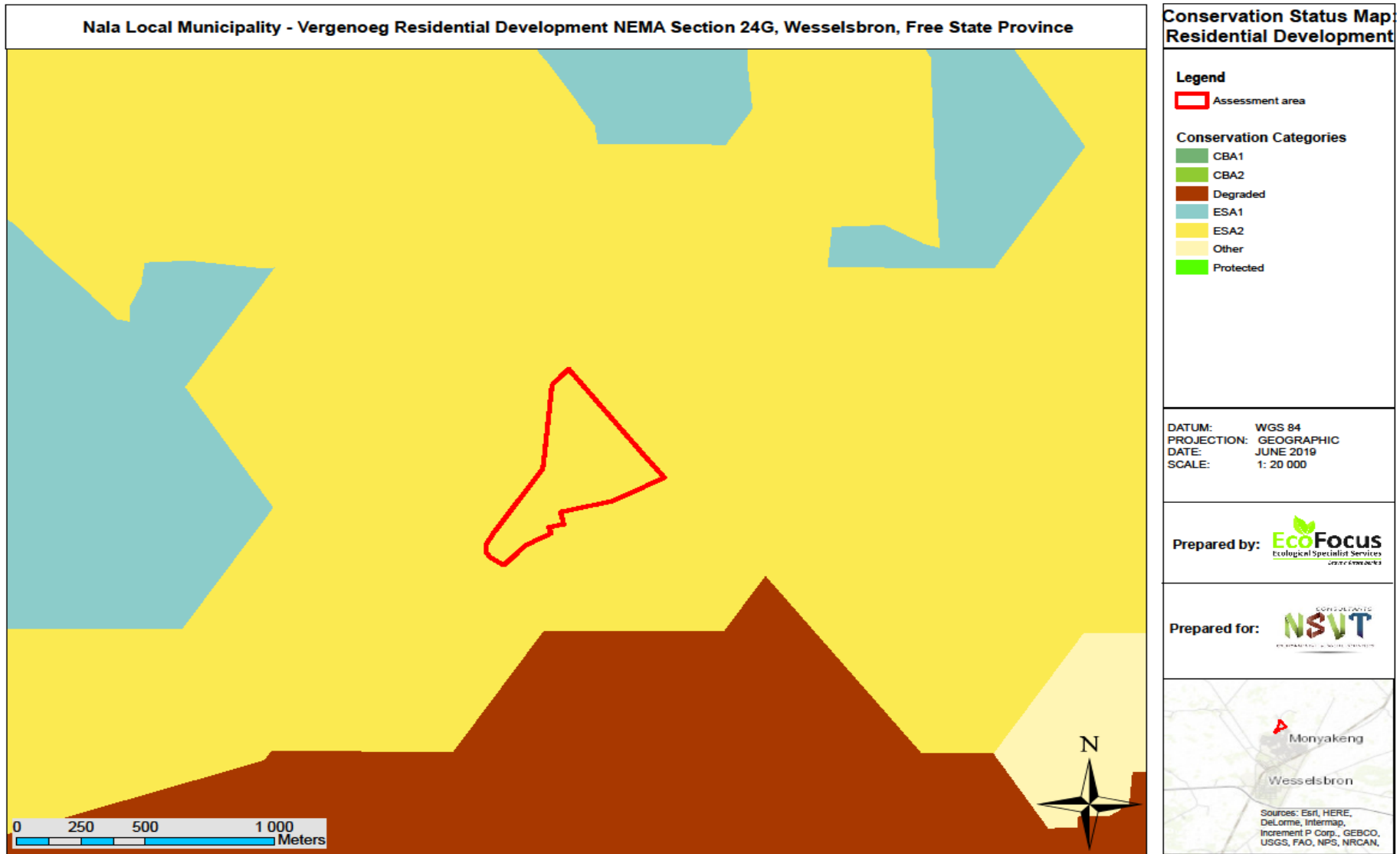


Figure 3: Conservation status map illustrating the conservation status associated with the assessment area (see A3 sized map in the Appendices)

## 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 project area as provided by the engineering design team is correct and will not be significantly deviated from as this was the only area assessed.
- the necessary environmental authorisations have been successfully obtained for the surrounding residential developments.
- the public, local communities, relevant organs of state and landowners will receive a sufficient reoccurring opportunity to participate and comment on the project during the NEMA Section 24G rectification 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 NEMA Section 24G rectification process is a retrospective assessment process and the specialists are limited to assessing the anticipated historic condition of the project area based on the surrounding natural, undeveloped areas.
- 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.
- it is reasonably assumed that the historic ecology of the assessment area prior to the informal residential transformation, would have been comparable to that of the surrounding undeveloped areas as they are situated directly adjacent to the assessment area. No significant change in soil structure or landscape topography or features is evident between the assessment area and these surrounding undeveloped areas which further supports this assumption.

Given that the NEMA Section 24G process involves prediction, the uncertainty factor forms part of the assessment process. Two types of uncertainty are associated with the 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. 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 Section 24G rectification 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 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 retrospectively after the original surface vegetation had already been transformed by the development. The anticipated historic condition of the project site is therefore purely based on the vegetation of the surrounding natural, undeveloped areas.
- The potential of future similar developments in the same geographical area which could lead to cumulative impacts cannot be meaningfully anticipated. It is however expected that further residential development is likely to take place in the broader area.

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

The entire assessment area constitutes an existing dense informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation. It is also completely isolated to the south by the existing Monyakeng settlement.

The remaining sparse vegetation present on most of the informal residential properties within the assessment area mainly consists of exotic and/or legally declared alien invasive species which serve ornamental, consumption and/or shading purposes. Such species include *Prunus persica* (exotic), *Ligustrum lucidum* (Category 3), *Schinus molle* (exotic), *Melia azedarach* (Category 3), *Ricinus communis* (Category 2), *Prosopis* sp. (Category 1b), *Kiggelaria africana* (indigenous) & *Canna indica* (Category 1b). No Red Data Listed-, provincially- or nationally protected species or any other species of conservational significance were found to be present within the assessment area.



**Figure 4: Image illustrating the completely transformed landscape of the assessment area**

The localised surrounding areas to the west, north and east of the assessment area are undeveloped but in a moderately disturbed and degraded state presumably mainly caused by significant continued long term overgrazing by livestock from the local community over time. It is reasonably assumed that the historic ecology of the assessment area prior to the informal residential transformation, would have been comparable to that of these surrounding undeveloped areas as they are situated directly adjacent to the assessment area. No significant change in soil structure or landscape topography or features is evident between the assessment area and these surrounding undeveloped areas which further supports this assumption. These surrounding undeveloped areas will therefore be discussed as reference areas representing the assumed historic ecology of the entire assessment area.

### 8.1. Current Existing Vegetation and Site Condition

The surrounding undeveloped areas constitute slightly sloping low growing grassland with a well-represented dwarf karroid shrub layer. This grassland has been subjected to significant continued long term overgrazing by livestock from the local community over time. The grass layer is therefore mainly covered by a low growing grass 'carpet' and a distinct lack of well represented grass tufting is evident. These surrounding undeveloped areas are therefore not necessarily viewed as being reminiscent of the natural climactic state of the relevant Western Free State Clay Grassland vegetation type (Gh 9).

The grass layer is mainly dominated by the species *Eragrostis chloromelas*, *E lehmanniana* as well as the Increaser 2 type pioneer species *Aristida congesta* & *Chloris virgata* (Van Oudtshoorn, 2004) which reiterates the severity level of overgrazing. Other grass species also found to be present but to a significantly lesser extent include *Cynodon dactylon*, *Themeda triandra*, *Eragrostis superba*, *E obtusa*, *Digitaria eriantha* & *Cymbopogon pospischilii*.

Dwarf karroid shrub species found to be well represented include no *Ruschia spinosa*, *R hamata*, *Lycium horridum*, *L cinerum*, *Osteospermum leptolobum*, *Pteronia sp.* & *Felicia spp.* A single individual of the legally declared invasive species *Austrocyllindropuntia subulata* (Category 1b) was also found to be present.

Forb species found to be well represented include *Bulbine narcissifolia*, *Berkheya onopordifolia*, *Moraea pallida*, *Oxalis depressa* & *Nidorella microcephala*. Other forb species also found to be present but to a significantly lesser extent include *Lessertia pauciflora*, *Gazania krebsiana*, *Colchicum melanthoides*, *Geigeria ornativa*, *Nananthus vittatus* & *Hypertelis sp.*

No Red Data Listed-, provincially- or nationally protected species or any other species of conservational significance were found to be present within the surrounding undeveloped areas to the west, north and east of the assessment area. It is therefore also not anticipated that the assessment area would necessarily have housed large numbers of any species of conservational significance. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species, if deemed necessary by the



competent authority. This will ensure that no provincially protected or significant species have potentially been omitted.

Due to the presence of the existing informal residential settlement along with the significant continued long term overgrazing by livestock from the local community, the surrounding undeveloped areas are subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the surrounding undeveloped areas for breeding and/or persistence purposes or for that matter, would necessarily have historically utilised the assessment area.

It is recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.



**Figure 5: Two images illustrating the moderately disturbed and degraded state of the localised surrounding undeveloped areas to the west, north and east of the assessment area**



## 8.2. Water Pans

A significantly sized water pan is present approximately 140 m north-east of the assessment area. At the time of the site assessment, the pan was fully inundated and dominated by aquatic vegetation. It is however anticipated that the pan could potentially dry up during the latter stages of the winter season. The pan is in a relatively healthy and stable ecological condition and supports an important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes.

As is the case with the surrounding undeveloped grassland, the area surrounding the pan's edge has also been significantly disturbed and degraded presumably mainly by significant continued long term overgrazing by livestock from the local community over time. These pan edge areas mainly constitute dwarf karroid shrubland with very little, if any grass remaining.



**Figure 6: Image illustrating the presence of the significantly sized water pan to the north-east of the assessment area as well as the significantly disturbed and degraded area surrounding the pan's edge**

A broad surface water drainage area which feeds into the pan, is situated directly adjacent east of the assessment area. It flows from the south in a northerly direction past the assessment area, towards the pan. This drainage area also constitutes moderately disturbed and degraded grassland presumably caused by overgrazing activities and is mainly dominated by the grass species *Eragrostis plana*. The flow regime of the drainage area has seemingly however not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan.



**Figure 7: Image illustrating the broad surface water drainage area which is situated directly adjacent east of the assessment area and feeds into the pan**

The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the assessment area is deemed irreversible. Sufficient ecological restoration of the relevant vegetation type and its functionality within the assessment area, will therefore not be feasible and will not necessarily improve the current ecological integrity or -functionality of the water drainage area or pan.

In order to preserve the remaining integrity and functionality of the pan, it is however recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan. It is also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the pan.



A second significantly sized water pan also in relatively healthy and stable ecological condition and supporting an important aquatic habitat, is present approximately 760 m north-west of the assessment area. The assessment area is however not located close to the defined surface water drainage area towards the second pan to the north-west and therefore does not necessarily impact as directly on the second pan as opposed to the first pan discussed earlier. Although this is the case, the assessment area still forms part of the broader surface water catchment and drainage towards this second pan. It is therefore again recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back towards the second pan.



**Figure 8: Image illustrating the presence of the second significantly sized water pan to the north-west of the assessment area**

A long term sewage water leak present in the north-western portion of the assessment area has resulted in the confined area surrounding the leak, possessing certain wetland features. However, as this is purely as a result of anthropogenic causes, the area is not viewed as a true natural wetland and subsequently carries no increased conservational significance relative to any surrounding areas.



**Figure 9: Image illustrating the presence of the long term sewage water leak in the north-western portion of the assessment area which has resulted in the confined area surrounding the leak, possessing certain wetland features due to these anthropogenic causes**

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

The Present Ecological State (PES) of the assessment area is classified as Class F as it is critically/extremely modified. Transformation has reached a critical level and the ecosystem has been completely modified with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is deemed irreversible.

The Present Ecological State (PES) of the surrounding water pans is classified as Class B as they are largely natural. A small change in natural habitats and biota may have taken place due to the presence of the existing surrounding informal residential settlements as well as significant continued long term overgrazing by livestock from the local community over time, but the ecosystem functionality has remained essentially unchanged.

**Table 5: PES table for the water pans surrounding the assessment area (0-5 indicates decrease in significance)**

Criteria & Attributes	Relevance	Score	Reasoning
Flow Modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime, volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota.	4	<p>A broad surface water drainage area which feeds into the first pan to the north-east, is situated directly adjacent east of the assessment area. It flows from the south in a northerly direction past the assessment area towards the pan. This drainage area also constitutes a moderately disturbed and degraded grassland presumably caused by overgrazing activities and is mainly dominated by the grass species <i>Eragrostis plana</i>. The flow regime of the drainage area has seemingly however not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan.</p> <p>In order to preserve the remaining integrity and functionality of the pan, it is however recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan.</p>
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River	4	<p>The assessment area is not located close to the defined surface water drainage area towards the second pan to the north-west and therefore does not necessarily impact as directly on the second pan as opposed to the first pan discussed earlier.</p>



	diversions or drainage.		Although this is the case, the assessment area still forms part of the broader surface water catchment and drainage towards this second pan.
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduce or changes wetland habitat directly or through changes in inundation patterns.	4	It is therefore also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans.
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	4	<p>At the time of the site assessment, the two pans were fully inundated and dominated by aquatic vegetation. It is however anticipated that the pans could potentially dry up during the latter stages of the winter season. They are both in a relatively healthy and stable ecological condition and support important aquatic habitats which are subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes.</p> <p>As is the case with the surrounding undeveloped grassland, the area surrounding the first pan's edge has however also been significantly disturbed and degraded presumably mainly by significant continued long term overgrazing by livestock from the local community over time. These pan edge areas mainly constitute dwarf karroid shrubland with very little, if any grass remaining.</p> <p>It is recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.</p>

Indigenous Vegetation Removal	Direct destruction of habitat through any human activities affecting wildlife habitat and flow attenuation functions, organic matter inputs and increase potential for erosion.	5	<p>The two pans are located approximately 140 m and 760 m away from the assessment area respectively. No direct removal or destruction of aquatic vegetation/habitat has therefore taken place.</p> <p>It is also recommended that no further future development may take place to the east of the assessment area towards the water drainage area or first pan.</p> <p>As is the case with the surrounding undeveloped grassland, the area surrounding the first pan's edge has however also been significantly disturbed and degraded presumably mainly by significant continued long term overgrazing by livestock from the local community over time. These pan edge areas mainly constitute dwarf karroid shrubland with very little, if any grass remaining.</p> <p>It is therefore recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.</p>
Alien Fauna	Presence of alien fauna affecting faunal community structure.	5	No significant alien invasive species establishments were found to be present within or around the two pans.
Over utilisation of biota	Over gazing, over fishing etc.	3	<p>As is the case with the surrounding undeveloped grassland, the area surrounding the first pan's edge has also been significantly disturbed and degraded presumably mainly by significant continued long term overgrazing by livestock from the local community over time. These pan edge areas mainly constitute dwarf karroid shrubland with very little, if any grass remaining.</p> <p>It is therefore recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.</p>
<b>Total</b>		<b>29/35</b>	
<b>Class</b>		<b>B</b>	

The historic Ecological Importance and Sensitivity (EIS) of the assessment area and localised surrounding undeveloped areas to the west, north and east would probably have been classified as Class C (moderate) as they could have been viewed as being ecologically important and sensitive on local scale mainly due to the close proximity to the first pan and its associated surface water drainage area as well as the area forming part of the broader surface water catchment and drainage towards the second pan. Biodiversity is however still relatively ubiquitous. The assessment area would therefore have been viewed as being of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as water catchment and drainage areas towards the two pans.

The Ecological Importance and Sensitivity (EIS) of the surrounding water pans is classified as Class B (high) as they are viewed as being ecologically important and sensitive on provincial scale mainly due to their locally unique and important aquatic habitat attributes and role with regards to broader ecological services and –functionality. Biodiversity is locally relatively unique and may be sensitive to habitat modifications. The surrounding water pans are therefore viewed as being of relatively high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as ecological services and –functionality.

**Table 6: EIS table for the water pans surrounding the assessment area (0-5 indicates increase in significance)**

<b>Determinant</b>	<b>Score</b>
1. Rare and Endangered Species	2
2. Population of Unique Species	3
3. Species/taxon Richness	3
4. Diversity of Habitat Types or Features	3
5. Migration route/breeding and feeding site for wetland species.	4
6. Sensitivity to changes in Natural Hydrological Regime.	4
7. Sensitivity to water quality changes.	4
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	3
9. Protected Status	3
10. Ecological Integrity	4
<b>Total</b>	<b>33/50</b>
<b>Overall Ecological Sensitivity and Importance</b>	<b>B</b>



#### 8.4. Species List for the Assessment Area

**Table 7: Species list for the assessment area (Legally declared invasive species highlighted in pink)**

Graminoids	Forbs	Shrubs & trees
<i>Aristida congesta</i>	<i>Berkheya onopordifolia,</i>	<i>Austrocyllindropuntia subulata</i>
<i>Chloris virgata</i>	<i>Bulbine narcissifolia,</i>	<i>Felicia spp.</i>
<i>Cymbopogon pospischilii</i>	<i>Canna indica</i>	<i>Kiggelaria africana</i>
<i>Cynodon dactylon</i>	<i>Colchicum melanthoides</i>	<i>Ligustrum lucidum</i>
<i>Digitaria eriantha</i>	<i>Gazania krebsiana</i>	<i>Lycium cinereum</i>
<i>Eragrostis chloromelas</i>	<i>Geigeria ornativa</i>	<i>Lycium horridum</i>
<i>Eragrostis lehmanniana,</i>	<i>Hypertelis sp.</i>	<i>Melia azedarach</i>
<i>Eragrostis obtusa</i>	<i>Lessertia pauciflora</i>	<i>Osteospermum leptolobum</i>
<i>Eragrostis plana</i>	<i>Moraea pallida</i>	<i>Prosopis sp.</i>
<i>Eragrostis superba</i>	<i>Nananthus vittatus</i>	<i>Prunus persica</i>
<i>Themeda triandra</i>	<i>Nidorella microcephala</i>	<i>Pteronia sp.</i>
-	<i>Oxalis depressa</i>	<i>Ricinus communis</i>
-	-	<i>Ruschia hamata</i>
-	-	<i>Ruschia spinosa</i>
-	-	<i>Schinus molle</i>

### **8.5. Ecological Site Sensitivity Map**

The site sensitivity map below illustrates the delineation of the first water pan situated north-east of the assessment area as well as its associated surface water drainage area which flows from the south in a northerly direction past the assessment area, towards the pan.



Figure 10: Site sensitivity map illustrating the delineation of the first water pan situated north-east of the assessment area as well as its associated surface water drainage area which flows from the south in a northerly direction past the assessment area, towards the pan (see A3 sized map in the Appendices)

## 9. Ecological Impact Assessment

The following section identifies the ecological impacts (both positive and negative) caused by the project on the surrounding environment.

Once the 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 ecological impacts caused by the development and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The accepted Mitigation Hierarchy for assessing and managing potential ecological impacts as embedded within the principles of Section 2 of NEMA, implies that significant ecological impacts must firstly be avoided/prevented. If this is not entirely possible, ecological impacts must be minimised and then rehabilitated or restored. The ecological impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implementation of effective management strategies for them.

### 9.1. Ecological Impacts Caused by the Project

#### **Transformation of terrestrial vegetation on the assessment area associated with the Western Free State Clay Grassland vegetation type (Gh 9)**

The entire assessment area is approximately 19.9 ha in size and is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation.

The localised surrounding areas to the west, north and east of the assessment area are undeveloped but in a moderately disturbed and degraded state presumably mainly caused by significant continued long term overgrazing by livestock from the local community over time. These surrounding undeveloped areas are therefore not necessarily viewed as being reminiscent of the natural climactic state of the relevant Western Free State Clay Grassland vegetation type (Gh 9). This vegetation type is classified as least threatened (SANBI, 2006- ).

The significance of this impact was medium-high.

Mitigation measures to reduce impacts are recommended under heading 9.3.

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

The assessment area is approximately 19.9 ha in size and is categorised as an Ecological Support Area two (ESA 2) in accordance with the Free State Provincial Spatial Biodiversity Plan 2017, which sets out biodiversity priority areas in the province. The entire assessment area is however occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation.

A broad surface water drainage area which feeds into the first pan to the north-east, is situated directly adjacent east of the assessment area. It flows from the south in a northerly direction past the assessment area towards the pan. The flow regime of the drainage area has seemingly however not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan.

The assessment area is not located close to the defined surface water drainage area towards the second pan to the north-west and therefore does not necessarily impact as directly on the second



pan as opposed to the first pan discussed earlier. Although this is the case, the assessment area still forms part of the broader surface water catchment and drainage towards this second pan.

The two pans are in a relatively healthy and stable ecological condition and support important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes. They therefore scored relatively high PES and EIS values and are viewed as being of relatively high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as ecological services and – functionality.

The assessment area and localised surrounding undeveloped areas to the west, north and east would probably have scored a moderate historic EIS value as these areas could have been viewed as being ecologically important and sensitive on local scale mainly due to the close proximity to the first pan and its associated surface water drainage area as well as the area forming part of the broader surface water catchment and drainage towards the second pan. The assessment area would therefore have been viewed as being of moderate conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as water catchment and drainage areas towards the two pans.

The significance of this impact was medium.

Mitigation measures to reduce impacts are recommended under heading 9.3.

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

The entire assessment area is approximately 19.9 ha in size and is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation.

No Red Data Listed-, provincially- or nationally protected species or any other species of conservational significance were found to be present within the assessment area or the surrounding undeveloped areas to the west, north and east of the assessment area. It is therefore also not

anticipated that the assessment area would necessarily have housed large numbers of any species of conservational significance. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals.

Due to the presence of the existing informal residential settlement along with the significant continued long term overgrazing by livestock from the local community, the surrounding undeveloped areas are subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the surrounding undeveloped areas for breeding and/or persistence purposes or for that matter, would necessarily have historically utilised the assessment area.

The two pans are in a relatively healthy and stable ecological condition and support important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes.

The significance of this impact was low.

Mitigation measures to reduce impacts are recommended under heading 9.3.

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

The entire assessment area is approximately 19.9 ha in size and is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation.

The remaining sparse vegetation present on most of the informal residential properties within the assessment area mainly consists of exotic and/or legally declared alien invasive species which serve ornamental, consumption and/or shading purposes. Such species include *Prunus persica* (exotic), *Ligustrum lucidum* (Category 3), *Schinus molle* (exotic), *Melia azedarach* (Category 3), *Ricinus communis* (Category 2), *Prosopis sp.* (Category 1b) & *Canna indica* (Category 1b). All of these individuals will in fact be removed during the new construction phase which will prove to be beneficial to the environment.

No significant alien invasive species establishments were found to be present within or around the assessment area or two pans. Merely a single individual of the legally declared invasive species



*Austrocyllindropuntia subulata* (Category 1b) was also found to be present within the undeveloped areas surrounding the assessment area.

The assessment area and surrounding areas could however potentially be prone to significant alien invasive species establishment due to surface disturbances and vegetation clearance caused by new construction activities.

The significance of this impact was low but could potentially increase during the new construction and operational phases.

Mitigation measures to reduce impacts are recommended under heading 9.3.

#### **Surface material erosion**

No significant soil erosion is currently evident within or around the assessment area. The assessment area is slightly sloping and forms part of the broader surface water catchment and drainage towards the two pans. The area could therefore be prone to slight soil erosion due to the loosening of materials and vegetation clearance caused by new construction activities.

The significance of this impact was low but could potentially increase during the new construction and operational phases.

Mitigation measures to reduce impacts are recommended under heading 9.3.

#### **Dust generation and emissions**

No signs of significant dust pollution is currently evident within or around the assessment area or two pans. The new construction activities associated with the development could however potentially result in significant fugitive dust emissions due to vegetation clearance and movement of machinery and equipment. Generated dust could spread into- and contaminate the surrounding undeveloped areas and two pans.

The significance of this impact was low but could potentially increase to medium during the new construction phase.

Mitigation measures to reduce impacts are recommended under heading 9.3.

### **Impeding and contamination of the water drainage area's flow regime and subsequent decrease in ecological integrity and -functionality of the two pans**

A broad surface water drainage area which feeds into the first pan to the north-east, is situated directly adjacent east of the assessment area. It flows from the south in a northerly direction past the assessment area towards the pan. The flow regime of the drainage area has seemingly however not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan.

The assessment area is however not located close to the defined surface water drainage area towards the second pan to the north-west and therefore does not necessarily impact as directly on the second pan as opposed to the first pan discussed earlier. Although this is the case, the assessment area still forms part of the broader surface water catchment and drainage towards this second pan.

The two pans are in a relatively healthy and stable ecological condition and support important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes. They therefore scored relatively high PES and EIS values and are viewed as being of relatively high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as ecological services and – functionality.

The activities associated with the new construction phase could potentially impede on the flow regime of the surface water catchment and water drainage area towards the two pans, due to artificial obstruction of natural surface water flow during rainfall events. New construction activities could also result in contamination of natural surface water flow into the surface water catchment and water drainage area towards the two pans due to surface material erosion and hydrocarbon or other chemical spills by machinery and equipment.

Continued contamination of natural surface water flow towards the two pans during the operational phase, once the residential settlement has been established, could also occur due to continued residential activities. This could result in gradual deterioration of the ecological integrity and - functionality of the two pans over time.

The significance of this impact was low but could potentially increase to medium-high during the new construction and operational phases.

Mitigation measures to reduce impacts are recommended under heading 9.3.

#### **Contamination of the surrounding natural areas through domestic garbage/waste dumping**

Disposing of domestic garbage/waste into the undeveloped surrounding areas and water drainage area, by occupants of the existing informal residential settlement currently takes place extensively. Such anthropogenic activities tend to cause an ecological 'edge effect' which negatively impacts on the urban/rural interface area and the integrity of the surrounding undeveloped areas through expanding the negative anthropogenic footprint.

The new development could result in significant continued disposal and dumping of domestic waste/garbage into the surrounding undeveloped areas and water drainage area outside the residential footprint which could have a significant negative impact on the ecological integrity and - functionality of the two pans over time.

The significance of this impact was medium but could potentially increase during the new construction and operational phases.

Mitigation measures to reduce impacts are recommended under heading 9.3.

## 9.2. Cumulative Impacts

The entire assessment area is approximately 19.9 ha in size and is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation. It is also completely isolated to the south by the existing Monyakeng settlement.

The localised surrounding areas to the west, north and east of the assessment area are undeveloped but in a moderately disturbed and degraded state presumably mainly caused by significant continued long term overgrazing by livestock from the local community over time. These surrounding undeveloped areas are therefore not necessarily viewed as being reminiscent of the natural climactic state of the relevant Western Free State Clay Grassland vegetation type (Gh 9).

The extensive presence of existing agricultural developments within the local and broader area, have resulted in significant cumulative loss of natural vegetation as well as faunal and avifaunal habitat associated with the relevant vegetation type. Due to the small relative size of the assessment area, the development has not necessarily added any significant additional residual cumulative ecological impact to the transformation of the broader region and relevant vegetation type.

The flow regime of the water drainage area has seemingly not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan. The two pans are in a relatively healthy and stable ecological condition and support important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes. The development has therefore not necessarily added any significant additional residual cumulative ecological impact to the transformation of the Ecological Support Area two (ESA 2).

The potentially significant long term ecological impact associated with the impeding and contamination of the water drainage area's flow regime which could cumulatively add to decreased ecological integrity and -functionality of the two pans, can be suitably reduced and mitigated to within acceptable residual levels.

To conclude, it is not anticipated that the proposed development would pose any significant potential long term residual cumulative ecological impacts within the broader region due to the already extensively transformed nature of the area.

### 9.3. Risk Ratings of Potential Impacts

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

Table 8: 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 Western Free State Clay Grassland vegetation type (Gh 9)</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>	Irreversible (5)	-
<b>Probability of Impact Occurrence</b>	Definite (5)	-
<b>Cumulative Impact Rating prior to mitigation</b>	Medium	-
<b>Environmental Significance Score and Rating prior to mitigation</b>	Medium-High (85)	-

**Mitigation Measures to be implemented**

The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the assessment area is deemed irreversible. Sufficient ecological restoration of the relevant vegetation type and its functionality within the assessment area, will therefore not be feasible and will not necessarily improve the current ecological integrity or -functionality of the water drainage area or pans.

In order to preserve the remaining integrity and functionality of the first pan, it is recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan.

The new project construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.

No site construction camps to be established within the surrounding undeveloped areas to the west, north and east outside the project footprint area. If site camps are required outside the project area, they must be set up in the adjacently located existing informal residential settlement to the south so as not to impact on the surrounding natural vegetation.

Adequately cordon off the construction area and ensure that no construction activities, machinery or equipment operate or impact within the undeveloped surrounding areas outside the cordoned off area.

Adequate operational procedures for machinery and equipment must be developed in order to strictly govern movement of machinery only within project footprint area and ensure environmentally responsible construction practices and activities.



	<p>Existing roads and farm tracks in close proximity to the project area must be used during construction. No new roads or tracks to be constructed or implemented outside the footprint areas of the development.</p> <p>Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction.</p> <p>It is recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (48)	-
	<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>	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 (72)	-
<b>Mitigation Measures to be implemented</b>	<p>The virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the assessment area is deemed irreversible. Sufficient ecological restoration of the relevant vegetation type and its functionality within the assessment area, will therefore not be feasible and will not necessarily improve the current ecological integrity or -functionality of the water drainage area or pans.</p> <p>In order to preserve the remaining integrity and functionality of the first pan, it is recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan.</p> <p>It is also recommended that development and layout designs for the new residential development should include</p>	

adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans

The new project construction footprint must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.

No site construction camps to be established within the surrounding undeveloped areas to the west, north and east outside the project footprint area. If site camps are required outside the project area, they must be set up in the adjacently located existing informal residential settlement to the south so as not to impact on the surrounding natural vegetation.

Adequately cordon off the construction area and ensure that no construction activities, machinery or equipment operate or impact within the undeveloped surrounding areas outside the cordoned off area.

Adequate operational procedures for machinery and equipment must be developed in order to strictly govern movement of machinery only within project footprint area and ensure environmentally responsible construction practices and activities.

Existing roads and farm tracks in close proximity to the project area must be used during construction. No new roads or tracks to be constructed or implemented outside the footprint areas of the development.

	<p>Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction.</p> <p>It is recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (48)	-
	<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 associated with the assessment area</b>	
<b>Magnitude of Negative or Positive Impact</b>	Very low (2)	-
<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>	Irreversible (5)	-
<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)	-
<b>Mitigation Measures to be implemented</b>	<p>It is recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species, if deemed necessary by the competent authority. This will ensure that no provincially protected or significant species have potentially been omitted.</p> <p>In order to preserve the remaining integrity and functionality of the first pan, it is recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan.</p> <p>It is also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans.</p> <p>It is recommended that sufficient grazing management plans and practices must be implemented for livestock of</p>	

	the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (30)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Terrestrial alien invasive species establishment</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>	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>All Category 1b and 2 alien invasive species individuals currently within the project area, must be actively eradicated 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>If any Category 2 species are however to be left in situ, alien invasive species permits must be obtained from the competent authority in accordance with the above-mentioned regulations.</p> <p>Category 3 species may remain in prescribed areas and provinces but further planting, propagation and/or trade is prohibited.</p> <p>Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan during the construction and operational phases. Such a management plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction in order 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 (22)	-
	<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>	Very low (2)	-
<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>	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>Adequate stormwater and erosion management measures must be implemented for the entire assessment area during the new construction and operational phases. 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>It is also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans.</p> <p>Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction in order to prevent significant erosion from occurring.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (11)	-

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	Assessment Area	No go alternative
<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>	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 (56)	-
<b>Mitigation Measures to be implemented</b>	Implement suitable dust management and prevention measures during the construction phase.	

	<p>Construction areas and –roads to be sufficiently wetted down during the new construction phase in order to prevent significant fugitive dust emissions.</p> <p>Adequate operational procedures for machinery and equipment must be developed in order to strictly govern and restrict movement of machinery in order to avoid unnecessary fugitive dust emissions and ensure environmentally responsible construction practices and activities.</p> <p>Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction in order to prevent significant dust emissions from occurring.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (22)	-

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	Assessment Area	No go alternative
<b>Identified Environmental Impact</b>	<b>Impeding and contamination of the water drainage area's flow regime and subsequent decrease in ecological integrity and -functionality of the two pans</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>	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 (88)	-
<b>Mitigation Measures to be implemented</b>	A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation in accordance with the National Water Act (Act 36 of 1998).	

In order to preserve the remaining integrity and functionality of the first pan, it is recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan.

Adequate stormwater and erosion management measures must be implemented for the entire assessment area during the new construction and operational phases. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation in order to prevent any significant contamination from occurring.

It is also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans.

The storm water management measures incorporated into the development and layout designs should be inspected on a biannual basis (twice a year). They must be adequately maintained to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans in order to maintain their ecological functionality and integrity over time.

If hydrocarbons or other chemicals are to be stored on site during the new construction phase, the storage areas must be situated as far away as practicably possible from the water drainage area and two pans. It is recommended that hydrocarbons be stored in the south-western portion of the assessment area.

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.

Adequate hydrocarbon and other chemical storage, handling, usage and spillage clean-up procedures must be developed and all relevant construction personnel must be sufficient trained on- and apply these procedures during the entire new construction phase.

A comprehensive pan health assessment and aquatic bio-monitoring assessment must be conducted prior to commencement of the construction phase. This information will serve as baseline pan 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.

A comprehensive pan health assessment and aquatic bio-monitoring assessment must then be conducted on a minimum annual basis in order to ensure that the ecological functionality and integrity of the pan is maintained over time. This information must then be compared to the baseline data collected during the initial assessment prior to the commencement of the construction phase. Such an assessment must be conducted by a suitably qualified and experienced ecologist.

Water samples of the pan must be collected directly downstream of the assessment 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.

Water samples of the pan must then be collected directly downstream of the proposed project area on a minimum annual basis. The quality of these samples must be chemically and biologically analysed by an accredited laboratory and compared to the baseline data collected during the initial assessment prior to the commencement of the construction phase.

If any reduction in wetland health or chemical and biological water quality is determined due to the project, the



	competent authority must immediately be notified and the necessary steps must be followed by the applicant to locate and remediate the source of contamination/health reduction as soon as practicably possible.	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (34)	-
	<b>Assessment Area</b>	<b>No go alternative</b>
<b>Identified Environmental Impact</b>	<b>Contamination of the surrounding natural areas through domestic garbage/waste dumping</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>	Moderate (3)	-
<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 active community waste clean-up initiative will have to be implemented in order to attempt to remove and adequately dispose of existing domestic garbage/waste scattered throughout the surrounding undeveloped areas to the west, north and east.</p> <p>Continued domestic garbage/waste dumping within the surrounding undeveloped areas must be prevented. Implement adequate waste collection and disposal management measures for the new residential development in order to prevent undesired disposal/dumping into the surrounding undeveloped areas.</p> <p>Provide training interventions for the local community on the correct management of domestic waste/garbage within the existing residential settlement.</p>	
<b>Cumulative Impact Rating after mitigation implementation</b>	Low	-
<b>Environmental Significance Score and Rating after mitigation implementation</b>	Low (11)	-

## 10. Summary and Conclusion

The entire assessment area is approximately 19.9 ha in size and is occupied by an existing informal residential settlement which has virtually completely transformed all previously existing natural surface vegetation. It is also completely isolated to the south by the existing Monyakeng settlement.

The localised surrounding areas to the west, north and east of the assessment area are undeveloped but in a moderately disturbed and degraded state presumably mainly caused by significant continued long term overgrazing by livestock from the local community over time. These surrounding undeveloped areas constitute a low growing grass 'carpet' with a distinct lack of well represented grass tufting but a well-represented dwarf karroid shrub layer. These areas are therefore not necessarily viewed as being reminiscent of the natural climactic state of the relevant Western Free State Clay Grassland vegetation type (Gh 9). It is recommended that sufficient grazing management plans and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding undeveloped areas and attempt to improve/restore the ecological condition over time.

It is reasonably assumed that the historic ecology of the assessment area prior to the informal residential transformation, would have been comparable to that of these surrounding undeveloped areas as they are situated directly adjacent to the assessment area. No significant change in soil structure or landscape topography or features is evident between the assessment area and these surrounding undeveloped areas which further supports this assumption.

No Red Data Listed-, provincially- or nationally protected species or any other species of conservational significance were found to be present within the assessment area or the surrounding undeveloped areas. It is therefore also not anticipated that the assessment area would necessarily have housed large numbers of any species of conservational significance. It must however be noted that the time of the assessment was not necessarily favourable for successful identification of all plant species individuals. It is therefore recommended that an additional ecological walkthrough be conducted prior to commencement of the project during the flowering period of underground bulbous plant species, if deemed necessary by the competent authority. This will ensure that no provincially protected or significant species have potentially been omitted.

Due to the presence of the existing informal residential settlement along with the significant continued long term overgrazing by livestock from the local community, the surrounding

undeveloped areas are subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any large or conservationally significant faunal species would utilise the surrounding undeveloped areas for breeding and/or persistence purposes or for that matter, would necessarily have historically utilised the assessment area.

Two significantly sized water pans are present approximately 140 m north-east and 760 m north-west of the assessment area respectively. A broad surface water drainage area which feeds into the first pan to the north-east, is also situated directly adjacent east of the assessment area. It flows from the south in a northerly direction past the assessment area towards the pan. The flow regime of the drainage area has seemingly however not been significantly compromised by the transformation within the assessment area and it seems that surface water runoff from the broader area during rainfall events, is still adequately getting channelled through the drainage area towards the pan.

The assessment area is not located close to the defined surface water drainage area towards the second pan to the north-west and therefore does not necessarily impact as directly on the second pan as opposed to the first pan discussed earlier. Although this is the case, the assessment area still forms part of the broader surface water catchment and drainage towards this second pan.

The two pans are in a relatively healthy and stable ecological condition and support important aquatic habitat which is subsequently utilised by a wide variety of waterbirds, amphibian species and aquatic invertebrates for breeding, foraging and persistence purposes. They therefore scored relatively high PES and EIS values and are viewed as being of relatively high conservational significance for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as ecological services and – functionality.

The assessment area and localised surrounding undeveloped areas would probably have scored a moderate historic EIS value as these areas could have been viewed as being ecologically important and sensitive on local scale mainly due to the close proximity to the first pan and its associated surface water drainage area as well as the area forming part of the broader surface water catchment and drainage towards the second pan. The assessment area would therefore have been viewed as being of moderate conservational significance for habitat preservation and ecological functionality

persistence in support of the surrounding ecosystem, broader vegetation type, ESA 2 as well as water catchment and drainage areas towards the two pans.

It is the opinion of the specialist that the virtually complete loss and transformation of natural habitat, biota and basic ecosystem functionality within the assessment area is deemed irreversible. Sufficient ecological restoration of the relevant vegetation type and its functionality within the assessment area, will therefore not be feasible and will not necessarily improve the current ecological integrity or -functionality of the water drainage area or pans.

It is further the opinion of the specialist that the potentially significant long term ecological impact associated with the impeding and contamination of the water drainage area's flow regime and subsequent decrease in ecological integrity and -functionality of the two pans, can be suitably reduced and mitigated to within acceptable residual levels. In order to preserve the remaining integrity and functionality of the first pan, it is recommended that no further future development may take place to the east of the assessment area towards the water drainage area or pan. It is also recommended that development and layout designs for the new residential development should include adequate storm water management measures to ensure that sufficient volumes and quality of surface water runoff from the footprint area is still channelled back into the water drainage area towards the two pans.

The project should therefore be considered by the competent authority for Environmental Authorisation and approval. The 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, licenses and permits must also be obtained prior to any commencement.

## 11. References

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## Abbreviated Curriculum Vitae

### Qualifications

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  - 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**

#### **2019**

- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed Kopanong Local Municipality Bridge Upgrading development project in Philippolis, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 4.9 ha Royal Vision Developments Gravel Quarry development project outside Kroonstad, Free State Province.
- Completion of a specialist ecological assessment and report for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 53 ha Arborlane Estates (Pty) Ltd agricultural development project outside Augrabies, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 42.7 ha Arborlane Estates (Pty) Ltd NEMA Section 24G agricultural development project outside Augrabies, Northern Cape Province.
- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed 53 ha Arborlane Estates (Pty) Ltd agricultural development project outside Augrabies, Northern Cape Province.

- Completion of a specialist ecological assessment and report for a proposed 20.2 km Water Pipeline Development from Lindley to Arlington, Free State Province.
- Completion of a specialist watercourse delineation and report for a proposed 5.36 ha Filling Station and Shopping Centre Development project in Thaba Nchu, Free State Province.
- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed 20.2 km Water Pipeline Development from Lindley to Arlington, Free State Province.
- Completion of a specialist Grazing and Invasive Species Management Plan for the Farm Driefontein no 274, outside Ficksburg, Free State Province.
- Completion of a Water Use License Application (WULA) Risk Assessment for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Completion of a Rehabilitation and Alien Invasive Species Management Plan for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Completion of a Protected Species Relocation Management Plan for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Completion of a GIS Master Layout Plan for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Completion of a specialist ecological assessment and report for a proposed 535 ha Farms Bultfontein & Folmink agricultural development project outside Prieska, Northern Cape Province.
- Completion of a specialist ecological assessment and report for the proposed 6.42 ha Phokwane Local Municipality Residential development project in Jan Kempdorp, Northern Cape Province.
- Completion of a Stormwater Management Plan for a proposed 2 ha Chimoio Game Camp Lodging development project outside Kroonstad, Free State Province.
- Completion of a GIS Master Layout Plan for a proposed 2 ha Chimoio Game Camp Lodging development project outside Kroonstad, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 13.8 ha Phokwane Local Municipality Cemetery expansion project in Jan Kempdorp, Northern Cape Province.

**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.
- Completion of a specialist Grazing Management Plan for the Farm Fairdale no 1048, outside Vrede, Free State Province.
- Completion of a specialist ecological assessment and report for the proposed 14.4 ha Frankfort Landfill Site expansion project in Frankfort, Free State 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.